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Self-efficacy and the predictors for NCLEX-RN® success for baccalaureate nursing students

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SELF-EFFICACY AND THE PREDICTORS FOR NCLEX-RN® SUCCESS FOR BACCALAUREATE NURSING STUDENTS

by

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ABSTRACT

Self-Efficacy and the Predictors for NCLEX-RN® Success for Baccalaureate Nursing Students

by

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The National Council Licensure Examination for Registered Nurses (NCLEX) is the examination that nursing graduates must pass to attain the title of registered nurse and practice professionally. Each year a substantial number of nursing graduates are unable to enter the nursing profession because of failure on the NCLEX. Failure on this examination is a concern, especially since this country desperately needs nurses. Currently, the United States (U.S.) is faced with a nursing shortage. This shortage significantly impacts the U.S. health care system and requires urgent attention so that the health care needs of the people in this country are met.

Ensuring success on the NCLEX is a complex role for nurse educators. It is vital that nurse educators attain knowledge about the predictors of NCLEX success so that they can design strategies and interventions to optimize student performance. Numerous studies are noted that examined the predictors for NCLEX success, reflecting great interest in this area. However, most investigated the academic predictors; few studies examined the nonacademic predictors. This study aimed to provide new knowledge to nurse educators to assist them to (a) identify interventions that will facilitate success on NCLEX, and (b) identify the strategic points for intervention during a nursing program.

This quantitative study used Albert Bandura's Social Learning Theory (Bandura, 1977) as the theoretical framework to guide it, and investigated the academic, nonacademic, and self-efficacy variables that influence NCLEX passage. Academic variables focused on pre-nursing scores/grades and nursing course grades, while the nonacademic variables focused on personal and environmental factors/stressors and self-efficacy expectations. Seventy-nine (79) universities in the U.S. with accredited baccalaureate nursing programs were contacted to distribute recruitment materials to students. Data was collected via an email survey using Survey Monkey.com© (SM) and was collected at one point, after the participant took the NCLEX for the first time and received results.

Logistic regression was the primary data analysis method used to identify the academic, nonacademic, and self-efficacy variables that influence NCLEX passage. A support vector machine (SVM) model was used as a secondary testing method. Correlation analysis using Pearson product-moment correlation coefficient was done to identify relationships existing among self-efficacy, academic, and nonacademic variables of NCLEX passage.

Logistic regression findings revealed that the variables of significance were the medical-surgical grade, home and family events and responsibilities, and self-efficacy expectations. The final adjusted model revealed that the variables of significance were the medical-surgical grade and self-efficacy expectations. The SVM model showed that the medical-surgical grade and the pharmacology grade were the variables that could best predict NCLEX outcomes. Correlation analysis revealed that all academic variables showed a positive correlation with self-efficacy expectations and negative correlations between the nonacademic variables and self-efficacy expectations.

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CHAPTER 1

INTRODUCTION

This introductory chapter provides information about the study and includes the following sections: (a) background and significance, (b) statement of the problem, (c) statement of the purpose, (d) variables, (e) operational definitions, and (f) the research questions.

Background and Significance of the Study

Nurses play a critical role in this nation's health care system and represent the largest occupation of all health care workers (Labor, Health and Human Services, Education & Related Agencies, 2006). Currently, this country is in the midst of a nursing shortage. This nursing shortage is projected to worsen and according to Nelson (2002), it is expected to reach a 20% deficit by the year 2020. This alarming statistic impacts the health care system in the U.S. and requires attention so that the health care needs of people residing in this country are met.

The literature identifies various factors that contribute to the nursing shortage. Some of these include: (a) a steep population growth, (b) an insufficient number of enrollments into nursing schools due in part to the shortage of nursing faculty, (c) an aging nursing workforce, and (d) the aging population and baby boomer generation (individuals born in the U.S. between the years of 1946 to 1964), who will require concerted health care services in the future (U.S. Census Bureau, 2006). Another factor that affects the number of nurses entering the health care profession each year is NCLEX outcomes. If a graduate fails the NCLEX, he or she is unable to enter the health care profession and practice as a registered nurse (RN).

The National Council of State Boards of Nursing (NCSBN) is the governing agency that administers the licensing examination to nursing graduates. According to the NCSBN, the number of U.S.-educated graduates who took the examination in 2008 for the first time was 129,121 (National Council of State Boards of Nursing, 2009). The percentage of graduates passing was approximately 87% (111,947) indicating that 13% (17,174) failed the NCLEX (National Council of State Boards of Nursing, 2009). Therefore, 17,174 potentially viable registered nurses were unable to enter the workforce in the U.S. during 2008 because they failed the NCLEX. In the year 2009, there were 134,708 first-time U.S. graduates who took the exam; approximately 119,108 (88%) passed and 15,600 (12%) failed (National Council of State Boards of Nursing, 2010).

With regard to the critical need to investigate the predictors of NCLEX outcomes, another crucial point is that the risk for failure is close to 50% if the NCLEX needs to be taken a second time. According to the National Council of State Boards of Nursing (2009), 29,264 graduates repeated the exam in 2008 and 46.7 % failed. In the year 2007, 26,411 graduates repeated the exam and 47.6 % failed (National Council of State Boards of Nursing, 2008). The numbers of repeat failures are especially distressing because of the U.S. nursing shortage. Therefore, the factors that affect the outcomes and the predictors of success and failure need to be identified so that interventions can be implemented to increase the NCLEX pass rate on first-time testing.

Steep Population Growth

The census count of people living in the U.S. is done every 10 years. In the most recent census from the year 2000, the total population was 281,421,905 (U.S. Census Bureau, 2004). By 2006, the U.S. population had reached the 300 million mark (U.S. Census

Bureau, 2006). Based on a population clock maintained by the U.S. Census Bureau (2008), the estimated population in 2008 was 304,537,292. This is predicted to increase by more than one third by the year 2050, so that the estimated population at that time will be 419,854,000 (U.S. Census Bureau, 2004). These statistics emphasize the need to implement strategies to increase the professional nursing workforce so that the health care needs of the people in the U.S. can be met.

Insufficient Number of Enrollments into Nursing Schools

The U.S. Bureau of Labor Statistics projects that more than one million new and replacement nurses will be needed by the year 2016 (Dohm & Schniper, 2007). Current enrollment numbers in nursing programs are not sufficient to meet the projected demands for nurses. Nursing programs not only need to admit the most qualified candidates but also need to improve the learning environment by implementing strategies that will adequately prepare a safe practitioner and facilitate success on NCLEX. According to Buerhaus, Potter, Staiger, and Auerbach (2009), the demand for nurses is expected to grow by 2% to 3% each year and the shortage of nurses could reach as high as 260,000 by the year 2025.

Although the National League for Nursing (2009) noted an increase in nursing enrollments for 2006 admissions, 2007 to 2008 data revealed that annual admissions dropped (National League for Nursing, 2010). Also noted was that more than 119,000 qualified applicants were turned away from prelicensure programs in 2008, due in part to the shortage of nursing faculty (National League for Nursing, 2010). Almost three quarters (71.4%) of the nursing schools responding to a 2007 American Association of Colleges of Nursing (AACN) survey pointed to faculty shortages as a reason for not accept-

ing all qualified applicants (AACN, 2007). Fang and Wisniewski (2008) note a national nurse faculty vacancy rate of 8.8% in the 2007 to 2008 academic year. Additionally, AACN (2005) notes that a national sampling of 395 schools showed that of 8,907 full-time positions, 717 (8.1%) were vacant. These faculty shortages affect the number of new nurses entering the workforce.

Aging Nursing Workforce

The aging workforce in nursing is also a concern and emphasizes the urgent need for increasing the number of nurses entering the nursing profession. According to findings from a 2004 national sample survey of RNs, the U.S. Department of Health and Human Resources (2006) reports that the average age of RNs climbed to 46.8 years, up from 45.2 in 2000. This report also indicates that 41% of RNs were 50 years of age or older (33% in 2000 and 25% in 1980) and that only 8% of RNs were under the age of 30, compared with 25 percent in 1980 (U.S. Department of Health and Human Resources, 2006).

Aging Population

The literature indicates that the current nursing shortage presents a serious concern with regard to the growing population and meeting the needs of the aging population in the U.S. (U.S. General Accounting Office, 2003). In fact, the U.S. General Accounting Office (2003) reports the expected number of Americans ages 65 and older is estimated to become 70 million by the year 2030 and 82 million by the year 2050. This in part is due to the aging baby boomer generation. Additionally, it is noted that the fastest growing segment within the older population is individuals 85 years of age and older; this population, estimated at about 4,000,000 in 2000, is expected to grow to 19 million by the year 2050 (Wiener & Tilly, 2002; U.S. General Accounting Office, 2003, p. 1).

The health care system in the U.S. is faced with a nursing shortage that is expected to worsen. The steep population growth coupled with the aging population exacerbates the need for adequate health care services in the U.S. The current nursing shortage is a critical one, and the data noted in the literature points to a continuing nursing shortage that will reach far into the future. No single strategy will solve this serious problem; many strategies need to be implemented. One strategy is to increase the number of nursing graduates entering the profession. In the year 2008 there were 17,174 nursing graduates unable to enter the profession because of failing the NCLEX; there were 15,600 in 2009. Therefore, it is vital that nurse educators be equipped to prepare nursing students to pass the NCLEX on their first attempt. Nurse educators need knowledge about the factors that influence success on NCLEX in order to achieve this goal.

Statement of the Problem

The need for nurses in the health care profession is a critical one. Implementing strategies to resolve the shortage is crucial in order to maintain the necessary health care resources for the clients that the profession currently serves and for those who will need services in the future. The literature addresses the concern of a nursing shortage, a faculty shortage, and the aging population, and identifies strategies for resolving nursing and faculty shortages (Buerhaus, Potter, Staiger, & Auerbach, 2009; Dohm & Schniper, 2007; Nelson, 2002; Wiener & Tilly, 2002). Regardless, an area that requires additional attention with regard to the nursing shortage is the causes of NCLEX failures. Failure on this examination significantly impacts the number of nurses entering the health care profession each year.

Failing the NCLEX causes negative personal, social, and economic consequences for the nursing graduate, nursing programs, and the health care profession. The literature supports that if the academic and nonacademic factors that indicate success can be identified, interventions can be implemented to prevent the negative consequences of failure (Seldomridge & DiBartolo, 2004). These researchers also indicate that early identification of at-risk students is important so that interventions can be implemented to improve the likelihood of initial NCLEX success.

For the nursing graduate who fails NCLEX, issues may include but are not limited to, decreased self-confidence in the ability to succeed and embarrassment. From an economic perspective, the graduate is unable to obtain employment in the career field and the opportunity to do so is delayed until the examination is passed. Furthermore, each time that the graduate applies to take the examination, a fee is required (Seldomridge & DeBartolo, 2004).

The nursing shortage crisis has also placed pressure on nursing programs to increase recruitment efforts and to increase the number of qualified graduates entering the profession. Entry into this profession can only occur if the qualified graduate passes the NCLEX. Furthermore, nursing faculty face pressure from boards of nursing and accrediting bodies to achieve a program outcome related to a specific percent pass rate on the NCLEX; this pass rate is required in order to maintain accreditation status. Nursing programs failing to meet standards run the risk of losing accreditation or being unable to attract qualified students (Beeson & Kissling, 2001).

The majority of the research studies that identified predictors related to success or failure on the NCLEX focus on academic predictors (Beeman & Waterhouse, 2001;

Crow, Handley, Morrison, & Shelton, 2004; Foti & DeYoung, 1991; Heupel, 1994; Mills, Becker, Sampel, & Pohlman, 1992; Stuenkel, 2006). Arathuzik and Aber (1998) indicate that identification of nonacademic factors could assist in understanding the performance of students and identify at-risk students so that strategies can be designed early to help students succeed on the NCLEX. Investigating the academic reasons why a graduate fails the NCLEX is vital for designing curriculum plans and strategies to prevent failure. However, the literature also indicates the need to investigate nonacademic reasons for failure (Arathuzik & Aber, 1998; Campbell & Dickson, 1996; Poorman & Webb, 2000). A nursing student may be successful in academics during the nursing program yet take the NCLEX and fail. This failure may be due to nonacademic situations, and if these can be identified, strategies can be established to assist and support the nursing student to prevent failure. There is a paucity of literature regarding nonacademic reasons. Therefore, to provide a holistic framework for educating and developing strategies to optimize success, nonacademic reasons need to be investigated.

Statement of Purpose

The nursing workforce in the U.S. needs to increase in order to ensure adequate and available health care services to meet the needs of Americans. A primary way to increase this workforce is through nursing education that will ensure graduating qualified individuals who will be successful on NCLEX. Therefore, focusing on methods to ensure educational and NCLEX success without lowering educational standards is a priority.

NCLEX outcomes bear a direct impact on the nursing shortage, resulting in limited health care resources for the clients served in the profession. Ensuring success on the NCLEX is one means of increasing the number of nurses in the workforce in the U.S.

Ensuring this success is a complex role for nurse educators because of the multidimensional elements that explain human and behavioral science. Therefore, the predictors of NCLEX outcomes need to be identified from more than simply one perspective. In other words, both academic and nonacademic predictors of NCLEX outcomes need to be investigated.

The purpose of this quantitative study was to identify the effect of selected academic, nonacademic, and self-efficacy variables on NCLEX outcomes. This study aimed to provide new knowledge to nursing science about the predictors for NCLEX outcomes. This knowledge will assist nurse educators to (a) identify interventions that will facilitate success on NCLEX, and (b) identify the strategic points for intervention during a nursing program. Nurse educators struggle with the problem of how to adequately prepare both a competent professional nurse and a successful NCLEX candidate. Studies done to identify the academic predictors to success on NCLEX reveal inconsistencies regarding these predictors and many studies indicate that nonacademic predictors need to be investigated. Studies investigating the nonacademic predictors of success on NCLEX are limited in number and therefore further research in this area needs to be done. Additionally, it is noted that what a nurse educator expects in terms of NCLEX outcomes does not always occur. For example, some graduates with high grades through the nursing program fail the NCLEX. Likewise, some graduates with low grades pass the NCLEX. Therefore, factors other than academic ones may be affecting NCLEX success.

Albert Bandura's Social Learning Theory (Bandura, 1977) and his concept of self-efficacy expectations was used as the theoretical framework that guided this study. Logistic regression was the primary data analysis method employed to identify the academic,

nonacademic, and self-efficacy variables that influenced NCLEX passage. A support vector machine (SVM) model was also used as a secondary testing method. Finally, correlation analysis using Pearson product-moment correlation coefficient was done to identify relationships existing among academic, nonacademic, and self-efficacy variables of NCLEX passage.

Variables

The dependent variable for this study was NCLEX outcomes (pass or fail). Pre-nursing course scores/grades, nursing course grades, personal and environmental factors/stressors, and self-efficacy expectations were the independent variables.

Pre-Nursing Scores/Grades

Specific to this variable, the Scholastic Aptitude Test (SAT) verbal score (or the SAT Reasoning Test critical reading score) and the college chemistry grade were studied.

Nursing Course Grades

The fundamentals of nursing grade, medical-surgical nursing grade, pharmacology grade, and leadership/management grade were investigated.

Personal and Environmental Factors/Stressors

Specific to this variable, out-of-school events/responsibilities and worry were investigated. Additionally, information was collected about the primary language spoken.

Self-Efficacy Expectations

The effect of self-efficacy on NCLEX passage was investigated in this study.

Operational Definitions

For the purpose of this study, the following operational definitions were used.

Academic Variables

Academic variables are factors that relate to the student's direct involvement with pre-entrance tests and courses taken at the college or university. These include pre-nursing course scores/grades and nursing course grades.

Performance Accomplishments

Performance accomplishments are a source of self-efficacy expectations and the successful achievements in the academic variables of this study.

Pre-Nursing Scores/Grades

The pre-nursing scores/grades are pre-entrance tests and courses taken before entrance into the nursing program. These included the Scholastic Aptitude Test (SAT) verbal score (or the SAT Reasoning Test critical writing score), and the college chemistry grade.

Nursing Course Grades

Nursing course grades are the grades achieved in selected nursing courses taken during the nursing program. These included grades in fundamentals of nursing, medical-surgical nursing, pharmacology, and leadership/management nursing.

Nonacademic Variables

Nonacademic variables include factors that do not directly relate to testing or courses taken at the college or university. These included personal and environmental factors/stressors and self-efficacy expectations.

Emotional Arousal

Emotional arousal is a source of self-efficacy expectations and is associated with the nonacademic variables of this study. Emotional arousal is defined as a mood state that

can be extreme indicating that the student is threatened by personal and environmental factors/stressors; or low, indicating that threats from personal and environmental factors/stressors are minimal.

Personal and Environmental Factors/Stressors

Personal and environmental factors/stressors include out-of-school events/responsibilities, worry, and primary language spoken.

Out-of-School Events/Responsibilities

Out-of-school events/responsibilities are the life events that a student experiences while in nursing school that takes time away from studying.

Worry

Worry is a concern that can be functional or dysfunctional. Dysfunctional worry is a concern that can disrupt daily functioning and interfere with the individual's ability to succeed. Functional worry does not disrupt daily functioning.

Primary language spoken

Primary language spoken is the principal language learned.

Self-Efficacy Expectations

Self-efficacy expectations are synonymous with the definition of self-efficacy and are an individual's belief about his or her self-confidence and ability to accomplish goals.

NCLEX Outcomes

NCLEX outcomes refer to the result received on the NCLEX and can be either pass or fail.

Research Questions

The following research questions were used to guide and implement this study.

1. Which academic or self-efficacy variables influence NCLEX passage for a student in a baccalaureate degree nursing program?
2. Which nonacademic or self-efficacy variables influence NCLEX passage for a student in a baccalaureate degree nursing program?
3. What relationships exist among self-efficacy, academic, and nonacademic variables of NCLEX passage for a student in a baccalaureate degree nursing program?

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

For the review of the literature, the researcher explored previous studies that relate to the research questions for this study. This chapter begins with a brief background of the NCLEX examination. Following is a discussion of previous studies located and includes the following sections: (a) demographics, (b) academic predictors, (c) nonacademic predictors, (d) variables of this study, (e) and summary.

Background of the NCLEX Examination

The NCLEX was first administered in July, 1982, when it replaced the State Board Test Pool Examination. Originally, the NCLEX results were reported as a numerical score. In 1988, the reporting procedure changed to a "pass" or "fail" instead of a numerical score. In 1994, although the reporting procedure remained the same, an additional change was implemented; the examination changed from a paper and pencil format to a computer adaptive format. To date, this format is still used for administering the NCLEX and reporting results.

The predictors for success on the NCLEX have been an area of interest for many years. Since the 1980s, multiple studies have explored these predictors. However, following modification of the NCLEX examination to a pass/fail score, fewer studies were published because of the difficulty with making correlations and predicting success with the pass/fail method of scoring (Seldomridge & DiBartolo, 2004; Waterhouse & Beeman, 2003). Seldomridge and DiBartolo (2004) and Waterhouse and Beeman (2003) noted that

the number of studies conducted continued to decrease when the testing format was changed to computer adaptive testing (CAT).

Demographics

The relationship of demographic predictors to NCLEX performance has been studied extensively. Some of these demographic variables have included age, gender, race/ethnicity, primary language spoken, income level, and educational level of parents. Other demographic predictors identified in studies include, but are not limited to, number of children, sibling rank, income level of siblings, enrollment status (part time or full time), responsibilities outside of school, and attendance in a commercial review course. Some conflicting findings are noted with regard to some of the demographic variables.

Some researchers showed that non-traditional college age students had a higher percent pass rate than traditional age students (Beeson & Kissling, 2001; Briscoe & Anema, 1999; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003). Others documented that age and sex are not significantly correlated with NCLEX success (Beeman & Waterhouse, 2001; McKinney, Small, O'Dell, & Coonrod, 1988; Roncoli, Lisanti, & Falcone, 2000). Mills, Becker, Sampel, and Pohlman, (1992) also found that gender did not correlate with NCLEX success and that age was unrelated to success. Furthermore, other researchers concurred that gender did not affect NCLEX success (Beeman & Waterhouse, 2001; Beeson & Kissling, 2001; Sayles, Shelton, & Powell, 2003). With regard to race, Endres (1997) noted that race is unrelated to NCLEX success, whereas Sayles, Shelton, and Powell (2003) reported that African Americans had a significantly higher failure rate than Caucasians. Likewise, Briscoe and Anemia (1999) found that international students and students from Africa had a higher failure rate.

As far as NCLEX success and participation in an NCLEX commercial review course, Waterhouse, Carroll, and Beeman (1993) found no correlation. Conversely, Crow, Handley, Morrison, and Shelton (2004) found a significant relationship between participation in a commercial review course and NCLEX success. Hence, no clear conclusion about the value of commercial review courses can be drawn.

Academic Predictors

Empirical studies have investigated a variety of academic predictors including Scholastic Aptitude Test (SAT) scores or American College Test Assessment (ACT) scores (Crow, Handley, Morrison, & Shelton, 2004; Foti & DeYoung, 1991; Roncoli, Lisanti, & Falcone, 2000), nursing GPA (Stuenkel, 2006; Azathuzik & Aber, 1998; Foti & DeYoung, 1991; Mills, Becker, Sampel, & Pohlman, 1992; Beeson & Kissling, 2001; Endres, 1997; Alexander, 1997), science course grades, and nursing course grades (Beeman & Waterhouse, 2001; Heupel, 1994; Stuenkel, 2006), Mosby AssessTest scores (Foti & DeYoung, 1991), National League for Nursing (NLN) Achievement Test scores (Crow, Handley, Morrison, & Shelton, 2004), and other standardized testing scores, such as the Health Education Systems, Inc. exams (Stuenkel, 2006; Nibert, Young, & Adamson, 2002).

Results identifying academic predictors have been conflicting. Some studies show that students who were successful on NCLEX had significantly higher science grades, SAT, and ACT scores as compared to students who failed (Alexander, 1997; Briscoe & Anema, 1999; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003; Roncoli, Lisanti, & Falcone, 2000). Other studies also demonstrated that entrance criteria, standardized exams, nursing theory grades, and GPA significantly relate to NCLEX success (Beeson &

Kissling, 2001; Campbell & Dickson, 1996; Crow, Handley, Morrison, & Shelton, 2004; Foti & deYoung, 1991; Krupa, Quick, & Whitney, 1988; McKinney, Small, O'Dell, & Coonrod, 1988; Quick, Krupa, & Whitney, 1985; Seldomridge & DiBartolo, 2004; Steunkel, 2006; Waterhouse & Beeman, 2003).

Campbell and Dickson, (1996) conducted a 10-year evaluation using integrative review and meta-analysis and noted that GPA averages and grades in science courses were the best predictors of NCLEX success. These researchers also reported that the least predictive of the variables were exam scores on SATs and nursing courses. The findings of Daley, Kirkpatrick, Frazier, Chung, and Moser (2003) differed from Campbell and Dickson. These data demonstrated that the final course grade for a senior-level medical-surgical nursing course and cumulative GPA were the only program variables consistent with success. Mills, Becker, Sampel, and Pohlman (1992) concurred and found that the best time for predicting NCLEX performance was at the end of the nursing program and that GPA average was the only significant predictor at this point in the program. Waterhouse, Carroll, and Beeman (1993) noted that grades in the first senior level nursing course and graduation GPA were the best predictors.

Stuenkel (2006) studied the relationship of several nursing course grades (pharmacology, pathophysiology, medical-surgical, maternal-child, mental health, community, and leadership) to NCLEX success and concluded that those who passed NCLEX held higher mean scores for nursing theory grades. Beeman and Waterhouse (2001) indicated that the variables that were significantly related to NCLEX success were grades in Nursing Foundations, Pathophysiology II, Wellness Nursing, and Restorative Nursing Interventions I and II.

Grades for nursing courses consistently had some predictive value for success with NCLEX. The number of Cs in nursing courses was reported to be a stronger predictor of NCLEX failure and the more Cs earned, the greater the risk (Beeman & Waterhouse, 2001; Beeson & Kissling 2001; Barkley, Rhodes, & Dufour, 1998). Other researchers note that failure in even one nursing course is associated with NCLEX failure (Alexander, 1997; Endres, 1997; Roncoli, Lisanti, & Falcone, 2000). Some researchers note that the NLN Achievement tests taken during the nursing program were predictive of performance on NCLEX, yet most researchers found that end-of-program exit exams were strong predictors of NCLEX outcomes (Briscoe & Anema, 1998; Barkley, Rhodes, & Dufour, 1998).

Nonacademic Predictors

Studies addressing nonacademic predictors, such as test anxiety, self-esteem, and personal and environmental issues are not in abundance in the literature. However, some studies included both academic and nonacademic predictors (Arathuzik &Aber, 1998). From the nonacademic perspective, Arathuzik and Aber (1998) noted significant correlations between success and lack of family demands or responsibilities, lack of emotional stress, and sense of competency. Additionally, they indicated that students who did not speak English as the primary language at home did not do well on NCLEX and that high GPAs were evident in students who were successful on NCLEX.

Poorman and Martin (1991) conducted a study that addressed nonacademic predictors and looked at the relationship between performance on the NCLEX and differences in test anxiety, cognitions related to testing, and academic performance. These researchers concluded that variables other than academic ones were the best predictors of actual

NCLEX scores and these nonacademic variables included self-predicted NCLEX scores and self-perceived grades. Additionally, they noted that those who passed the NCLEX experienced more facilitative thoughts during major nursing examinations and were more likely to consider themselves good test-takers as compared to those who failed.

Test anxiety and stress have also been linked to performance on exams (Hight, 1996; Mills, Wilson, & Bars, 2001). Hight (1996) noted that a statewide survey showed that nursing students had higher anxiety scores than national norms for college students. Campbell and Dickson (1996) noted that many noncognitive factors were weak predictors but found that test anxiety and self-concept/esteem showed some correlation with NCLEX success.

Qualitative studies of nursing graduates who have taken the NCLEX revealed additional information. Poorman and Webb (2000) conducted a qualitative study on nursing graduates who failed the NCLEX. One theme that emerged was that the graduates felt abandoned and cut off from faculty who had been important in their learning experience. Eddy and Epeneter (2002) conducted a qualitative study that interviewed graduates who passed and graduates who failed the NCLEX on first attempt. Findings indicated that those who passed accepted responsibility for learning, were proactive in test preparation, took the exam when they felt ready, and used stress management techniques during testing. Those who failed tended to perceive that their lack of success was the responsibility of others, that they were less able to manage stress, and took the exam when they did not feel ready.

Variables of this Study

As noted previously, since the pass/fail format of the NCLEX was instituted, it has been difficult to identify the predictors to success. Additionally, studies demonstrate conflicting findings regarding the predictors for NCLEX outcomes. Many studies indicate that nonacademic variables need investigation because of their effect on NCLEX outcomes. The variables chosen for this study and the rationale for their selection are described in this section. Pre-nursing course scores/grades, nursing course grades, personal and environmental factors/stressors, and self-efficacy expectations were the independent variables of this study. The dependent variable of this study was NCLEX outcomes (pass or fail).

Pre-Nursing Course Scores/Grades

Pre-nursing course scores/grades were the academic variables of this study and included: (a) the SAT verbal score (or the SAT Reasoning Test critical reading score), and (b) the college chemistry grade.

SAT verbal score. Inconsistent findings are noted in the literature about the total SAT score and NCLEX outcomes. However, Foti and DeYoung (1991) investigated the effect of the SAT verbal score and noted that all students they studied with a SAT verbal score over 400 were successful in passing the NCLEX. Arathuzik and Aber (1998) reported that competency in critical thinking was demonstrated by students who passed the NCLEX. Therefore, the verbal SAT score was selected as a variable for this study to investigate the effect of student's critical thinking and reading skills on NCLEX outcomes.

College chemistry grade. The college chemistry grade was selected as a variable for this study for a number of reasons. Pauling (1988) describes chemistry as the science of substances, their properties, and their reaction that changes them to other substances, and explained that almost all of science can be included in chemistry. Chemistry can be applied to many biological processes of the human body and its functioning. For example, understanding the concepts of nutrition and the biomolecules (carbohydrates, lipids, amino acids, and proteins) requires knowledge of the principles related to chemistry. Understanding human physiological processes and pharmacological concepts also requires knowledge of chemical principles. Additionally, administering medications is a role of the nurse that requires a great deal of understanding about the pharmacological properties of the medication being administered and the effects of the medication on the human body. Few studies are noted that have investigated chemistry as a predictor of NCLEX outcomes. A study done by Heupel (1994) showed that chemistry did not appear to be a good predictor of NCLEX success. Yet, Campbell and Dickson (1996) noted that grades in science courses were the best predictors of NCLEX success. Additionally, a more recent study done by Yin and Burger (2003) demonstrated that course grades in the natural sciences (chemistry, microbiology, and anatomy and physiology) are positively related to NCLEX success.

Nursing Course Grades

Nursing course grades were academic variables of the study and include: (a) fundamentals, (b) medical-surgical; (c) pharmacology; and (d) leadership/management. Based on the findings of previous studies, nursing course grades were selected as a predictor of NCLEX success. Most studies have demonstrated that low grades in a number of selected

nursing courses place the student at risk for NCLEX failure (Barkley, Rhodes, & Dufour, 1998; Beeman & Waterhouse, 2001; Beeson & Kissling, 2001; Stuenkel, 2006).

The fundamentals of nursing course was selected because this course serves as a foundation for all other nursing courses and presents the nursing principles, concepts, and skills that form the foundation. The medical-surgical nursing course was selected as a predictor variable because this course presents concepts related to holistic care in a variety of settings and addresses the application of concepts to all body systems and diseases.

Administering medications and the many responsibilities associated with medication administration (such as safety, monitoring for side and adverse effects, teaching) is a major role of the nurse. In addition, the current NCLEX-RN test plan indicates that 13-19% of test questions on the NCLEX address pharmacological therapies (National Council of State Boards of Nursing, 2007). This means that if a graduate took a 100 question exam, 19 of the questions could be pharmacology ones. Therefore, strength in the area of pharmacology is important with regard to the NCLEX.

In the clinical setting, the professional nurse needs to assume the role of a leader and manager in a variety of situations. In the current NCLEX test plan, management of care is a subcategory of the Safe and Effective Care Environment Client Needs category and accounts for 13-19% of the questions on NCLEX. According to the National Council of State Boards of Nursing (2007), the subcategory of management of care includes several leadership and management concepts such as case management, collaboration, concepts of management, delegation, establishing priorities, staff education, and supervision. The leadership/management course directly relates to the test plan components. Therefore,

knowledge of and the ability to apply leadership/management concepts is important with regard to NCLEX.

Personal and Environmental Factors/Stressors

Personal and environmental factors/stressors were nonacademic variables for this study. These included out-of-school events/responsibilities, worry, and primary language spoken.

Out-of-school events/responsibilities. Out-of-school events/responsibilities are life events that a student experiences while in nursing school that take time away from studying. Arathuzik and Aber (1998) noted significant correlations between NCLEX success and lack of family demands or responsibilities, lack of emotional stress, and sense of competency. Therefore, out-of-school events and responsibilities and their effect on NCLEX outcomes were studied. The Recent Life Changes Questionnaire (RLCQ) (Miller & Rahe, 1997) was used to study this variable. This instrument assesses the following areas: (a) health, (b) work, (c) home and family, (d) personal and social, and (e) financial.

Worry. Worry is a concern that can be functional or dysfunctional (Gladstone & Parker, 2003). Specific to this study, dysfunctional worry is worry that can disrupt daily functioning and interfere with the individual's ability to succeed. Studies that specifically address worry and NCLEX outcomes are limited. However, Arathuzik and Aber (1998) noted that students scoring lower on the internal stressors of emotion, anxiety, anger, guilt, and loneliness were more successful on NCLEX. Furthermore, test anxiety and stress have also been linked to performance on exams (Hight, 1996; Mills, Wilson, & Bars, 2001). For this study, the Brief Measure of Worry Severity (BMWS) self-report

measure (Gladstone, Parker, Mitchell, Malhi, Wilhelm, and Paule-Austin (2005) was used.

Primary language spoken. According to the U.S. Census Bureau (2008), the U.S. will be more racially and ethnically diverse by mid-century. Minority populations, such as the Hispanic, Asian, or black populations, are expected to become the majority by the year 2042. Nurse educators are discovering that students with English as a second language (ESL) have unique challenges that threaten their success on NCLEX. Educators need to develop strategies that will meet these students' needs and ensure success. Based on the population projections (U.S. Census Bureau, 2008), nurse educators will need to teach more ESL students than they have in the past. Therefore, educational challenges for nurse educators will increase.

The literature notes that many ESL students have testing difficulties (Femea, Gaines, Braithwaite, & Abdur-Rahman, 1995; Jalili-Grenier & Chase, 1997). Unfortunately, students who do not speak English as the primary language at home do not do well on NCLEX (Arathuzik & Aber, 1998). Therefore, based on the population projections and these researcher findings, investigating the effect of primary language spoken on NCLEX outcomes is important.

Self-Efficacy Expectations

Mills, Wilson, and Bar (2001) conducted a study to describe the effects of a holistic intervention program designed to prepare students for the NCLEX and concluded that a qualitative analysis of student journaling indicated that personal perception of the ability to pass the NCLEX affected outcomes. Otherwise, studies that specifically addressed self-efficacy expectations and NCLEX success were not found. However, numerous stu-

dies that demonstrated self-efficacy's importance in students' success in an academic and practice setting were located (Bong, 2004; Bong & Skaalvik, 2003; Gore, 2006; Linnenbrink & Pintrich, 2003; Pajares, 2003; Pajares & Schunk, 2001; Shunk, 2003;). Studies also noted that academic self-efficacy beliefs can be used to predict college students' academic performance and persistence (Pajares, 1991; Zimmerman, Bandura, & Martinez-Pons, 1992).

Since the introduction of Bandura's Social Learning Theory (Bandura, 1977), the construct of self-efficacy has been widely studied in psychology in an attempt to understand and predict human behavior (Gore, 2006; Pajares, 1966). According to Bandura (1977), self-efficacy expectations are an individual's belief about his or her ability to accomplish goals and these beliefs help to determine what activities individuals will pursue, the effort that the individual will expend in pursuing those activities, and how long they will persist in the face of obstacles. The literature reveals that self-efficacy is an important variable to understand human behavior.

Many nursing studies have evaluated self-efficacy's influence in health care and in success with academic studies. Some of these studies related to health-related behaviors (Ali, 1998), health promotion (Boehm, Coleman-Burns, Schlenk, Funnell, Parzuchowski, & Powell, 1995; Condiotte & Lichtenstein, 1981; Resnick, 2001), managing acute and chronic illness (Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999; Borsody, Courtney, Taylor, & Jairath, 1999), and patient education (Moon & Backer, 2000; Resnick & Spellbring, 2000; Washington, 2001). The literature also indicated that the concept of self-efficacy has been explored as it relates to self-expectations of the advanced practice nurse (Beraducci & Lengacher, 1998). Additional nursing literature findings reveal stu-

dies related to teacher and mentor self-efficacy expectations (Hayes, 1998; Nugent, Bradshaw, & Kito, 1999). These studies located in the literature note a relationship between self-efficacy and outcomes.

In the area of nursing education, the number of self-efficacy studies is limited in number. However, those located reveal a relationship between self-efficacy and performance. Goldenberg, Iwasiw, and MacMaster (1997) explored self-efficacy expectations of senior baccalaureate nursing students and preceptors. Mandorin and Iwasiw (1999) conducted a study looking at the effects of computer-assisted instruction on the self-efficacy of baccalaureate nursing students in learning theory. Andrew (1998) investigated whether self-efficacy can predict academic performance in the sciences of a first-year undergraduate nursing course. Hodge (1999) demonstrated that self-efficacy had an important effect on achievement in mathematical calculations. Harvey and McMurray (1994) conducted a study of academic and clinical self-efficacy to identify problems with progression in undergraduate nursing students and found that academic self-efficacy factors (but not clinical self-efficacy) were predictive of course withdrawal.

As noted, numerous research studies have demonstrated self-efficacy's importance in success in an academic and practice setting. However, studies that have specifically investigated a direct relationship of self-efficacy expectations and NCLEX outcomes have not been found in the literature review. This study explored this relationship using the General Perceived Self-Efficacy scale (Scholz, Gutierrez Dona, Sud, & Schwarzer, 2002).

Summary

The literature demonstrates a steady increase in the number and variety of NCLEX outcome predictors. Some of these studies were conducted prior to implementation of the pass or fail score on NCLEX, some were conducted after implementation of the pass or fail score, and some following implementation of computerized adaptive testing for NCLEX. Some predictors identified in studies done before the implementation of computerized adaptive testing may not be relevant with this latest form of testing. Therefore, since current nursing students need to take the NCLEX via computerized adaptive testing, further research regarding predictors of NCLEX success is necessary.

The inconsistent findings noted in the literature leads the nurse researcher to ask if nonacademic factors play a primary role in the students' ability to pass NCLEX, particularly because some nursing graduates with high scores on SATs and high nursing course grades fail the NCLEX (Roncoli, Lisanti, & Falcone, 2000; Briscoe & Anema, 1999; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003; Alexander, 1997; Stuenkel, 2006). These incidents related to NCLEX passage require researchers to investigate nonacademic factors as predictors of NCLEX success.

The limited number of studies that have investigated nonacademic issues and the role they play with regard to NCLEX outcomes leave questions about nonacademic factors unanswered. Although there is a wealth of literature on the academic predictors of NCLEX outcomes, much of that literature implies that nonacademic issues play a role in NCLEX outcomes, and thus, the area of nonacademic issues requires investigation.

CHAPTER 3

CONCEPTUAL FRAMEWORK

Introduction

The theoretical framework that guided this study was Albert Bandura's Social Learning Theory, also known as Social Cognitive Theory. This chapter describes Bandura's theory and the framework used for this study and includes information about the following: (a) background of Social Learning Theory, (b) self-efficacy expectations, (c) performance accomplishments and emotional arousal, (d) the NCLEX® Self-Efficacy Expectations model, and (e) the variables of this study. This chapter concludes with a summary.

Background of Social Learning Theory

Social Learning Theory originated in the discipline of psychology and has evolved as a context of behaviorism to understand human behavior. According to Crosbie-Brunett and Lewis (1993), behaviorism could be explained in terms of observable acts described by a stimulus-response sequence. In this context, behaviorism focused on experimental methods and on variables that could be observed, measured, and manipulated, thus avoiding any subjectivity. Consequently, this theory of personality indicates that one's environment causes one's behavior and that internal stimuli are not a factor.

Following this position about behaviorism, there was much debate regarding the presence of a mediating factor(s) that determines the relationship between a stimulus and a response, including rewards or punishments, reinforcements, or feedback (Woodward, 1982). Crosbie-Brunett and Lewis (1993) noted that personality theorists propose that an individual's behavior was purposeful and motivated by a pursuit of goals and that one's perception of, and attitude toward the environment held a significant influence on beha-

vior. Additionally, it is noted that a personality theorist's view was that an individual's thoughts, feelings, and behaviors are transactions with that individual's physical and social surroundings (Crosbie-Brunett & Lewis, 1993). Thus, it was thought that cognitions along with the environment were a driving force behind behavior.

Concurrent with a personality theorist's view, Bandura believes in the concept of reciprocal determinism in which the environment causes behavior and behavior affects the environment, creating a cause and effect relationship between the stimulus and the response (Bandura, 1977). Further in his work, Bandura studied personality as an interaction among the environment, behavior, and the individual's psychological processes (personal factors). This inclusion brings into account the internal or unobservable stimuli. Bandura (1977) also described that external reinforcement did not account for all types of learning and that an intrinsic reinforcement and a form of internal reward was also important for an individual to attain a sense of satisfaction, pride, and accomplishment.

According to Social Learning Theory, an individual's behavior is determined by the reciprocal interaction of three factors: personal factors, behavior, and the environment (Bandura, 1977). This theory contends that behavior is regulated antecedently through cognitive processes and psychosocial experiences. These processes and experiences affect self-efficacy and determine the response consequences; that is, whether the individual will perceive self-efficacy as high or low. The response consequences are used to form expectations of behavioral outcomes. This capability to form these expectations is what provides the individual the ability to predict an outcome of his or her behavior before the behavior is performed. There are several core aspects addressed in Social Learning Theory, but for this study, self-efficacy expectations, as influenced by performance ac-

complishments and emotional arousal, and its relationship to NCLEX success are investigated. Appendix A provides an illustration depicting the NCLEX® Self-Efficacy Expectations Model for this study.

Self-Efficacy Expectations

Central to Bandura's work are the concepts of self-efficacy and self-efficacy (outcome) expectations. The concept of self-efficacy was originally proposed by Bandura in social science research in developing Social Cognitive Theory, and according to Bandura (1977), has been used extensively in the field of psychology. The concept of self-efficacy is described as a type of self-reflection that affects one's behavior (Bandura, 1977). Self-reflection enables an individual to assess his or her own experiences, develop perceptions about his or her own capabilities that guide behavior, and determine how much effort will ensue for performance. Thus, self-reflection leads to an individual's self-efficacy expectations. Bandura (1977) also describes self-efficacy as an individual's belief regarding his or her abilities to successfully perform activities or tasks and indicates that the stronger the sense of self-efficacy, the more confident one is to succeed.

Self-efficacy expectations are focused on the person's belief in their own capacity to carry out particular behaviors. These expectations determine the behaviors a person chooses to perform, their degree of perseverance, and the quality of the performance. As applied to this study, if a nursing student has high self-efficacy expectations, that student would work hard and persevere and would believe that he or she would achieve NCLEX success. Conversely, low self-efficacy expectations could lead to self-doubt about one's ability to achieve success. Therefore, low self-efficacy expectations could result in NCLEX failure. According to Bandura (1997), individuals possess a self-regulatory func-

tion that provides the capability to influence their own cognitive processes and actions and thus alter their environments. Therefore, whatever self-efficacy beliefs an individual holds will help to determine what activities the individual will pursue, the effort that he or she will expend in pursuing these activities, and how long he or she will persist in the face of obstacles and hardships. Pajares (1991) concurs with this belief and notes that specific to student performance, the beliefs that students develop about their academic performances are in part the result of what they have come to believe that they have accomplished.

Bandura (1977) explained that common patterns exist in the sequence of most environmental events. These common patterns create the ability for an individual to predict a certain outcome. Learning experiences associated with environmental events provide information to an individual about the courses of action that produce desirable accomplishments and those that produce undesirable outcomes. These learning experiences and their common associated patterns function as antecedent determinants so that the individual will take a course of action that will successfully accomplish a task. These antecedent determinants deserve mention because of their effect on self-efficacy expectations. However, this study was not intended to focus on antecedent determents or identifying the courses of action that will lead to successful accomplishment of a task. Rather, its purpose was to identify the academic and nonacademic variables that influence self-efficacy effect on NCLEX passage and identify the relationships that exist among self-efficacy and the academic and nonacademic variables of the study.

Albert Bandura also specifically identifies four major sources of information that create self-efficacy expectations. These include the following: (a) performance accom-

plishments, (b) emotional arousal, (c) vicarious experience, (d) and verbal persuasion (Bandura, 1977, p. 80). Of these four sources, performance accomplishments and emotional arousal were selected to be used in this study. A description of performance accomplishments and emotional arousal follows.

Performance Accomplishments and Emotional Arousal

According to Bandura (1977), performance accomplishments provide the most dependable source of efficacy expectations because they are based on one's personal experiences. For this study, performance accomplishments were defined as the successful achievements in the academic variables. The academic variables for this study were pre-nursing scores/grades and nursing course grades. If performance accomplishments experienced academically were positive, then self-efficacy expectations would be high. Likewise, positive performance accomplishments as a source of high self-efficacy expectations would lead to successful performance in pre-nursing scores/grades and nursing course grades. Performance accomplishments may serve as an antecedent to successful performance in pre-nursing scores/grades and nursing course grades. In other words, what the student brings to the college/university academic environment is a result of previous personal and psychosocial experiences. Therefore, the student may begin nursing education with high or low self-efficacy expectations. Regardless, the purpose of this study is not to measure self-efficacy expectations specifically at the time of entrance into the college/university setting but rather, during the nursing program. Moreover, the purpose of the study is to explore the academic and nonacademic variables that influence self-efficacy's effect on NCLEX passage and identify the relationships that exist among self-efficacy and the academic and nonacademic variables of the study.

According to Bong (2004) and Pajares (1996), repeated success develops high self-efficacy expectations and reduces the likelihood of failure in academic courses. If positive performance accomplishments lead to high self-efficacy expectations, then students with higher performance accomplishments should demonstrate higher self-efficacy. Furthermore, positive performance accomplishments result in success with testing and academic courses. If a student achieves success in a test or nursing course, this experience should increase the student's self-efficacy expectations for being successful in subsequent courses. Conversely, if a student repeatedly receives low grades, self-efficacy expectations could weaken, resulting in the possibility of failure on NCLEX.

Emotional arousal also serves as a source of self-efficacy expectations. Bandura (1977) describes emotional arousal from a physiological and psychological perspective. From a physiological standpoint, Bandura (1977) noted that the stress response is the physiological arousal that occurs when an individual is threatened, and the psychological perspective is the emotional state that results from the threat. This study does not investigate the physiological perspective. Rather, it focuses on the psychological perspective of emotional arousal, specifically addressing personal and environmental factors/stressors as nonacademic variables and their effect on self-efficacy expectations, and ultimately NCLEX success.

Specific to this study, emotional arousal was defined as a mood state that can be extreme indicating that the student is threatened by personal and environmental factors/stressors; or low, indicating that threats from personal and environmental factors/stressors are minimal. Bandura (1977) proposed that levels of self-efficacy expectations are influenced by the degree of the emotional arousal an individual experiences and

the resulting level of worry. When threats result in a high state of emotional arousal, increased levels of worry may result**,** whereas minimal threats should result in low levels of worry (Bandura, 1977). Therefore, it is the assumption of this study that personal and environmental factors/stressors that cause an increased emotional arousal and level of worry can be threatening to the student and lower self-efficacy expectations. Conversely, a student is more likely to hold high self-efficacy expectations and achieve successful accomplishments if he or she is not experiencing an increased emotional arousal state or worry.

NCLEX® Self-Efficacy Expectations Model

Appendix A provides an illustration depicting the NCLEX® Self-Efficacy Expectations Model for this study. The connecting relationship between performance accomplishments and emotional arousal indicates that performance accomplishments can influence emotional arousal. Likewise, emotional arousal can influence performance accomplishments. For example, if a student is performing well academically (performance accomplishments), the emotional arousal state about future performance and success should be low. If a student is not performing well academically (performance accomplishments), the emotional arousal state would be activated and the student could experience a high level of worry about future performances in courses and the ability to succeed. Emotional arousal factors, such as out-of-school events/responsibilities, could lead to an increased level of worry about the ability to succeed. This increased level of worry could affect performance and the ability to succeed in nursing courses (performance accomplishments). However, if the student has no or minimal out-of-school events/responsibilities then worry about success may be limited to educational responsibilities and the student is likely to perform better in nursing courses (performance accomplishments). Emotional arousal

factors can also be activated for the student who does poorly in academics but has few out-of-school responsibilities. Poor performance in academics may result in worry about the inability to succeed. The next section describes the relationship of the NCLEX® Self-Efficacy Expectations Model and the variables of this study.

Variables of this Study

The NCLEX® Self-Efficacy Expectations Model proposes that performance accomplishments and self-efficacy expectations directly affect the successful outcome in taking the nursing licensing exam (see Appendix A). The variables for performance accomplishments include pre-nursing scores/grades and nursing course grades. This model also proposes that emotional arousal and self-efficacy expectations directly affect the successful outcome in taking the nursing licensing exam. Personal and environmental factors/stressors (out-of-school responsibilities, worry, and primary language spoken) were studied as they relate to the concept of emotional arousal. Both performance accomplishments and emotional arousal influence the new graduate nurses' self-efficacy expectations, which in turn affects the NCLEX outcome.

Academic Variables

For pre-nursing scores/grades, the Scholastic Aptitude Test (SAT) verbal score (or the SAT Reasoning Test critical writing score) and the college chemistry grade were addressed in this study. At this point in the educational process (pre-nursing), performance accomplishments are a significant factor as related to self-efficacy expectations. Pre-nursing scores/grades are critical factors for determining entrance into a nursing program because certain standards and required scores or grades may be necessary for acceptance. If a student achieved above the required scores or grades for entrance then the student

would feel good about him- or herself and the ability to succeed in the nursing program. Thus, self-efficacy expectations are high for performance accomplishments and the ability to succeed in the program, and resultantly on NCLEX. Conversely, if the student received minimal required scores or grades for entrance into the nursing program, he or she may feel uncertain about the ability to succeed in upcoming nursing courses and on NCLEX; thus self-efficacy expectations related to performance accomplishments may be low. This situation identifies a strategic point for intervention by nursing faculty.

The nursing course grades that were addressed in this study include fundamentals, medical-surgical nursing, pharmacology, and leadership/management. In most programs the first nursing course that the student takes is the fundamentals of nursing or a similarly titled course. If a nursing student achieved success in the fundamentals nursing course, self-efficacy expectations related to performance accomplishments and the continued ability to succeed in subsequent nursing courses and on NCLEX could increase. Alternatively, if a nursing student did not do well and achieved a low or barely passing grade, self-efficacy expectations related to performance accomplishments may be low. Thus, this situation identifies a strategic point for intervention by nursing faculty.

Nonacademic Variables

For this study, data regarding primary language spoken were collected because not being fluent in English creates numerous stressors for the student, such as translating words and needing additional time for assignments and for completing exams (Femea, Gaines, Braithwaite, & Abdur-Rahman, 1995; Arathuzik & Aber, 1998). Data related to out-of-school events/responsibilities and worry was also collected.

When Bandura (1977) discussed the processes of learning, he emphasizes that if an individual is going to learn, he or she must be paying attention. Therefore, if attention is reduced or distracted by competing stimuli, then learning is disrupted. Personal or environmental factors/stressors could act as competing stimuli during the educational process and can affect successful achievement. For example, if educational responsibilities (attending classes and clinical experiences and scheduling reading and studying time) need to be balanced with out-of-school events/responsibilities (reporting to a job or caring for a family member), worry can ensue about how all of these responsibilities can be successfully met. This emotional arousal of worry would affect performance and self-efficacy expectations. Therefore, a strategic point for intervention exists if the student's educational process is competing with personal or environmental factors/stressors. In contrast, if a student has no or minimal out-of school events/responsibilities then his or her only priority or worry would relate to educational responsibilities. Thus, a premise of this study is the less emotional arousal of worry an individual experiences, the higher the self-efficacy expectations; thus, NCLEX success.

Summary

As noted in Social Learning Theory, Bandura (1977) describes self-efficacy expectations as an individual's belief regarding his or her abilities to successfully perform activities or tasks. This construct of self-efficacy is a way to understand and predict individual behavior. On examination of Bandura's Social Learning Theory, it is apparent that learning occurs as a result of a multitude of interrelated factors. This reinforces the criticality of the need to explore the factors that affect NCLEX success from more than one perspective. Therefore, with regard to NCLEX success, in addition to identifying academic

predictors, it is also necessary to investigate nonacademic predictors, such as personal and environmental factors/stressors, and the effect(s) of self-efficacy expectations on successful achievement. For this study, two major sources of information that create self-efficacy expectations were used as a guide to investigate the variables and the concept of self-efficacy expectations. These sources of information include performance accomplishments and emotional arousal (Bandura, 1977). According to Bandura (1977) performance accomplishments provide the most dependable source of self-efficacy expectations because they are based on one's personal experiences. For this study, variables investigated related to the concept of performance accomplishments include pre-nursing scores/grades and nursing course grades. Bandura (1977) also indicated that emotional arousal influences self-efficacy expectations and that an individual is more likely to succeed if that individual is not experiencing an emotional arousal state of worry. For this study, the variables addressed that relate to the concept of emotional arousal were personal and environmental factors/stressors, including out-of-school events/responsibilities, worry, and primary language spoken.

CHAPTER 4

METHODOLOGY

Introduction

In this chapter, details of the methodological techniques designed to test the Self-Efficacy Expectations for NCLEX® Success Model are described. Included are sections addressing the following (a) research design, (b) research questions, (c) sample, (d) sampling procedures, (e) instruments, (f) data collection procedures, (g) procedures for managing data; and (h) statistical analysis methods. Finally, this chapter concludes with the ethical considerations associated with this study.

Description of the Research Design

A cross-sectional descriptive study was used to explore relationships of the study variables for a national sample of graduates who completed their program from a nationally accredited baccalaureate degree nursing program located in the U.S. in 2009. The dependent variable for this study was NCLEX outcomes (pass or fail). Pre-nursing course scores/grades, nursing course grades, personal and environmental factors/stressors, and self-efficacy expectations were the independent variables. The cross-sectional descriptive design involves the collection of data and the study of variables and their relationships at a fixed point in time (Polite & Beck, 2004). The advantage of using a cross-sectional design for this study was that its purpose suits the intent of this study, which was to explore and gain information about the variables and identify relationships among them and on NCLEX outcomes. A disadvantage of this design is that it does not provide information about causality; however, this study did not intend to investigate cause and effect among variables. A survey method was used to collect data from the participants at one point in

time, after he or she took the NCLEX for the first time. Once data was collected, a descriptive analysis of the variables and their relationship was pursued.

Research Questions

Because the design is exploratory and the purpose of this study was to identify the academic and nonacademic predictors of first attempt NCLEX outcomes as well as to determine the relationship between the variables of the study, research questions rather than hypotheses were developed. This study did not intend to test theory; rather, it was a starting point for hypothesis generation and future research. To guide and implement this study, the following research questions were used.

1. Which academic or self-efficacy variables influence NCLEX passage for a student in a baccalaureate degree nursing program?
2. Which nonacademic or self-efficacy variables influence NCLEX passage for a student in a baccalaureate degree nursing program?
3. What relationships exist among self-efficacy, academic, and nonacademic variables of NCLEX passage for a student in a baccalaureate degree nursing program?

Sample

The target population was senior students in a nationally accredited baccalaureate degree nursing program in the U.S. graduating in the year 2009. Inclusion criteria for the sample included: (a) a 2009 baccalaureate degree nursing graduate who was at least 18 years of age, (b) the baccalaureate degree nursing program was nationally accredited and listed in the *National League for Nursing (NLN) Guide to State Approved Schools of Nursing – RN* (2006), (c) the graduate completed the NCLEX and received the results once, and (d) the graduate was able to access the Internet and complete the survey. Ex-

clusion criteria for the sample included: (a) a graduate who was already licensed as a registered nurse at the time of graduation, (b) a graduate who took the NCLEX more than once, and (c) a student or graduate who did not provide an email address for sending the survey.

Sampling Procedures

The target population was recruited from nationally accredited baccalaureate degree nursing programs in the U.S. To obtain a geographically dispersed sample, several steps in the sampling procedure were implemented. First, nationally accredited baccalaureate degree nursing programs were identified through the NLN *Guide to State Approved Schools of Nursing – RN* (2006). This book provided information on all types of nursing programs, including baccalaureate, associate degree, and diploma and listed a total of 584 baccalaureate programs. There were 388 nationally accredited baccalaureate programs listed that were accredited by either the National League for Nursing Accrediting Commission (NLNAC) or the Commission on Collegiate Nursing Education (CCNE), or both.

Next, to recruit baccalaureate degree nursing students who experienced similar educational experiences, the researcher examined the data for similarities for each nationally accredited program with regard to their minimum degree required for admittance in the program, and for the degree conferred. Programs then selected indicated a minimum required degree of a high school diploma or General Education Development (GED) and a baccalaureate degree as the degree conferred. One hundred and forty-three (143) programs met these criteria. Programs indicating a need for minimum admission requirements greater than a high school diploma or GED, and programs that listed a degree conferred of master's of science in nursing (MSN) were excluded. Programs that did not

provide any of this information in their listing were also excluded because of lack of information.

To guarantee a representative ethnic mix of nursing graduates, only programs that had an enrollment of at least 10% minority were selected from the 143 programs. As well, because a part-time student has a less academic workload than a full-time student, programs that had 20% or less part-time students were selected from the 143. This yielded a total of 90 programs in which 34 were located in the South, 22 in the West, 17 in the Midwest, and 17 in the North Atlantic. These 90 programs were selected as the institutions for recruitment of the accessible population. Based on the NLN *Guide to State Approved Schools of Nursing – RN* (2006), this yields an accessible population of approximately 3000. Table 1 provides a display of the geographical locations as well as the numbers of programs in each state selected for recruitment.

Instruments Used in the Study

Survey

The survey was created using Survey Monkey, an electronic survey program. The survey was designed so that the participant could skip a question if he or she desired to do so. Additionally, the participant could exit the survey at any time while answering questions. However, the participant still received compensation for participating as long as the survey was submitted and the participant provided an email address for forwarding the compensation.

The survey contained 109 items and included questions about the following: (a) demographic data, (b) academic data, (c) personal and environmental factors/stressors, and (d) self-efficacy expectations, and (e) NCLEX outcome. The description of the study and

Table 1

Geographical Location, State, and Number of Schools for Recruitment

Geographical Location	State	Number of Schools
South	Alabama	8
	Arkansas	3
	Florida	2
	Georgia	3
	Kentucky	1
	North Carolina	2
	Mississippi	1
	Oklahoma	4
	South Carolina	2
	Tennessee	2
	Texas	6
West	Alaska	1
	California	10
	Colorado	3
	Hawaii	1
	Idaho	2
	Nevada	3
	New Mexico	2

Table 1 Continues

Table 1 Continued

Geographical Location	State	Number of Schools
Midwest	Illinois	2
	Indiana	3
	Kansas	2
	Michigan	2
	Minnesota	2
	Missouri	1
	Ohio	5
North Atlantic	Connecticut	2
	Massachusetts	4
	New York	3
	Pennsylvania	5
	Rhode Island	3

consent was included in the first part of the survey. Appendix B displays a copy of the description, consent, and the survey. Follow-up questions and a thank you page were at the end of the survey. The parts of the survey are described below.

Part I: description of the study and consent. The first part of the survey began with a description of the research study. It also provided the informed consent. The researcher used the protocol set by the Institutional Review Board at the University of Nevada, Las

Vegas (UNLV) as a guide to develop the informed consent. This protocol can be located at the UNLV Office for the Protection of Research Subjects Web site at http://research.unlv.edu/OPRS/informed-consent.htm. The parts of the informed consent included the following: (a) title and description of the research study, (b) investigators and contact numbers, (c) purpose of the research study, (d) participants eligible for the research study, (e) procedures for the research study, (f) benefits of participation, (g) risks of participation, (h) contact information, (i) cost and compensation issues for participation, (j) voluntary participation statement, (k) confidentiality procedures, and (l) the procedure for providing consent.

Part II: demographic data. This part consisted of 7 questions that related to individual characteristics of the participant, 6 of which were in the multiple-choice categorical format and 1 in a single textbox format. The questions asked about the following: (a) age, (b) gender, (c) if the participant grew up in the U.S. and if not, how many years the participant lived in the U.S., (d) the region of the country in which the nursing program was located, (e) whether the college/university was a private or public one, (f) race/ethnicity, and (g) primary language spoken/learned. Although primary language spoken was the nonacademic variable specifically selected for this study, obtaining additional demographic data provided supplementary information about the participants and information for additional data analysis.

A single textbox type of question was used for data collection about age so that the participant could enter his or her age. Gender included dichotomous categories (male or female). Data about the number of years that the participant lived in the U.S. provided information about possible differences in cultural environment for the individual. For this

question, dichotomous categories (yes or no) were presented to determine if the participant lived in the U.S. for all of his or her life. If the participant answered "no" then the participant was asked to record (in a single text box) the number of years that he or she lived in the U.S.

The question about the geographic region in which the graduate's nursing program was located was asked to determine if specific findings were exclusively related to a region of the country; the regions for selection included South, West, Midwest, and North Atlantic. Private institutions normally charge higher tuition fees than public institutions (The College Board, 2010). Therefore, the participant was asked about private or public status of the college or university attended to determine the monetary value of the education and to identify a possible covariate, that being the potential for greater motivation and thus success when paying high tuition fees.

According to the U.S. Census Bureau (2008), the U.S. will be more racially and ethnically diverse by mid-century. Minority populations, such as the Hispanic, Asian, or black population, are expected to become the majority by the year 2042. Nurse educators currently face the challenge of educating students from diverse populations so that they will be successful on NCLEX. Based on the population projections, these challenges will increase. Category selection for race/ethnicity included: (a) American Indian, (b) Black, (c) Caucasian, (d) Chinese, (e) East Indian, (f) Eskimo, (g) Filipino, (h) Hispanic, (i) Inuit, (j) Japanese, (k) Korean, and (l) Other.

Femea, Gaines, Braithwaite, and Abdur-Rahman (1995) noted that many English as a second language (ESL) students have testing difficulties. Arathuzik and Aber (1998) noted that students who are bilingual and did not speak English as the primary language

at home did not do well on NCLEX. The expected increase in the minority population brings with it an increase in people who speak English as a second language. Therefore, based on the population projections, investigating the effect of primary language spoken and NCLEX outcomes becomes increasingly important. Category selection for primary language spoken included: (a) English; (b) Chinese; (c) Japanese; (d) Korean; (e) Spanish; and (f) Other.

Part III: academic data. This part of the survey consists of 9 questions and asked the participant about pre-nursing scores/grades and nursing course grades. The pre-nursing scores/grades included: (a) Scholastic Aptitude Test (SAT) total score, (b) SAT verbal score (or the SAT Reasoning Test critical reading score), (c) SAT math score, (d) the American College Test (ACT) exam score, and (e) college chemistry grade. The nursing course grades included: (a) fundamentals, (b) medical-surgical, (c) pharmacology, and (d) leadership and management.

For the SAT score or the ACT score, questions were presented in a single textbox format. For this study, the researcher was interested in determining a relationship between the SAT verbal score (or the SAT Reasoning Test critical reading score) and NCLEX outcomes. However, to obtain supplementary data about the SAT scores, the participant was also asked the total SAT score and the SAT math score. In addition to including questions about SAT scores, the researcher included a question about the ACT® score because the ACT is another popular test usually administered while in high school as a college admission and placement examination. According to the 2008 ACT Annual Report, 1.42 million high school students in the graduating class of 2008 took the ACT test (www.act.org/aboutact/report.html). For the SAT exam, approximately 2 mil-

lion students took the exam (http://professionals.collegeboard.com/testing/sat-reasoning). Conversion tables for ACT and SAT scores are provided by Princeton Review for use to convert an ACT score to a SAT score if necessary (http://www.princetonreview.com/). Because many high school students take the SAT or ACT exam more than once, the survey question asked the participant for the most current score.

The question seeking information about the college chemistry grade was in a multiple-choice categorical format. Categories included the following: (a) A = 90-100, (b) B = 80-89, (c) C = 70-79, (d) D = 60-69, and (e) not applicable to me. Because a college student may take more than one chemistry course (such as organic and biochemistry), the participant was asked to record the most current course grade.

The participant was also asked to record grades for nursing courses (fundamentals, medical-surgical, pharmacology, leadership/management). These questions were in a multiple-choice categorical format and category selection were the same as those used to record the chemistry grade. For these questions, because the possibility existed that the participant may have had to repeat a course, the most current course grade was requested. Additionally, since a nursing student may be required to enroll in more than one medical-surgical nursing course, the participant was asked to record the grade of the most recently taken medical-surgical nursing course.

Part IV: personal and environmental factors/stressors. Part IV of the survey asked the participant questions that addressed personal and environmental factors/stressors specifically related to out-of-school events/responsibilities and worry. There were a total of 82 items in this section in which 74 related to out-of-school events/responsibilities and 8 related to worry.

Questions presented in a multiple choice (multiple answers) format were used to identify the out-of-school events/responsibilities that the participant encountered while attending nursing school. The instrument used for measurement was the Miller and Rahe (1997) Recent Life Changes Questionnaire (RLCQ) (Miller & Rahe, 1997) and included items related to the following: (a) health, (b) work, (c) home and family, (d) personal and social, and (e) financial. The RLCQ identified 74 life events that have values (Life Change Units) attached to them; these units are used to measure life change events. In the RLCQ, the higher the Life Change Unit (LCU) the greater the negative effect on the individual (Miller & Rahe, 1997). A copy of the RLCU and their associated LCUs is located in Appendix C. Permission for use of the tool was obtained from Dr. Rahe (see Appendix F).

As defined for this study, worry is a concern that can be functional or dysfunctional. According to Gladstone and Parker (2003), worry can range from functional (useful for motivating and problem-solving) to dysfunctional, which can disrupt daily functioning and interfere with the individual's ability to succeed. This study investigated worry using the Brief Measure of Worry Severity (BMWS) self-report measure developed by Gladstone, Parker, Mitchell, Malhi, Wilhelm, and Paule-Austin (2005). As designed by the authors of the tool, a 4-point scale with the ratings of: 1 = not true at all, 2 = somewhat true, 3 = moderately true, and 4 = definitely true was used. Each item in the tool measured a characteristic of dysfunctional worry so that higher scores indicated the risk for dysfunctional worry. A copy of the Brief Measure of Worry Severity (BMWS) is located in Appendix D. Permission for using the tool in this study was obtained from Elsevier and is located in Appendix G.

Part V: self-efficacy expectations. Self-efficacy expectations regarding the ability to accomplish goals while in nursing school was measured using the General Perceived Self-Efficacy scale (Scholz, Gutierrez-Dona, Sud, & Schwarzer, 2002). This scale was comprised of 10 items using a 4-point scale with the ratings of: 1 = not true at all, 2 = hardly true, 3 = moderately true, and 4 = exactly true. Permission for use of the scale in this study was obtained from Hogrefe & Huber Publishers GmbH and is located in Appendix H. A copy of the tool is located in Appendix E. Following this section, the participant was asked about his or her NCLEX result. A response of either pass or fail was used for this question.

Part VI: follow-up information: In this part of the survey, the participant was asked to provide an email address in a single textbox so that the $5.00 gift certificate from Amazon.com could be sent. Additionally, the participant was asked if he or she would like a copy of the results of the study sent via electronic mail. Finally, the participant was asked whether or not he or she used the study guide that was sent and if it was used, if it was helpful.

Following Part VI was a page that thanked the participant for participating in the study. This page also briefly reviewed the purpose of the study, consent for participating, and confidentiality. The procedure for electronically submitting the survey was provided along with contact information for the Principal and Student Investigators of the study.

Pilot Study of the Survey

A 5-day pilot study was conducted to test the clarity and ease of completing the tool in Survey Monkey. The sample included 2 nursing graduates who recently took NCLEX, 1 nurse educator, 2 nursing students, and 2 laypersons. The participants were asked a

question about the amount of time (in minutes) for completion of the survey so that future study participants could be informed on the amount of time they could expect for completion. Additional questions addressed clarity, understandability, and if there was anything confusing or frustrating about taking the survey. A comment box at the end was provided for additional comments. A progress bar was placed across the top of the survey to inform the participant about the percentage of questions answered and the amount remaining for completion. The pilot study also included informed consent information. The informed consent is located in Appendix I. The pilot study survey is located in Appendix J.

Data Collection Procedures

Once approval to conduct the research study was obtained from the Institutional Review Board (IRB) at the University of Nevada, Las Vegas, data collection procedures began. A copy of the approval form is located in Appendix K. While awaiting approval from the IRB at UNLV, the researcher contacted deans, directors, or chairpersons of the nursing departments of each selected institution via email. The researcher provided a description and purpose of the study and requested permission to recruit senior nursing students as participants, contingent on UNLV and the Office of Protection of Research Subjects approval from the participating universities. The researcher also described a potential procedure for informing senior students of the study and recruiting participants, and invited the dean to recommend an alternative procedure, if one was necessary, based on the functioning of the nursing department. A copy of the letter to the nursing department is located in Appendix L.

The researcher also contacted the Office of Protection of Research Subjects of each institution in which the accessible population for the study was being sought to (a) pro-

vide a description and purpose of the study, (b) provide a description of the intended method for contacting the accessible population, (c) inform them that IRB approval from UNLV to conduct the study was approved, and (d) request information about their required protocol to obtain approval to seek participants. The researcher explained to the Office of Protection of Human Subjects of each institution that the study was to be conducted after the student graduated and became a graduate nurse. In other words, data collection would not be conducted on campus. Yet, senior students needed to be informed of the study and invited to participate before they graduated in order for the researcher to obtain an "after graduation" email address. Appendix M provides a copy of the letter that was sent to each Office of Protection of Human Subjects.

The researcher designed two possible informing and recruiting procedures. These are described as follows. With the first procedure, the researcher planned a scheduled visit to the institution to meet with the senior students to provide a description and purpose of the study and any other related information. A recruitment letter and flyer was distributed and reviewed and questions were addressed. For this procedure, two schools were visited; one was located in the North Atlantic and the other in the Midwest. The second procedure involved providing the recruitment materials to the dean of the nursing program for distribution to the students via the institution's communication procedure. A copy of the recruitment letter is located in Appendix N. A copy of the recruitment flyer can be located in Appendix O.

The recruitment letter invited senior nursing students to participate in the study. The letter described the purpose of the study, confidentiality issues, the participant's role, compensation issues, and contact information for the investigators of the study. The re-

cruitment flyer summarized the information from the letter and asked interested students to email his or her "after graduation" email address and date of graduation to the researcher at the provided email address. The researcher monitored the email site daily for submission of information from interested participants and for questions related to the study. The researcher answered questions that arose, which included questions related to eligibility. The researcher sent via email a study guide for preparing for the NCLEX within 2 weeks following the documented graduation date. A copy of this study guide is located in Appendix S. At three weeks and at four weeks following the graduation date, the researcher sent an email to the interested participant reminding him or her of the study. Six weeks after the graduation date the researcher sent an email that provided the Survey Monkey link and directions for access and submission of the survey. A follow-up reminder email that contained the Survey Monkey link was sent one week later (seven weeks after graduation). A copy of the reminder emails are located in Appendix P and in Appendix Q. The email that contained the survey link is located in Appendix R. Upon submission of the survey, the participant received a $5.00 gift certificate from Amazon.com. This gift certificate was emailed within 7 to 10 days after submission of the survey.

The Survey Monkey site for survey submission was set so that upon submission of the survey responses, a response percent and response count were recorded for each categorical item and a rating average and response count was recorded for each rating scale item. This provided the researcher with the ability to easily browse responses or review a summary of responses and keep track of the response rate for the survey. A cut-off submission date was set for November 30, 2009. The principal investigator and the student

investigator were the only persons who had access to the responses or any other information gathered in Survey Monkey.

Although not directly related to data collection, the student researcher monitored for email requests for assistance in preparing for a retake of the NCLEX. Three students requested assistance. For each of these students, an assessment plan was used to determine the student's needs and an individualized plan of study was recommended. A copy of the assessment plan is located in Appendix T. All correspondence was done via email and at no time during this preparation period was identifying information requested. These three students followed-up and reported that they passed the NCLEX on the retake.

Procedures for Managing Data

The survey link for accessing the electronic survey in Survey Monkey was sent to 214 individuals who responded to an email invitation to become a participant in the study. Of the 214 individuals, 196 participated and returned the survey. Of importance to note is that the response summary for the NCLEX outcome showed that 13 participants did not answer this question. Therefore, 183 participants were included in the data analysis procedures.

Survey responses were downloaded from Survey Monkey into an Excel file and the file was reviewed and cleaned. Columns that were unnecessary were deleted, such as the email address column and the column that asked the participant if he or she would like a copy of the results of the study. An identification column was created and each survey respondent was assigned a number to ensure that the identification number matched the survey respondent number. Variable names (columns) were created to correspond with

the questions in the survey and a code book was developed that included a survey question column, SPSS code name for the variable, and the variable description.

The Excel file was then uploaded into Statistical Package for the Social Sciences (SPSS®) Graduate Pack 15.0 for Windows®. The file was reviewed for accuracy and string variables were recoded into numeric variables. One error was noted in the ACT® score column. One participant documented that the ACT score was 1180; the highest achievable ACT score is 36. This documented score was deleted and noted as missing data. Following these procedures, the data was ready for analysis.

Statistical Analysis Methods

Logistic regression was the primary data analysis method employed to identify academic, nonacademic, and self-efficacy variables that influence NCLEX passage. A support vector machine (SVM) model was also used as a secondary testing method and the findings from this data analysis procedure was compared with a different learning machine used for data analysis, known as artificial neural networks (ANN). Correlation analysis using Pearson product-moment correlation coefficient was done to identify relationships existing among self-efficacy, academic, and nonacademic variables of NCLEX passage. Finally, descriptive statistics were conducted for the demographic information collected in this study. This section provides information about logistic regression, the SVM, and ANN. Chapter 5 provides the findings of the study.

Logistic Regression

In this study, a block approach for logistic regression analysis was used and two models were tested. The first model answered research question one and investigated the academic or self-efficacy variables that influence NCLEX passage. The second model

answered research question two and examined the nonacademic or self-efficacy variables that influence NCLEX passage.

This data analysis method allowed the use of either categorical or continuous independent variables or a mix of both. Predictor variables could be tested to determine their predictive ability on the dependent variable while controlling the effects of other independent variables (Tabachnick & Fidell, 2007). Logistic regression also provided an indication of the adequacy of the model by assessing goodness of fit.

The assumptions that needed to be considered with logistic regression included: (a) sample size, (b) multicollinearity, (c) independence of errors, and (d) outliers. These assumptions are described below.

Sample size. Sample size and the number of independent variables needed to be considered because if the sample size was too small and if there were a large number of variables (predictors), problems could occur with the analysis, such as large parameter estimates and standard errors, and failure of the solution to converge. According to Tabachnick and Fidell (2007), descriptive statistics should be run on each of the variables and categories should be collapsed or deleted if they have limited numbers of cases or are not important to the analysis. Additionally, these authors noted that if the logistic regression analysis indicated a problem, the offending variable should be deleted (p. 442). Vittinghoff and McCulloch (2006) note that a minimum of 10 cases per predictor variable for logistic regression analysis is adequate. There were six academic independent variables included in the logistic regression analysis and these were: (a) verbal SAT score, (b) college chemistry grade, (c) fundamentals grade, (d) medical-surgical grade, (e) pharmacology grade, and (f) leadership/management grade. There were eight nonaca-

demic independent variables included in the logistic regression analysis. These were (a) health, (b) work, (c) home and family, (d) personal and social, (e) financial, (f) worry, (g) primary language spoken, and (h) self-efficacy expectations. Data were collected from 196 participants. However, since 13 of the participants did not record his or her NCLEX result, final sample size totaled 183. Also noted was that 53.5% (n = 105) of the 196 participants did not record a verbal SAT score; thus, the verbal SAT score was excluded from the study. Therefore, the final total for predictors for inclusion in the logistic regression analysis was 13. Hence, sample size for this study was adequate since it included 13 predictor variables, requiring a minimum sample size of 130.

Multicollinearity. Logistic regression is sensitive to high correlations among the independent variables (Tabachnick & Fidell, 2007). Part of the analysis is to check for high intercorrelations among the independent variables to determine if the independent variables are strongly related to the dependent variable and not related to each other. Correlations were checked and all values were less than .7. A bivariate correlation of .7 or more may indicate multicollinearity and according to Tabachnick and Fidell (2007), if the correlation is too high, one variable should be omitted or a composite variable from the scores of the two highly correlated variables should be formed.

Collinearity diagnostics were also done and tolerance values and variance inflation factor (VIF) values were acceptable. The tolerance value provides an indication of how much of the variability of the specified independent variable is not explained by other independent variables and if the value is small (less than .1) the possibility of multicollinearity exists. The VIF value is an inverse of the Tolerance value and values above 10 indicate multicollinearity. If this occurs, one of the highly intercorrelating variables may

need to be removed. Table 2 displays collinearity statistics for the academic and nonacademic variables of the study.

Independence of errors. Logistic regression assumes that responses of different cases are independent of each other (Tabachnick & Fidell, 2007, p. 443). For this study, the dependent variable was dichotomous, that being pass or fail on the NCLEX with a pass response taking the value of probability 1 (P_1) and a fail response taking the value of 0 (P_0). A single case was represented in the data only once, therefore outcomes were statistically independent. Additionally, the outcome categories for this study were mutually exclusive and collectively exhaustive. In other words, clear criteria were established for each category (pass or fail) and each case in the logistic regression analysis was in one of these categories or the other.

Outliers. Outliers can influence the results in logistic regression; therefore it is necessary to check for outliers. Final analysis demonstrated that no outliers were present.

Pearson Product-Moment Correlation Coefficient

Correlation analysis using Pearson product-moment correlation coefficient was done to answer research question three, identifying the relationships that exist among self-efficacy, academic, and nonacademic variables of NCLEX passage.

The assumptions considered with this data analysis technique included level of measurement, related pairs, independence of observations, and linearity (McLaughlin & Marascuilo, 1990; Pallant, 2007). None of the assumptions were violated. The variables used in the test were continuous variables, each case provided a score for each variable investigated, and the observations in the data were independent of one another. Additionally, scatterplots of scores produced a straight line, indicating linearity.

Table 2

Collinearity Statistics: Academic and Nonacademic Variables

Academic Variables	Tolerance	VIF
Chemistry	.559	1.788
Fundamentals	.510	1.960
Medical-surgical	.540	1.853
Pharmacology	.530	1.888
Leadership-management	.492	2.031
Self-efficacy expectations	.858	1.165

Noncademic Variables	Tolerance	VIF
Primary language spoken	.921	1.086
Worry	.746	1.341
Health	.651	1.536
Work	.761	1.315
Primary language spoken	.921	1.086
Worry	.746	1.341
Health	.651	1.536
Work	.761	1.315
Home and family	.712	1.405
Personal and social	.708	1.412
Financial	.761	1.313
Self-efficacy expectations	.878	1.139

VIF = variance inflation factor

Support Vector Machine (SVM)

Support Vector Machine with sequential minimal optimization was used to explore its capability to predict NCLEX outcomes for the study sample. SVM is a machine learning method that is data-driven and can be used to make predictions on the basis of training from past data (Kalra & Ahmad, 2009). Several research studies are found that have used this data analysis procedure to make time-series forecasting about events such as stream-flow forecasting (Kalra & Ahmad, 2008; Asefa, Kemblowski, McKee, & Khalil, 2006), flood stage forecasting (Liong & Sivapragasam, 2002), and soil moisture predictions (Gill, Asefa, Kemblowski, & McKee, 2006). No nursing research studies were located that used SVM as a prediction model.

The learning paradigm for the model used in this study was unsupervised and a stratified 10- fold cross-validation was done to enhance the generalization ability of the network. In stratified 10-fold cross-validation, the data is divided randomly into 10 parts. Each part is held out in turn and the SVM model is trained on the remaining nine-tenths; then its error rate is calculated on the holdout set. Thus, the learning procedure is executed a total of 10 times and testing is done on 10 different sets. Finally, the 10 error estimates are averaged to yield an overall error estimate. All data was initially entered into the network and one variable at a time was eliminated from the model. Multiple performance measures were used to identify the most favorable input variables. The performance measures that were used include: (a) mean absolute error (MAE), (b) relative absolute error (RAE), (c) root mean squared error (RMSE), and (d) root relative squared error (RRSE).

The MAE measures the average magnitude of the errors in a set of predictions and can be used together with the RMSE to determine the variance in errors in the set of predictions. The greater difference between them, the greater the variance in individual errors in the sample. The RMSE is the square root of the mean square error (MSE), which measures the average of the square of the error. The RRSE is relative to what would have been if a simple predictor, which provides the average of the actual values, was used. This measure takes the square root of the relative squared error to reduce the error to the same dimensions as the number being predicted. The RAE is similar to the RRSE in that it is also relative to a simple predictor. However, the error is just the total absolute error instead of the total squared error.

Artificial Neural Network

An artificial neural network (ANN) provides a method of studying problems by using a parallel computational model of interconnective processing units. According to Hassoun (1995), this networking feature is adaptive in nature, allowing learning by example. In other words, a part of the sample of the study entered into the data base system of a neural network is treated as a training sample.

A literature search reveals an extensive use of artificial neural networks as a method to study problems in the environmental, biological, and engineering fields of study. It is also noted that artificial neural networks is used widely in the health arena to investigate the classification of diagnoses (deSilva, Hernandez, & Rangayyan, 2008; Anderson, Stromberg, Mat-Isa, Mashor & Othman, 2008; Ozsen, Kara, Latifoglu, & Gunes, 2007; Patnaik & Manyam, 2008). With regard to the area of academics, one study is located and the researchers applied artificial neural network analysis to identify predictors of success

for students admitted to an undergraduate medical school (van Heerden, Aldritch, & de Plessis, 2008). No studies were located that used ANNs as a methodology to investigate the predictors of NCLEX outcomes.

For this study, artificial neural networks (ANN) served as an alternative data analysis technique to SVM. In the context of machine learning, ANN is a non-linear statistical data modeling tool that can be used to model complex relationships between inputs and outputs or to find patterns in data sets (Steinwart & Christmann, 2008, p. 20). Following testing with SVM, two types of artificial neural networks were employed including Radial Base Functions (RBF) and Multi-layer Perceptrons (MLP). The findings were compared with those found from SVM analysis.

Ethical Considerations (Protection of Research Subjects)

Institutional Review Board (IRB) approval was sought from the University of Nevada, Las Vegas (UNLV) Office of the Protection of Research Subjects prior to implementing this study, and the protocol set forth by the IRB was followed throughout the entire study. In order to obtain an accessible population of nursing graduates, these potential participants needed to be contacted and informed about the research study when they were senior nursing students during their last semester of nursing school. Therefore, the researcher contacted each Office of the Protection of Research Subjects of the universities or colleges in which the accessible population was being sought to find out what the protocol and requirements were for contacting the senior nursing students and distributing recruitment materials. Once UNLV approval was obtained, the researcher submitted required documentation of UNLV approval and any other required protocol to participating institutions, as requested. The researcher contacted the dean, director, or

chairperson of the nursing department of the participating institutions to inform them about UNLV and their institution approval, and sought their approval for contacting and distributing a recruitment letter and flyer to senior nursing students. Once approval was obtained from the nursing department, the researcher collaborated with the nursing department or designates to develop a plan for contacting and distributing the recruitment materials to students.

An electronic survey was used to collect data from the participants of the research study. This method of data collection required an "after graduation email address" for the participant. No other information was needed from the participant to conduct the research study. The electronic survey method of data collection provided convenience for the participant because the participant was able to take the survey and answer the questions at a time that was most convenient for him or her. Consent to participate in the research study was also included in the electronic survey and was placed in the first part of the survey so that the participant had access to all required consent information before participating. An "Exit this Survey" button was located in the upper right hand corner of each page of the survey so that the participant could exit the survey at any time, if he or she wished to do so. Submitting the survey constituted consent for participating in the research study and use of the data collected for analysis and possible publication for this study, and for any future analysis and publication of the data. The electronic survey used in the study was designed so that the participant did not need to answer a question if he or she did not want to answer it. In other words, the participant was able to skip over questions and leave questions unanswered. Some sections of the survey presented prepared measurement tools that were created by others. Permission to use these prepared

measurement tools was requested and obtained from each of the copyright holders. Copies of these permissions are located in Appendix F, Appendix G, and Appendix H. To protect the privacy of the participant, the Internet Protocol (IP) function was shut off in the Survey Monkey program. Additionally, the database used in Survey Monkey was encrypted.

All information gathered in this research study was kept confidential. The principal investigator and the student investigator were the only persons with access to Survey Monkey to view participant responses. No reference was made in written or oral materials that could link the participant to the study. The surveys completed online through the Internet were saved on a flash drive and stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time, the flashdrive will be destroyed. The surveys completed online will be permanently deleted from the Survey Monkey system once all data was collected, saved on the flash drive, and imported into SPSS and the learning machine systems for analysis.

Summary

The purpose of this cross-sectional descriptive study was to explore the academic, nonacademic, and self-efficacy variables that influence NCLEX passage and identify the relationships that exist among self-efficacy, academic, and nonacademic variables of the study. A national sample of 196 graduates who completed their program from a nationally accredited baccalaureate degree nursing program located in the U.S. in 2009 participated in the study. Data was collected via an email survey using Survey Monkey and was collected at one point in time, after the participant took the NCLEX for the first time. This study aimed to provide new knowledge to nursing science about the predictors

for NCLEX outcomes. This knowledge may assist nurse educators to identify interventions that facilitate success on NCLEX and identify strategic points for intervention during the nursing program. Logistic regression was the primary data analysis method employed to investigate the academic, nonacademic, and self-efficacy variables that influence NCLEX passage. A support vector machine (SVM) model was used as a secondary testing method and the findings from this data analysis procedure was compared with a different learning machine used for data analysis, known as artificial neural networks (ANN). Correlation analysis using Pearson product-moment correlation coefficient was done to identify relationships existing among self-efficacy, academic, and nonacademic variables of NCLEX passage.

CHAPTER 5

FINDINGS OF THE STUDY

Introduction

This chapter presents the findings of this study and includes a results section and a summary. The results section provides a description of the sample, variables, and the reliability and validity of the instruments, followed by a discussion of the statistical findings for each research question. The summary provides a review of the findings.

To guide and implement this study, the following research questions were used.

1. Which academic or self-efficacy variables influence NCLEX passage for a student in a baccalaureate degree nursing program?
2. Which nonacademic or self-efficacy variables influence NCLEX passage for a student in a baccalaureate degree nursing program?
3. What relationships exist among self-efficacy, academic, and nonacademic variables of NCLEX passage for a student in a baccalaureate degree nursing program?

Results of the Study

The results section begins with a description of the sample, the variables, and the reliability and validity of the instruments. This is followed by the statistical findings for each research question, and the study findings using a support vector machine (SVM).

Description of the Sample

Included in this section is information about the following: (a) participating universities and participants, (b) participant response rate, (c) gender and age, (d) race/ethnicity, (e) primary language spoken, (f) geographic location of the nursing program, (g) type of nursing program, and (h) NCLEX failures. Chi-Square tests for Independence were con-

ducted to identify a relationship between demographics and NCLEX outcomes and these findings are provided.

Participating universities and participants. Ninety universities in the United States (U.S.) with accredited nursing programs were contacted to participate in this study. These nursing programs yielded an approximate accessible population of 3000 graduates in the year 2009. Of the 90 universities, 3 declined from participation because of preparation commitments related to an accreditation process or prior commitments to participate in other studies. Eighteen of the 90 universities required approval through their Institutional Review Board (IRB). Required information was submitted to ten IRBs and approval was received. The IRBs for the remaining 8 universities were not contacted because their review process was not compatible with the timing of this study. Consequently, recruitment information was sent to 79 universities for distribution to students, who if interested in participating were requested to contact the researcher. Of these 79 universities, 27 were located in the South, 20 in the West, 16 in the Midwest, and 16 in the North Atlantic.

Participant response rate. There were 214 individuals who contacted the researcher to become a participant in the study. Data was collected for a period of 7 months and of these 214 individuals, 196 (91.5%) participated and returned the electronic survey used in this study. Of importance is the response summary for the question regarding NCLEX outcome, the dependent variable of the study. For this question, 183 participants answered the question, whereas 13 (6%) did not. Of the 183 who provided data for the dependent variable, 86.9% (n = 159) recorded a pass and 13.1% (n = 24) recorded a fail. The NCLEX outcome survey question for the 13 participants who did not respond was noted as missing data and was not included in the data analysis procedures. To summar-

ize, 196 individuals participated in the study; however, 13 individuals did not provide a response to the survey question about NCLEX outcome. This yielded a final $n = 183$.

Gender and age. The majority of the study sample (89.1%; $n = 163$) reported their gender as female. Thus, 10.9% ($n = 20$) of the participants were male. The range of ages was 20 to 54 years with a mean age of 25.53 and standard deviation of 6.253. The Chi-square test for independence (with Yates Continuity Correction) showed no relationship between gender and NCLEX outcome, X^2 (1, $n = 183$) = .379, $p = .538$, phi = -.071. Although the Chi-square test for independence (with Pearson Chi-square) showed no relationship between age and NCLEX outcome, X^2 (26, $n = 182$) = 25.890, $p = .469$, Cramer's V =.377, thirty (16.4%) of the participants were 30 years of age or older and of these thirty participants only 1 (0.03%) recorded a fail. For those who were under the age of thirty (84.6%, $n = 152$), 23 (15.1%) recorded a fail.

Race/ethnicity. The study sample was from diverse backgrounds. The majority of participants (82.5%; $n = 151$) reported their race/ethnicity as Caucasian. Nonetheless, 8.7% ($n = 16$) were Hispanic; 4.4% ($n = 8$) were Black; 0.5% ($n = 1$) were Filipino; 0.5% ($n = 1$) were Asian; and 0.5% ($n = 1$) was American Indian. Although none of the participants selected Eskimo, Inuit, East Indian, Japanese, or Korean as race/ethnicity, 2.7% ($n = 5$) of the participants selected the Other category. For statistical analysis purposes, an Asian category was created that included Chinese, Japanese, and Korean, and the American Indian and East Indian categories were merged.

The Chi-square test for independence (with Pearson Chi-Square) indicated a significant relationship between race/ethnicity and NCLEX outcome, X^2 (6, $n = 183$) = 36.254, $p = .000$, Cramer's V = .445. Of interest to note is that the NCLEX outcome for Hispanic

participants (n = 16) was evenly distributed; 8 (50%) passed and 8 (50%) failed the NCLEX.

Most of the participants (94%; n = 172) grew up in the U.S.; 6% (n =11) did not. For those who did not grow up in the U.S., the number of years lived in the U.S. ranged from 3 to 30 years with a mean of 12.50 years and standard deviation of 7.512. A Chi-square test for independence (with Yates Continuity Correction) was conducted to investigate a relationship between NCLEX outcome and whether or not the participant grew up in the U.S; no relationship was found, X^2 (1, n = 183) = .003, p = .958, phi = -.038.

Primary language spoken. The participants' had six language choices to select from including: (a) English, (b) Chinese, (c) Japanese, (d) Korean, (e) Spanish, and (6) Other. No respondents selected Chinese, Japanese, or Korean. Therefore, for statistical analysis purposes the six categories were collapsed into three that included: (a) English, (b) Spanish, and (c) Other. The primary language spoken by the study participants was English (92.9%; n = 170). Participant selections for Spanish was 3.8%, n = 7, and selections for the Other category were 3.3%, n = 6. The Chi-square test for independence (with Pearson Chi-square) indicated a significant relationship between primary language spoken and NCLEX result, X^2 (2, n = 183) = 34.237, p = .000, Cramer's V = .433. Of importance to note is that of the 7 participants who selected Spanish as the primary language spoken, 85.7% (n = 6) failed the NCLEX and 14.3% (n = 1) passed.

Geographic location of the nursing program. Selections for geographic location of the nursing program included (a) Midwest, (b) North Atlantic, (c) South, and (d) West. Most participants (50%; n = 91) indicated that the nursing program was located in the North Atlantic. Of the remaining participants, 19.2% (n = 35) selected the South, 19.8%

(n = 36) selected the West, and 11% (n = 20) selected the Midwest. One participant did not respond to this question. The Chi-square test for independence (with Pearson Chi-square) indicated a significant relationship between geographical location and NCLEX result, X^2 (3, n = 182) = 13.206, p = .004, Cramer's V = .269. Of interest to note is that 10 (27.8%, n = 36) participants who recorded West as the geographical location failed the NCLEX and 4 (20%, n = 20) who recorded Midwest failed. Whereas, 10 (11%, n = 91) who recorded North Atlantic failed and no participant (n = 35) from the South failed.

Type of nursing program. The selections for the type of nursing program included private or public. The findings regarding the type of nursing program attended were essentially evenly distributed. Of the 183 participants, 42.9% (n = 90) selected private and 50.8% (n = 93) selected public. The Chi-square test for independence (with Yates Continuity Correction) showed no relationship between NCLEX outcome and the type of nursing program, X^2 (1, n = 183) = 1.018, p = .313, phi = -.091. A description of the sample and NCLEX outcome is noted in Table 3.

NCLEX failures. Of the 24 participants who reported a fail on the NCLEX, three contacted the researcher for assistance with remediation and preparation for retaking the NCLEX. Assistance was made available strictly via email correspondence and confidentiality was maintained. An individualized plan of study, resources, and email communication was provided. Each of these three participants reported via email correspondence that they achieved a pass on retaking the NCLEX.

Variables

Academic variables. For this study, six academic variables were selected for investigation and these included: (a) verbal SAT score, (b) college chemistry grade,

Table 3

Description of the Sample and NCLEX Outcome

Demographic	Finding	NCLEX Outcome		
	%(number)	N	Pass	Fail
Gender	Female = 89.1(163)	163	143	20
	Male = 10.9(20)	20	16	4
Age	Range = 20 – 54			
	Mean = 25.53			
	SD = 6.253			
Race/ethnicity	Caucasian = 82.5(151)	151	139	12
	Hispanic = 8.7(16)	16	8	8
	Black = 4.4(8)	8	7	1
	Filipino = 0.5(1)	1	1	0
	Asian = 0.5(1)*	1	0	1
	American/East Indian = 0.5(1)	1	0	1
	Other = 2.7(5)**	5	4	1
Grew up in the U.S	94(172)	172	150	22
Did not grow up in U.S.	6(11)	11	9	2
Years lived in U.S.	Range = 3 – 30			
	Mean 12.5			
	SD = 7.512			

Table 3 Continues

Table 3 Continued

Demographic	Finding %(number)	NCLEX Outcome N	Pass	Fail
Primary language	English = 92.9(170)	170	152	18
	Spanish = 3.8(7)	7	1	6
	Other = 3.3(6)***	6	6	0
Location of school	North Atlantic = 50(91)	91	81	10
	South = 19.2(35)	35	35	0
	West = 19.8(36)	36	26	10
	Midwest = 11(20)	20	16	4
School type	Private = 49.2(90)	90	81	9
	Public = 50.8(93)	93	78	15

*Asian includes Chinese, Japanese, Korean.
**Other includes Eskimo, Inuit.
***Other includes Chinese, Japanese, Korean.
SD=standard deviation.

(c) fundamentals grade, (d) medical-surgical grade, (e) pharmacology grade, and (f) leadership/management grade. However, since 53.5% (*n* = 105) of the 196 participants did not record a verbal SAT score, the verbal SAT score was excluded from the study.

All recorded course grades were included in the data analysis procedures. Category selection for course grades included: (a) A = 90-100, (b) B = 80-89, (c) C = 70-79, and (d) D = 60-69. For data analysis purposes, these categories were recoded as follows: (a)

A = 90-100 recoded to 95, (b) B = 80-89 recoded to 85, (c) C = 70-79 recoded to 75 and (d) D = 60-69 recoded to 65. Table 4 provides a summary of the descriptive findings for course grades for the 196 participants who submitted the survey.

Table 4

Descriptive Findings for Course Grades

Course Name	*N*	Mean	SD	Range	
				Minimum	Maximum
Chemistry	187	88.36	7.10048	75.00	95.00
Fundamentals	191	88.97	6.14557	75.00	95.0
Medical-surgical	192	86.77	6.13885	75.00	95.00
Pharmacology	191	87.46	6.54678	75.00	95.00
Leadership/management	192	90.05	7.23556	65.00	95.00

N = sample; SD = standard deviation

Nonacademic variables. For this study, personal and environmental factors/stressors were investigated. These factors/stressors were categorized as primary language spoken, out-of-school events/responsibilities, and worry. Self-efficacy expectations were also examined. Table 3 provides information about primary language spoken. Table 5 displays the frequency of responses for the Brief Measure of Worry Severity scale. Table 6 displays the finding for the General Perceived Self-Efficacy scale.

Reliability and Validity of the Instruments

Recent Life Changes Questionnaire (RLCQ) (Miller & Rahe, 1997). Miller and Rahe (1997) note that significant Spearman rho correlation coefficients of 0.84 to 0.96 were consistently demonstrated with the RLCQ; however, these correlations represent studies comparing demographically divided groups. Communication with Dr. Rahe, one author of the instrument, revealed that the best reliability test would be a test-retest comparison of the total LCU scores on two testings not too far apart in time. Dr. Rahe (personal communication, October 10, 2009) reports that an unpublished test-retest run conducted 4 weeks apart showed reliabilities for the subscales from 0.71 to 0.85. Making comparisons was not an objective of this study. Additionally, since data was collected at one point in time (after the participant took the NCLEX for the first time), test-retest was not feasible. For this study, the instrument was used to identify subscales that may have a negative effect on the individual and predict an outcome. A copy of the RLCU and their associated LCUs is located in Appendix C. Data collected in this study regarding the frequencies and percents of all Life Change Events are displayed in Appendix U. A copy of the personal communication held with Dr. Rahe is located in Appendix V.

The Brief Measure of Worry Severity (BMWS) (Gladstone, Parker, Mitchell, Malhi, Wilhelm, & Paule-Austin, 2004). Gladstone, Parker, Mitchell, Malhi, Wilhelm, and Paule-Austin (2004) note the BMWS demonstrated Cronbach's coefficient alphas ranging from 0.79 to 0.87. In this study, the Cronbach alpha coefficient was .907, indicating very good internal consistency reliability for the scale for this study sample.

Additionally, the 8 items of the BMWS were subjected to principal components analysis (PCA). Prior to performing PCA, the suitability of data for factor analysis was as-

sessed. Inspection of the correlation matrix revealed that all coefficients were above .3. Additionally, the Kaiser-Myer-Olkin value was .902 and the Bartlett's Test of Sphericity reached statistical significance (p = .000). These findings supported the factorability of the correlation matrix. A copy of the BMWS is located in Appendix D.

The PCA analysis also revealed the presence of one component with an eigenvalue at 4.853, explaining 60.663% of the variance, and inspection of the screeplot revealed a clear break after the first component. This finding was further supported by the results of Parallel Analysis, which showed only one component with an eigenvalue exceeding the corresponding criterion values for a randomly generated data matrix of the same size. Oblimin rotation was performed and revealed that 69.913% of the variance was explained. Communalities displayed extraction values above .3, indicating that the items fit well together. The frequency of responses recorded by participants for this scale is displayed in Table 5.

The General Perceived Self-Efficacy scale (Scholz, Gutierrez Dona, Sud, & Swartzer, 2002). For data analysis purposes and to remove extreme outliers, if the frequency of a response for an item in the instrument was less than four, the responses for the rating of the item was moved to the next highest rating. This was done for six of the items (items 4, 5, 6, 7, 9, 10) and with these items, responses were moved from the rating 1 = not true at all, to 2 = hardly true. The frequency of responses recorded before rating responses were moved is displayed in Table 6.

The authors of this instrument note that the higher the score, the higher self-efficacy expectations held by the individual (Schwarzer & Jerusalem, 1995). Also noted by the authors of the instrument was that the mean value in most samples is 29.28., indicating

that a total point value greater that 29 indicates an individual with high self-efficacy. Additionally, Schwarzer and Jerusalem (1995) indicate that the median of the sample should be used as the cut-off point to determine high and low levels of self-efficacy expectations.

According to Schwartzer and Jerusalem (1995) the scale has been tested globally in 23 nations to assess a general sense of perceived self-efficacy. Cronbach's coefficient alphas ranged from 0.76 to 0.90 with most scores in the high 0.80s. In this study, the Cronbach alpha coefficient was .963, indicating very good internal consistency reliability for the scale for this sample. The mean value was 30.8163 with a standard deviation of 7.5716; the median value was 32.0. A copy of the General Perceived Self-Efficacy scale is located in Appendix E.

The 10 items of this instrument were subjected to principal components analysis (PCA). Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed that all coefficients were above .3. The Kaiser-Myer-Olkin value was .964 and the Bartlett's Test of Sphericity reached statistical significance (p = .000). These findings supported the factorability of the correlation matrix.

The PCA analysis also revealed the presence of one component with an eigenvalue at 7.513, explaining 75.128% of the variance, and inspection of the screeplot revealed a clear break after the first component. This finding was further supported by the results of Parallel Analysis, which showed only one component with an eigenvalue exceeding the corresponding criterion values for a randomly generated data matrix of the same size. Oblimin rotation was performed and revealed that 80.423% of the variance was explained.

Communalities displayed extraction values above .3, indicating that the items fit well together.

Construct Validity. Construct validity was examined for the BMWS and The General Perceived Self-Efficacy scale using Pearson product-moment correlation coefficient to investigate the relationship between worry and self-efficacy. Findings revealed a medium, negative correlation between the two variables, r = -.312, n = 184, p = .000, with low levels of worry associated with high levels of self-efficacy.

Findings of the Research Questions

Research Question 1. A block approach method for logistic regression was used to investigate the academic and self-efficacy variables that influence NCLEX passage. The model included 169 cases. For this model, the academic variables were entered first followed by self-efficacy expectations scores. Of these 169 cases, 87% (n = 147) reported a pass on the NCLEX and 13% (n = 22) reported a fail. The model revealed statistical significance, X^2 (6, n=169) = 56.338, p = .000, indicating that the model was able to distinguish between respondents who reported a pass on the NCLEX and those who did not. The model correctly classified 91.7% of the cases with the following findings, -2 Log likelihood 74.374 and Hosmer and Lemeshow goodness-of-fit, X^2 (8, n=169) = 7.687, p = .465. The model as a whole explained between 28.3% (Cox and Snell R square) and 52.6% (Nagelkerke R Square) of the variance in NCLEX outcome. As shown in Table 7, the course grade that made a statistically significant contribution to the model was the medical-surgical grade showing a p = .021 and an odds ratio of 1.176. Additionally, self-efficacy expectations is statistically significant showing a p = .011 and an odds ratio of

1.258. This analysis indicates that the medical-surgical nursing grade and self-efficacy influence NCLEX passage.

Research Question 2. Using a block method, logistic regression was conducted to examine the nonacademic and self-efficacy variables that influence NCLEX passage. The model included 179 cases in the analysis and for this model, the nonacademic variables were entered followed by self-efficacy expectations scores. Of the 179 cases, 87% (n = 156) reported a pass on the NCLEX and 13% (n = 23) reported a fail. The model revealed statistical significance, X^2 (8, n=179) = 39.367, p = .000, indicating that the model was able to distinguish between respondents who reported a pass on the NCLEX and those who did not. The model correctly classified 90.5% of the cases with the following findings, -2 Log likelihood 97.930 and Hosmer and Lemeshow goodness-of-fit, X_2 (8, n=179) = 10.303, p = .244.

The model as a whole explained between 19.7% (Cox and Snell R square) and 36.9% (Nagelkerke R Square) of the variance in NCLEX outcome. As shown in Table 8, one of the independent variables made a statistically significant contribution to the model (home and family) showing a p = .039. In this subscale (home and family), the event that demonstrated the strongest influence was a major change in health or behavior of a family member (n = 64, 35%). Following this event, a major change in living conditions (n = 49, 26.8%) and a change in family get-togethers (n = 46, 25.1%) were events that had some influence on home and family events and responsibilities. Three of the study variables were marginal but not significant; these include: (a) financial, p = .055, (b) personal and social, p = .061, and (c) work, p = .066. Additionally, self-efficacy expectations is

Table 5

Frequency of Responses for the Brief Measure of Worry Severity Scale

Question	N	Not true at all	Somewhat true	Moderately true	Definitely true
1.When I worry, it interferes with my day-to-day function-ing (e.g., stops me getting my work done, or organizing my day).	190	30	85	53	22
2. When I think I should be finished worrying about something, I find myself worrying about the same thing over and over again.	190	37	77	56	20
3. My worrying leads me to feel down and depressed.	190	43	86	42	19

Table 5 Continues

Table 5 Continued

Question	N	Not true at all	Somewhat true	Moderately true	Definitely true
4. When I worry, it interferes with my ability to make decisions or solve problems.	190	62	71	42	15
5. I feel tense and anxious when I worry.	188	11	67	61	49
6. I worry that bad things and events are certain to happen.	190	81	65	30	14
7. I often worry about not being able to stop myself from worrying.	189	96	57	25	11
8. As a consequence of my worrying, I tend to feel emotional unease or discomfort.	192	52	70	42	28

N = sample

Table 6

Frequency of Responses for the General Perceived Self-Efficacy Scale

Question	N	Not true at all	Hardly true	Moderately true	Exactly true
1.I can always manage to solve difficult problems if I try hard enough.	188	0	9	102	77
2. If someone opposes me, I find means and ways to get what I want.	188	6	43	125	14
3. It is easy for me to stick to my aims and accomplish my goals.	188	0	4	81	103
4. I am confident that I could deal efficiently with unexpected events.	188	2	8	114	64

Table 6 Continues

Table 6 Continued

Question	N	Not true at all	Hardly true	Moderately true	Exactly true
5. Thanks to my resourcefulness, I know how to handle unforeseen circumstances.	187	1	15	119	52
6. I can solve most problems if I invest the necessary effort.	188	1	8	83	96
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	187	2	27	110	48
8. When I am confronted with a problem, I can usually find several solutions.	187	0	17	121	49

Table 6 Continues

Table 6 Continued

Question	N	Not true at all	Hardly true	Moderately true	Exactly true
9. If I am in trouble, I can usually think of something to do.	187	2	16	122	47
10. No matter what comes my way, I am usually able to handle it.	187	1	11	121	54

N = sample

statistically significant showing a $p = .006$ and an odds ratio of 1.231. This analysis indicates that the nonacademic variables influencing NCLEX passage is home and family events and responsibilities and self-efficacy expectations. Table 9 displays the frequency of responses and their associated percent for home and family events and responsibilities. The frequencies and percents of all Life Change Events are displayed in Appendix U.

Research Question 3. Correlation analysis using Pearson product-moment correlation coefficient was used to answer research question three, identifying the relationships that exist among self-efficacy, academic, and nonacademic variables of NCLEX passage.

Table 7

Significance, Odds Ratio, and CI for Academic and Self-Efficacy Variables

Variable	Sig.	Odds Ratio	95% CI for Odds Ratio	
			Lower	Upper
College chemistry	.957	1.003	.899	1.120
Fundamentals	.082	1.125	.985	1.286
Medical-surgical	.021	1.176	1.025	1.350
Pharmacology	.072	1.127	.989	1.283
Leadership/Management	.226	.944	.859	1.036
Self-efficacy expectations	.011	1.258	1.054	1.502

Sig. = significance; CI = confidence interval.

Findings revealed that all academic variables showed a positive correlation with self-efficacy, indicating that as the course grade increases, self-efficacy increases. For the nonacademic variables, negative correlations were noted between the variable and self-efficacy indicating an inverse effect between the variable and self-efficacy. Table 10 displays a correlation matrix of these findings and can be located following the summary.

Support Vector Machine (SVM) Findings

Support Vector Machine testing with sequential minimal optimization was used to explore its capability to predict NCLEX outcomes for the study sample. SVM is a machine learning method that is data-driven and can be used to make predictions on the basis of training from past data (Kalra & Ahmad, 2009). The

Table 8

Nonacademic and Self-Efficacy Variables and Significance

Variable	Sig.	Odds Ratio	95% CI for Odds Ratio	
			Lower	Upper
Primary language spoken	.842	.889	.279	2.831
Worry	.133	.923	.831	1.025
Health	.385	.995	.984	1.006
Work	.066	1.011	.999	1.023
Home and family	.039	.994	.989	1.000
Personal and social	.061	1.007	1.000	1.013
Financial	.055	.985	.971	1.000
Self-efficacy expectations	.006	1.231	1.063	1.425

Sig. = Significance; CI = Confidence Intervals

learning paradigm for the model was unsupervised and a stratified 10-fold cross-validation was done to enhance the generalization ability of the network. In stratified 10-fold cross-validation, the data is divided randomly into 10 parts. Each part is held out in turn and the SVM model is trained on the remaining nine-tenths; then its error rate is calculated on the holdout set. All data was initially entered into the network and one variable at a time was eliminated from the model. Multiple performance measures were used to identify the most favorable input variables were demonstrated.

Table 9

Home and Family Events: Frequencies and Percentages

Life Change Event	Frequency	Percent
Major change in living conditions.	49	26.8
Change in residence: a move within the same town or city.	33	18.0
Change in residence: a move to a different town, city, or state.	35	19.1
A change in family get-togethers.	46	25.1
Major change in health or behavior of a family member.	64	35.0
Marriage.	8	4.4
Pregnancy.	9	4.9
Miscarriage or abortion.	4	2.2
Gain of a new family member: birth of a child.	13	7.1
Gain of a new family member: adoption of a child.	0	0
Gain of a new family member: a relative moving in with you.	3	1.6
Spouse beginning or ending work.	11	6.0
Child leaving home to attend college.	6	3.3
Child leaving home due to marriage.	0	0
Child leaving home for other reasons.	2	1.1
Change in arguments with spouse.	16	8.7

Table 9 Continues

Table 9 Continued

Life Change Event	Frequency	Percent
In-law problems.	8	4.4
Change in the marital status of your parents: divorce.	8	4.4
Change in the marital status of your parents: remarriage.	3	1.6
Separation of spouse: due to work.	2	1.1
Separation of spouse: due to marital problems.	3	1.6
Divorce.	2	1.1
Birth of a grandchild.	0	0
Death of spouse.	0	0
Death of a child.	0	0
Death of a brother or sister.	1	0.5
Death of a parent.	12	6.6

Thus, the learning procedure was executed a total of 10 times and testing was done on 10 different sets. Finally, the 10 error estimates were averaged to yield an overall error estimate. The performance measures that were used to evaluate the prediction of the SVM model are reported in Table 11 and include: (a) mean absolute error (MAE), (b) relative absolute error (RAE), (c) root mean squared error (RMSE), and (d) root relative squared error (RRSE). Table 11 follows Table 10.

As noted previously, the MAE measures the average magnitude of the errors in a set of predictions. The RMSE is the square root of the mean square error (MSE). The MSE is a risk function corresponding to the expected value of the squared error loss and measures the average of the square of the error. The MAE and the RMSE measures can be used together to determine the variance in errors in the set of predictions. The greater difference between them, the greater the variance in individual errors in the sample. The RRSE is relative to what would have been if a simple predictor, which provides the average of the actual values, was used. This measure takes the square root of the relative squared error to reduce the error to the same dimensions as the number being predicted. The RAE is similar to the RRSE in that it is also relative to a simple predictor. However, the error is just the total absolute error instead of the total squared error.

Table 12 illustrates the SVM model used in this analysis and can be located after Table 11. Findings showed that the medical-surgical grade and the pharmacology grade were the variables that could best predict NCLEX outcomes with both variables showing a mean absolute error (MAE) 0.0694, relative absolute error (RAE) 29.6%, root mean squared error (RMSE) 0.2634, and root relative squared error (RRSE) 77.5%. The confusion matrix is also provided in Table 12. As noted, the findings for model 13 correctly predicted 148 cases that passed the NCLEX and 13 cases who failed. The models incorrectly predicted 10 cases who failed and 2 cases that passed.

Following testing with SVM, artificial neural networks (ANN) was used to analyze the data and findings were compared with those found with SVM analysis. Two types of ANN models were used: (a) Radial Base Functions (RBF) and Multi-Layer Perceptrons (MLP). In this study, artificial neural networks served as an alternative data analysis

technique to SVM. The findings from ANN analysis are presented in Table 13 and these findings are compared with the sequential minimal optimization model (SMO) findings noted in Table 12. The confusion matrix for ANN using the radial based function (RBF) shows that the model correctly predicted 144 cases that passed the NCLEX and 12 cases who failed. The model incorrectly predicted 11 cases who failed and 6 cases that passed. For the multilayer perceptrons (MLP) model, the confusion matrix shows that the model correctly predicted 142 cases that passed the NCLEX and 11 cases who failed. The model incorrectly predicted 12 cases who failed and 8 cases that passed. Comparison of ANN and the SVM model shows that better predictions were found using SVM.

A disadvantage of ANN is that it is prone to overfitting, which results in poor performance during testing and directly affects generalization quality (Kalra & Ahmad, 2009; Hassoun, 1995). Kalra and Ahmad (2009) also note that a disadvantage of ANN is that it is "data hungry" and that incorrect network definition such as the number of nodes and number of hidden layers may lead to overfitting (p. 2). For this reason, SVM is the superior model for predicting as compared to ANN.

Self-efficacy alone (without other variables) and its influence on NCLEX passage was investigated using a logistic regression model. The model included 179 cases in the analysis. Of the 179 cases, 87% (n = 156) reported a pass on the NCLEX and 13% (n = 23) reported a fail. The model revealed statistical significance, X^2 (1, n=179) = 21.071, p = .000 and an odds ratio of 1.312. This model was able to distinguish between respondents who reported a pass on the NCLEX and those who did not. The model correctly classified 87.2% of the cases with the following findings, -2 Log likelihood 116.225 and Hosmer and Lemeshow goodness-of-fit, X_2 (8, n=179) = 9.528, p = .300. The model as a

whole explained between 11.1% (Cox and Snell R square) and 20.7% (Nagelkerke R Square) of the variance in NCLEX outcome. These findings indicate that self-efficacy expectations influence NCLEX passage.

A final adjusted model was tested using logistic regression. This model included the significant variables found in the previous logistic regression analyses. These were the medical-surgical grade, home and family events and responsibilities, and self-efficacy. The model included 178 cases in the analysis. Of the 178 cases, 87% (n = 155) reported a pass on the NCLEX and 13% (n = 23) reported a fail. The model revealed statistical significance, X^2 (3, n=178) = 51.720, p = .000. This model was able to distinguish between respondents who reported a pass on the NCLEX and those who did not. The model correctly classified 92.1% of the cases with the following findings, -2 Log likelihood 85.301 and Hosmer and Lemeshow goodness-of-fit, X_2 (8, n=178) = 5.696, p = .681. The model as a whole explained between 25.2% (Cox and Snell R square) and 47.0% (Nagelkerke R Square) of the variance in NCLEX outcome. Significant findings are noted for the medical-surgical grade and self-efficacy expectations. Although not significant, home and family events and responsibilities reveal marginal significance at p = .074. Table 14 illustrates these findings.

Summary

The block approach method for logistic regression was used to assess the influence of selected factors on the likelihood that respondents would report that they passed the NCLEX examination. Two logistic regression models were tested to answer research questions one and two. The first model answered research question one and investigated the academic and self-efficacy variables that influence NCLEX passage. The second

model answered research question two and investigated the nonacademic and self-efficacy variables that influence NCLEX passage.

The logistic regression model that answered research question 1 revealed statistical significance, showing X^2 (6, n=169) = 56.338, p = .000 and that the medical-surgical grade made a statistically significant contribution showing a p = .021 and an odds ratio of 1.176. Additionally, self-efficacy expectations was statistically significant showing a p = .011 and an odds ratio of 1.258. Hence, the medical-surgical grade and self-efficacy expectations influence a pass on the NCLEX.

The findings for the logistic regression model that answered research question 2 also revealed statistical significance, showing X^2 (8, n=179) = 39.367, p = .000 and that home and family events and responsibilities made a statistically significant contribution to the model showing a p = .039. Additionally, self-efficacy expectations is statistically significant showing a p = .006 and an odds ratio of 1.231. Therefore, this model revealed that the nonacademic variables influencing a pass on the NCLEX is home and family events and responsibilities and self-efficacy.

To answer research question three, Pearson product-moment correlation coefficient was used. Correlation analysis revealed that all academic variables showed a positive correlation with self-efficacy, indicating that as a course grade increases self-efficacy increases. For the nonacademic variables, correlation analysis revealed negative correlations between the variable and self-efficacy. Thus, as worry or events and responsibilities increase for the individual, self-efficacy decreases.

A SVM model was also employed to explore the potential of this data analysis technique to predict NCLEX outcomes. The findings showed that the medical-surgical grade

and the pharmacology grade were the variables that could best predict NCLEX outcomes with both variables showing a mean absolute error (MAE) 0.694, relative absolute error (RAE) 29.6%, root mean squared error (RMSE) 0.2634, and root relative squared error (RRSE) 77.5%.

Finally, two additional logistic regression models were tested. First, self-efficacy was tested alone and the model revealed statistical significance, X^2 (1, n=179) = 21.071, p = .000 with an odds ratio of 1.312, indicating that self-efficacy influenced NCLEX passage. Second, a final adjusted model was tested that included the medical-surgical grade, home and family events and responsibilities, and self-efficacy. The model revealed statistical significance, X^2 (3, n=178) = 51.720, p = .000 and significant findings were noted for the medical-surgical grade and self-efficacy expectations. However, home and family events and responsibilities revealed only marginal significance at p = .074.

Table 10

Correlation Matrix: Pearson Correlations of Variables and Self-Efficacy

	Chem	Fund	MS	Phar	LM	Worry	H	W	HF	PS	F	SEE
Chem	1.00											
Fund	.439	1.00										
MS	.476	.585	1.00									
Phar	.582	.501	.563	1.00								
LM	.553	.618	.582	.524	1.00							
Wor	-.188	-.056	-.161	-.161	-.141	1.00						
H	-.015	.044	-.031	-.083	-.001	.323	1.00					
W	.003	.047	.005	-.074	.040	.303	.381	1.00				
HF	-.071	.000	-.145	-.159	-.106	.324	.268	.343	1.00			
PS	.027	.104	.018	-.047	.017	.221	.504	.248	.252	1.00		
F	-.115	-.039	-.069	-.128	-.077	.216	.236	.276	.415	.260	1.00	
SEE	.311	.297	.225	.258	.326	-312	-.078	-.058	-.195	-.005	-.134	1.00

Chem = chemistry; Fund = Fundamentals; MS = medical-surgical; Phar = pharmacology; LM = leadership/management; H = health; W = work; HF = home and family; PS = personal and social; F = financial; SEE = self-efficacy expectations.

Table 11

Performance Measures and Formulas for Prediction in SVM

Performance Measure	Formula
Root-Mean-Squared Error (RMSE)	
Mean Absolute Error (MAE)	
Root Relative Squared Error (RRSE)	
Relative Absolute Error (RAE)	

SVM=Support Vector Machine

Table 12

SVM Models, MAE, RAE, RMSE, RRSE, and Confusion Matrix

SVM MODEL	C #(%)	I #(%)	MAE	RAE	RMSE	RRSE	Confusion Matrix	
							Fail (correct)* Pass (incorrect)*	Fail(incorrect)* Pass (correct)*
Baseline	150(86)	23(13.3)	0.234	100%	0.3397	100%	0	23
							0	150
SMO	160(92.5)	13(7.5)	0.0751	32.1%	0.2741	80.7%	10	13
							0	150
Model 3 (drop chem)	160(92.5)	13(7.5)	0.0751	32.1%	0.2741	80.7%	10	13
							0	150
Model 4 (drop fund)	161 (93)	12(7)	0.0694	29.64%	0.2634	77.53%	11	12
							0	150
Model 5 (drop lang)	160(92.5)	13(7.5)	0.0751	32.1%	0.2741	80.7%	10	13
							0	150

Table 12 Continues

Table 12 Continued

SVM MODEL	C #(%)	I #(%)	MAE	RAE	RMSE	RRSE	Confusion Matrix	
							Fail (correct)* Pass (incorrect)*	Fail(incorrect)* Pass (correct)*
Model 6 (drop L/M)	161(93)	12(7)	0.0694	29.64%	0.2634	77.53%	11	12
							0	150
Model 7 (drop work)	161(93)	12(7)	0.0694	29.64%	0.2634	77.53%	11	12
							0	150
Model 8 (drop fin)	160(92.5)	13(7.5)	0.0751	32.1%	0.274	80.7%	12	11
							2	148
Model 9 (drop health)	160(92.5)	13(7.5)	0.0751	32.1%	0.274	80.7%	12	11
							2	148
Model 10 (drop H/F)	159(91.9)	14(8.1)	0.08	34.6%	0.28	83.7%	11	12
							2	148
Model 11 (drop P/S)	160(92.5)	13(7.5)	0.0751	32.1%	0.274	80.7%	12	11

Table 12 Continues

Table 12 Continued

SVM MODEL	C #(%)	I #(%)	MAE	RAE	RMSE	RRSE	Confusion Matrix	
							Fail (correct)* Pass (incorrect)*	Fail(incorrect)* Pass (correct)*
							2	148
Model 12 (drop worry)	160(92.5)	13(7.5)	0.0751%	32.1%	0.274	80.7%	12	11
							2	148
Model 13 (drop SEE)	161(93)	12(7)	0.0694%	29.6%	0.2634	77.5%	13	10
							2	148
Model 14 (drop MS)	155(9.6)	18(10.4)	0.104	44.5%	0.32	94.9%	13	10
							8	142
Model 15 (drop pharm)	155(89.6)	18(10.4)	0.104	44.5%	0.32	94.9%	13	10
							8	142

Prepared by Dr. Sajjad Ahmad. SVM=support vector machine; C #(%)=correct number(%); I #(%)= incorrect number(%); MAE=mean absolute error; RAE=relative absolute error; RMSE=root mean-squared error; RRSE=root relative squared error; SMO=sequential minimal optimization model; chem=chemistry; fund=fundamentals; lang=language; L/M=leadership/management; fin=financial; H/F=home and family; P/S=personal and social; SEE=self-efficacy expectations; MS=medical-surgical; pharm=pharmacology; * = predicted. Note: *n* = 173.

Table 13

ANN Models, Radial Based Function (RBF), Multi-Layer Perceptrons (MLP), and Confusion Matrix

ANN Model	C #(%)	I #(%)	MAE	RAE	RMSE	RRSE	Confusion Matrix	
							Fail (correct)*	Fail (incorrect)*
							Pass (incorrect)*	Pass (correct)*
RBF	156(90.2)	17(9.8)	0.1464%	62.6%	0.2939	86.5%	12	11
							6	144
MLP	153(88.4)	20(11.6)	0.1188%	49.5%	0.32	94.9%	11	12
							8	142

Modified from ANN Model Description Findings prepared by Dr. Sajjad Ahmad.
ANN=artificial neural network; C #(%)=correct number(%); I #(%)= incorrect number(%); MAE=mean absolute error; RAE=relative absolute error; RMSE=root mean-squared error; RRSE=root relative squared error.
Note: n = 173.

Table 14

Final Adjusted Logistic Regression Model

Variable	Sig.	Odds Ratio	95% CI for Odds Ratio	
			Lower	Upper
Medical-surgical	.000	1.273	1.140	1.422
Home and family	.074	.995	.990	1.000
Self-efficacy	.007	1.244	1.061	1.458

Sig. = significance; CI = Confidence Intervals

CHAPTER 6

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This chapter includes the following: (a) summary of the research study, (b) discussion of the findings, (c) limitations of the study, (d) implications for nursing education, and (e) the recommendations for future research. It concludes with a summary.

Summary of the Research Study

The purpose of this study was to identify academic, nonacademic, and self-efficacy variables that influence NCLEX passage, with an aim of providing new knowledge to nursing science about these predictors. The dependent variable for this study was NCLEX outcomes (pass or fail). Selected pre-nursing course scores/grades and nursing course grades were the academic independent variables of the study and included the following: (a) verbal score on the Scholastic Aptitude Test (SAT), (b) college chemistry grade, (c) fundamentals grade, (d) medical-surgical grade, (e) pharmacology grade, and (f) leadership/management grade. Personal and environmental factors/stressors were the nonacademic independent variables and included: (a) primary language spoken, (b) worry, (c) out-of-school events and/or responsibilities, and (d) self-efficacy expectations.

The theoretical framework that guided this study was Albert Bandura's Social Learning Theory (Social Cognitive Theory). According to this theory, an individual's behavior is determined by the reciprocal interaction of three factors including: (a) personal factors, (b) behavior, and (c) environment (Bandura, 1977). This theory contends that behavior is regulated antecedently through cognitive processes and psychosocial experiences. These processes and experiences affect self-efficacy and determine the response consequences; that is, whether the individual will perceive self-efficacy as high or low. Thus, the re-

sponse consequences are used to form expectations of behavioral outcomes. There are several core aspects addressed in Social Learning Theory, but for this study, the concept of self-efficacy expectations was the focus.

Seventy nine (79) universities in the United States (U.S.) with accredited nursing programs were contacted to participate in this study. Twenty-seven (27) universities were located in the South, 16 in the North Atlantic, 16 in the Midwest, and 20 in the West. There were 214 individuals who contacted the researcher to become a participant in the study. Of these 214 individuals, 196 (91.5%) participated and returned the electronic survey used in this study. Data collection was done for a period of 7 months and data was collected at one point in time, after the participant took the NCLEX for the first time. An electronic survey created in Survey Monkey was used to collect data about demographics, academics and nonacademics including self-efficacy expectations, and the NCLEX result. Three instruments were used including: (a) the Recent Life Changes Questionnaire (RLCQ) (Miller & Rahe, 1997), (b) the Brief Measure of Worry Severity (BMWS) (Gladstone, Parker, Mitchell, Malhi, Wilhelm, & Paule-Austin, 2005), and (c) the General Perceived Self-Efficacy scale (Scholz, Gutierrez Dona, Sud, & Schwarzer, 2002). Thirteen (13) of the 196 participants did not answer the question about NCLEX outcome, the dependent variable of the study. Therefore, these 13 participants were excluded from the study, yielding a final $n = 183$.

Once data collection were complete, three data analysis methods were used to examine the data. Logistic regression was used as the predictor model to identify the academic, nonacademic, and self-efficacy variables that influence NCLEX passage, and Pearson product-moment correlation coefficient was used to identify the relationships

that exist among self-efficacy, academic, and nonacademic variables of NCLEX passage. A third model known as a Support Vector Machine (SVM) was employed to investigate its capability to predict NCLEX outcomes for the study sample.

Logistic regression analysis was done using a block approach. The initial analysis revealed that 53.5% (n = 105) of the participants did not record a verbal SAT score; therefore, the verbal SAT score was excluded from the study. Subsequent analysis revealed that the medical-surgical grade, home and family events and responsibilities, and self-efficacy influenced NCLEX passage. However, when a final adjusted logistic regression model was tested, home and family revealed marginal significance (p = .074) while the medical-surgical grade (p = .000) and self-efficacy (p = 007) remain significant.

Pearson product-moment correlation coefficient revealed that all academic variables showed a positive correlation with self-efficacy, indicating that as a course grade increases self-efficacy increases. For the nonacademic variables, correlation analysis revealed negative correlations between the variable and self-efficacy. Thus, as worry or events and responsibilities increase for the individual, self-efficacy decreases. Finally, SVM analysis revealed that the variables that could best predict NCLEX outcomes were the medical-surgical grade and the pharmacology grade.

Discussion of the Findings

This section provides a discussion of the findings of the study and includes the following sections: (a) demographic data, (b) academic data, (c) nonacademic data, and (d) data related to self-efficacy expectations.

Demographic Data

Several researchers found that age or gender was not significantly correlated with NCLEX success (Beeman & Waterhouse, 2001; Beeson & Kissling, 2001; McKinney, Small, O'Dell, & Coonrod, 1988; Mills, Becker, Sampel, & Pohlman, 1992; Roncoli, Lisanti, & Falcone, 2000; Sayles, Shelton, & Powell, 2003). The findings of this study also showed no relationship between age (p = .469) or gender (p = .538) and NCLEX outcome. However, important to note is that this study found that thirty (16.4%) of the participants were 30 years of age or older and of these thirty participants only 1 (0.03%) recorded a fail. For those who were under the age of thirty (84.6%, n = 152), 23 (15.1%) recorded a fail. Some studies were located that indicate that nontraditional college-age students had a higher percent pass rate than traditional age students (Beeson & Kissling, 2001; Briscoe & Anema, 1999; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003). So although this study demonstrated that age was not statistically correlated with NCLEX outcome, the finding that nontraditional college-age students had a higher percent pass rate than traditional age students suggests that further attention is warranted toward investigating age as a predictor.

With regard to race, Endres (1997) notes that race is unrelated to NCLEX success, whereas Sayles, Shelton, and Powell (2003) reported that African Americans had a significantly higher failure rate than Caucasians. Likewise, Briscoe and Anema (1999) found that international students and students from Africa had higher failure rates. This study demonstrated a relationship between race/ethnicity and NCLEX outcome. Of interest to note is that the NCLEX outcome for the Hispanic participants (n = 16) was evenly distributed; 8 (50%) passed and 8 (50%) failed the NCLEX. This study did not find that

participants who recorded Black as race/ethnicity were at risk for failure. In fact, study findings showed that only 1 respondent from this ethnic group (n = 8) reported a fail.

This study investigated an association between years lived in the U.S. and its relationship to NCLEX outcome, even though no other studies were located that examined this variable. No relationship was demonstrated. For this study sample, most of the participants (94.0%; n = 172) grew up in the U.S.; 6.0% (n =11) did not. For these 11 participants, the number of years lived in the U.S. ranged from 3 to 30 years with a mean of 12.50 years and standard deviation of 7.512. A Chi-square test for independence (with Yates Continuity Correction) was conducted to investigate a relationship between NCLEX outcome and whether or not the participant grew up in the U.S; no relationship was found, X^2 (1, n = 183) = .003, p = .958, phi = -.038.

No studies were located that specifically cited a relationship between geographical location of the nursing program or type of nursing program and NCLEX outcome. This study investigated these relationships and found that there was no relationship between the type of nursing program (public or private) and NLCEX outcome. However, this study did demonstrate a relationship between geographic location and NCLEX outcome X^2 (3, n = 182) = 13.206, p = .004, Cramer's V = .269. Noted was that a higher percent of failures attended school in the West and Midwest. Ten (27.7%) of the 36 participants who recorded West as the geographical location failed the NCLEX and 4 (20%) of the 20 who recorded Midwest failed. In the North Atlantic, 10 (11%, n = 91) failed. There were no failures in the South (n = 35).

Questionable to the researcher of this study was the rationale for findings related to geographical location and NCLEX failure. Because evidence from this study showed a

relationship between race/ethnicity, primary language spoken, and NCLEX outcome, the researcher looked at residential location of the Hispanic participants and the Spanish as the primary language spoken participants. Of the Hispanic participants, 7 (19.4%, *n* = 36) selected West, 2 (10%, *n* = 20) selected Midwest, 7 (7.69%, *n* = 91) selected North Atlantic, and 1 (2.8%, *n* = 35) selected South. For participants who indicated Spanish as the primary language, 5 (13.9%, *n* = 36) selected West, 2 (10%, *n* = 20) selected Midwest, 0 (0%, *n* = 91) selected North Atlantic, and 0 (0%, *n* = 35) selected South. Therefore, the rationale for the higher failure rates in the West and Midwest could be attributed to the greater number of Hispanic students and Spanish as the primary language spoken students attending nursing programs in these areas as compared to other areas.

Academic Data

Some studies showed that students who were successful on NCLEX had significantly higher science grades, SAT, and American College Test Assessment (ACT) scores as compared to students who failed (Alexander, 1997; Briscoe & Anema, 1999; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003; Roncoli, Lisanti, & Falcone, 2000). Other studies also demonstrated that entrance criteria, standardized exams, nursing theory grades, and GPA significantly relate to NCLEX success (Beeson & Kissling, 2001; Campbell & Dickson, 1996; Crow, Handley, Morrison, & Shelton, 2004; Foti & deYoung, 1991; Krupa, Quick, & Whitney, 1988; McKinney, Small, O'Dell, & Coonrod, 1988; Quick, Krupa, & Whitney, 1985; Seldomridge & DiBartolo, 2004; Stuenkel, 2006; Waterhouse & Beeman, 2003).

Foti and DeYoung (1991) investigated the effect of the SAT verbal score and noted that students with an SAT verbal score over 400 were successful in passing the NCLEX.

For this study, the verbal SAT score was selected as a variable. However, as mentioned previously, this variable had to be excluded because the sample size was inadequate.

Few studies are noted in the literature that investigated chemistry as a predictor of NCLEX outcomes. A study done by Heupel (1994) showed that chemistry did not appear to be a good predictor of NCLEX success. Yet, Campbell and Dickson (1996) noted that grades in science courses were the best predictors of NCLEX success. Additionally, a more recent study done by Yin and Burger (2003) demonstrated that course grades in the natural sciences (chemistry, microbiology, and anatomy and physiology) are positively related to NCLEX success. This study investigated the college chemistry grade as a predictor of NCLEX outcomes; no relationship was found. However, since conflicting findings are noted, it would be worthwhile to investigate the chemistry grade and other natural science grades as academic predictors in future research studies.

With regard to nursing courses, Stuenkel (2006) notes that grades in pharmacology, pathophysiology, medical-surgical, maternal-child, mental health, community, and leadership correlated with NCLEX success and concluded that those who passed NCLEX held higher mean scores for nursing theory grades. Beeman and Waterhouse (2001) also indicate that nursing course grades were significantly related to NCLEX success and many studies have demonstrated that low grades in a number of selected nursing courses place the student at risk for NCLEX failure (Barkley, Rhodes, & Dufour, 1998; Beeman & Waterhouse, 2001; Beeson & Kissling, 2001; Stuenkel, 2006). Other researchers note that failure in even one nursing course is associated with NCLEX failure (Alexander, 1997; Endres, 1997; Roncoli, Lisanti, & Falcone, 2003).

This study investigated grades in fundamentals, medical-surgical, pharmacology, and leadership/management; and logistic regression analysis found that the only nursing course grade demonstrating a relationship with self-efficacy's effect on NCLEX outcomes was the medical-surgical grade. Likewise, SVM analysis showed that the medical-surgical grade was a variable that could predict NCLEX outcomes. Additionally, SMV analysis revealed that the pharmacology grade was a predictable variable. The findings from this study and those from previous studies reveal a trend, in that nursing course grades are an important factor in predicting NCLEX outcomes.

Nonacademic Data

Although not in abundance, some studies addressing nonacademic predictors are noted in the literature. Arathuzik and Aber (1998) noted that students who did not speak English as the primary language at home did not do well on NCLEX. The literature also notes that many English as a second language (ESL) students have testing difficulties (Femea, Gaines, Braithwaite, & Abdur-Rahman, 1995; Jalili-Grenier & Chase, 1997).

This study investigated primary language spoken as a nonacademic variable of the study. Although logistic regression analysis did not reveal primary language spoken influencing self-efficacy's effect on NCLEX, the Chi-square goodness of fit test revealed a significant relationship X^2 (2, n = 183) = 34.237, p = .000, Cramer's V = .433, indicating that primary language spoken affects NCLEX outcome. Noted was that out of the 7 participants who selected Spanish as the primary language spoken, 6 (85.7%) failed the NCLEX and 1 (14.3%) passed. This finding is similar to findings of previous research, indicating a trend that may not be surprising. Yet, this finding merits greater attention es-

pecially since population projections indicate that the minority population is expected to become the majority by the year 2042 (U.S. Census Bureau, 2008).

Arathuzik and Aber (1998) note significant correlations between success and lack of family demands or responsibilities, lack of emotional stress, and sense of competency. Poorman and Martin (1991) looked at the relationship between performance on the NCLEX and differences in test anxiety, cognitions related to testing, and academic performance and concluded that variables other than academic ones were the best predictors of actual NCLEX scores. Likewise, Hight (1996), and Mills, Wilson, and Bar (2001) linked test anxiety and stress to poor performance on exams. Campbell and Dickson (1996) found that test anxiety and self-concept/esteem showed some correlation with NCLEX success.

Poorman and Webb (2000) conducted a qualitative study on nursing graduates who failed the NCLEX and found that after failing, these graduates felt abandoned and cut off from faculty who had been important in their learning experience. Eddy and Epeneter (2002) interviewed graduates who passed and failed the NCLEX on first attempt and found that those who passed accepted responsibility for learning, were proactive in test preparation, took the exam when they felt ready, and used stress management techniques during testing. For those who failed, noted was that they tended to perceive that their lack of success was the responsibility of others, that they were less able to manage stress, and took the exam when they did not feel ready.

This study explored worry and out-of-school events and responsibilities and their influence on NCLEX passage. No relationship was found between worry and NCLEX outcome. However, home and family events and responsibilities demonstrated a relationship

with the strongest influence being a major change in health or behavior of a family member. Following this event, a major change in living conditions and a change in family get-togethers were events that had an impact.

A surprising finding was that worry did not affect NCLEX outcomes. One explanation for this could be that worry is embedded in other factors, specifically those found to be significant in this study. Clearly expected was that home and family events and responsibilities impact success and the greater these responsibilities, the greater the risk for achieving success.

Self-Efficacy Expectations

Numerous research studies have been located that demonstrated self-efficacy's importance in students' success in academic and practice setting (Bong, 2004; Bong & Skaalvik, 2003; Gore, 2006; Linnenbrink & Pintrich, 2003; Pajares, 2003; Pajares & Schunk, 2001; Schunk, 2003). Studies also note that academic self-efficacy beliefs can be used to predict college students' academic performance (Pajares, 1991; Zimmerman, Bandura, & Martinez-Pons, 1992).

Many nursing research studies evaluated self-efficacy's influence in health care and in success with academic studies. Some of these studies investigated health-related behaviors (Ali, 1998), health promotion (Boehm, Coleman-Burns, Schlenk, Funnell, Parzuchowski, & Powell, 1995; Condiotte & Lichtenstein, 1981; Resnick, 2001), managing acute and chronic illness (Bijl, Poelgeest-Eeltink, & Shortridge-Baggett, 1999; Borsody, Courtney, Taylor, Jairath, 1999), and patient education (Moon & Backer, 2000; Resnick & Spellbring, 2000; Washington, 2001). The literature also indicates that the concept of self-efficacy has been explored as it relates to self-expectations of the advanced practice

nurse (Berarducci & Lengacher, 1998) and to teacher and mentor self-efficacy expectations (Hayes, 1998; Nugent, Bradshaw, & Kito, 1999). Findings reveal that self-efficacy affects outcomes.

Mills, Wilson, and Bar (2001) conducted a qualitative study and found that personal perceptions of the ability to pass the NCLEX affected outcomes. Otherwise, studies that specifically addressed self-efficacy expectations and its direct effect on NCLEX success were not found. In the area of nursing education, some studies were located that considered the effect of self-efficacy on performance and focused on the following: (a) self-efficacy expectations of senior baccalaureate nursing students and preceptors (Goldenberg, Iwasiw, & MacMaster, 1997), (b) the effects of computer-assisted instruction on the self-efficacy of baccalaureate nursing students in learning theory (Madorin & Iwasiw, 1999), (c) self-efficacy predicting academic performance in the sciences of a first-year undergraduate nursing program (Andrew, 1998), (d) self-efficacy and its effect on achievement in mathematical calculations (Hodge, 1999), and (e) the use of academic and clinical self-efficacy to identify problems with progression in undergraduate nursing students (Harvey & McMurray, 1994). Findings of these studies showed that self-efficacy affected performance, and Harvey and McMurray (1994) found that academic self-efficacy factors (but not clinical self-efficacy) were predictive of course withdrawal.

This study showed that self-efficacy expectations affected NCLEX passage. Additionally, correlation analysis revealed that all academic variables showed a positive correlation with self-efficacy, indicating that as the course grade increases, self-efficacy increases. For the nonacademic variables, negative correlations were noted between the va-

riable and self-efficacy, indicating that as worry or personal events and responsibilities increase, self-efficacy decreases.

In conclusion, further study needs to be done exploring self-efficacy and its effect on NCLEX passage. As noted previously, studies found that self-efficacy expectations affect student performance so one would think that these findings could be generalized. Therefore, it makes sense that that the findings of this study showed these relationships: as a course grade increases, self-efficacy expectations increase and when worry or personal events and responsibilities increase, self-efficacy expectations decrease. This in turn affects NCLEX outcome. This is not a surprising finding, yet it presents implications for nursing education with regard to discovering ways to increase a student's self-efficacy expectations and ways for providing support systems for those who are burdened by out-of-school events and responsibilities. Somewhat unforeseen was that the final adjusted model for logistic regression revealed home and family marginal (p = .074) but insignificant. Therefore, further study is warranted.

Study Limitations

One study limitation was that the verbal SAT score needed to be excluded from the statistical analysis. Exclusion was done because over one-half (53.5%, n = 105) did not record a verbal SAT score. Accordingly, 105 participants for this study either never took the SAT and thus did not have a score to report or chose not to answer the survey questions requesting this score. Vittinghoff and McCulloch (2006) noted that a minimum of 10 cases per predictor variable for logistic regression analysis is adequate. Therefore, the minimum sample size for the logistic regression model needed to be 130. Inclusion of the verbal SAT score in the logistic regression model yielded an inadequate sample size.

Another limitation of this study relates to the recruitment process. Eighteen of the 90 universities selected to participate required approval through their Institutional Review Board (IRB) to seek participants. Pursuing participation for 8 of the universities requiring IRB was not done because their IRB review process was not compatible with the timing of this study. Therefore, not all of the 90 nursing programs could be contacted to participate in this study. Initiating the recruitment process earlier than what was done for this study could have provided the time needed to seek IRB approval, possibly resulting in an increased sample size.

With regard to the recruitment process, an additional limitation was the time of the year in which participants were sought. Most potential participants received recruitment information during the month before graduation. Although thought to be the best time to seek participants, concluded was that at this time senior students were preparing for several events related to the program completion process, and these events were their priority. Introducing the research study to potential participants early in the final semester of the nursing program may have resulted in greater participation.

The researcher of this study also had to rely on others to introduce the study to potential participants and distribute recruitment materials. This was seen as a limitation of the study because although directions were provided for the distribution of recruitment materials, it was difficult to know exactly what procedures were done and if the same procedures were followed throughout. Although follow-up was done with the participating universities, the researcher could not ensure that materials reached the potential participants via the method planned. Enrolling students to participate in the study would be more effective if student and researcher face-to-face contact could have occurred. How-

ever, this enrollment method was not feasible from a geographical standpoint because schools across the nation participated.

Implications for Nursing Education

An evolving body of knowledge about the predictors of NCLEX outcomes exists, and this knowledge provides insights to nursing education for planning curricular and assessment and intervention strategies that will meet individual student needs.

Noted in this research study and in others was that although age is not a statistically significant predictor to NCLEX success, nontraditional college-age students have a higher percent pass rate than traditional age students (Beeson & Kissling, 2001; Briscoe & Anema, 1999; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003). For nursing education, age should be a factor to consider when planning support services for students. If a program primarily admits students who recently graduated from high school, support systems may be needed more so than would be needed by programs enrolling primarily non-nontraditional college-age students. However, one would suppose that nontraditional college-age students would have more home and family responsibilities than the traditional college-age student, and this may be the case. Yet, this study shows that nontraditional college-age students have a higher NCLEX pass rate. One explanation could be that older students are better able to deal with several coexisting events in their lives. Regardless, this finding provides nursing education with information about the likelihood of success for programs of study designed specifically for nontraditional students or those seeking a second degree.

Based on the population projections and the expected growth of the minority population (U.S. Census Bureau, 2008), nurse educators will be faced with teaching more ESL

students than they have in the past. ESL students have unique challenges that threaten his or her success on NCLEX (Femea, Gaines, Braithwaite, & Abdur-Rahman, 1995; Jalili-Grenier & Chase, 1997). Findings from this study showed that the Hispanic population and those who speak Spanish as the primary language are at risk for NCLEX failure. Also noted in this study is that more Hispanic participants and those who speak Spanish as the primary language attended nursing programs in the West or Midwest than in the North Atlantic and South regions. Educational challenges for all nurse educators will increase with regard to developing strategies that will meet this populations needs to ensure success. However, nurse educators in the West and Midwest will be most challenged, requiring administrative assistance for putting in place the necessary resources and support services for these challenged individuals.

Conflicting findings regarding the relationship of science grades and NCLEX outcomes are noted in the literature. This study found no relationship. While science grades as a predictor requires further research study, nurse educators should continue to use these grades as a criteria for entrance in the nursing program because they provide a foundation for understanding nursing concepts.

A definite trend is noted in the literature with regard to nursing course grades and NCLEX outcomes. Studies concluded that those who passed NCLEX held higher mean scores for nursing course grades (Alexander, 1997; Barkley, Rhodes, & Dufour, 1998; Beeman & Waterhouse, 2001; Beeson & Kissling, 2001; Endres, 1997; Roncoli, Lisanti, & Falcone, 2003; Stuenkel, 2006). This study found that the nursing course grade demonstrating a relationship with NCLEX outcomes was the medical-surgical grade. Likewise, SVM analysis showed that the medical-surgical grade could predict NCLEX outcomes

and also revealed that the pharmacology grade was a predictable variable. The findings of this study are congruent with what other researchers found and substantiate the importance of acquisition of nursing knowledge. For nursing education, findings of this study imply that medical-surgical nursing courses need to be a priority in curriculum planning, and the integration of medical-surgical nursing in all other courses should be considered. Following this, pharmacology needs to be considered a priority. Some program curriculums provide a pharmacology course, whereas others integrate pharmacology. Regardless, many students find this area of content difficult and overwhelming. Because this content area is critical to NCLEX success, additional support for the student is needed and greater emphasis should be placed on this course.

Other important findings demonstrated were the influence of self-efficacy on NCLEX passage and the relationship among self-efficacy, academic, and nonacademic variables. So, the more confident a student is and the more support systems available, the better he or she will perform. This finding points to the critical need for nurse educators to look at ways to increase a student's self-confidence. Also essential is the need to institute assessment strategies early on in the nursing program that will identify high-risk students, and to develop and implement support services for these students.

The literature notes significant correlations between success and lack of family demands or responsibilities (Arathuzik & Aber, 1998). Specific to the findings of this study is that home and family events and responsibilities influence success. Coupled with this finding is that the pharmacology and the medical-surgical grade are important for NCLEX passage. This knowledge may assist nurse educators to consider informing students about the need for them to seek out assistance from faculty if home and family

events present obstacles to learning. Additionally, nurse educators need to have resources in place for these students. Likewise, nurse educators need to be aware of the critical importance of pharmacology and medical-surgical nursing in terms of NCLEX passage; and they must provide educational strategies to ensure an understanding of the concepts of these courses so that students are successful with NCLEX.

Recommendations for Future Research

In September 2009, The National Council of State Boards of Nursing (NCSBN) announced that the new Test Plan for NCLEX-RN would be implemented in April 2010 (NCSBN, 2009). Later that year, the NCSBN announced that the passing standard for the NCLEX-RN was raised from -0.21 logits to -0.16 logits and that this new passing standard will take effect when the new Test Plan is implemented (NCSBN, 2009). Test Plan changes and a more difficult test necessitates the need to investigate their effects on the predictors of NCLEX outcomes. Therefore, it is recommended that continued research be done looking at academic variables, specifically medical surgical and pharmacology. The results could provide nursing science with knowledge about how to structure nursing courses with respect to NCLEX success. A national study would provide the researcher with findings that could be generalized. However, a study conducted in a specific nursing program could be fruitful in terms of providing that nursing program with specific information about their curriculum.

This study found that Hispanics and those individuals whose primary language spoken was Spanish performed poorly on the NCLEX and that a greater number of these individuals attend nursing schools in the West and Midwest as compared to other geographical areas. Also noted is that higher NCLEX failures rates are seen in the West and

Midwest. The population projections indicate that the minority population is expected to become the majority by the year 2042 (U.S. Census Bureau, 2008). These projections are noteworthy in light of findings of this research study, which point to the need for continued study for additional evidence that race/ethnicity and primary language spoken make a difference in NCLEX outcome.

It is also recommended that future studies investigate the relationship of the SAT Reasoning Test and NCLEX outcomes. This test replaces the SAT and was implemented in 2005. Therefore many upcoming graduates will take this test rather than the traditional SAT. The SAT Reasoning Test differs from the SAT in that it consists of three 800-point sections (math, critical reading, and writing) and investigation for a relationship of each test area to NCLEX outcome would provide data to nurse educators about content areas that need to be strengthened before entrance into the nursing program.

This study showed that self-efficacy expectations affected NCLEX success. In the area of nursing education, studies were located that looked at the effect of self-efficacy on performance and these studies also found that self-efficacy affected performance (Goldenberg, Iwasiw, & MacMaster, 1997; Madorin & Iwasiw, 1999; Andrew, 1998; Hodge, 1999; Harvey & McMurray, 1994). With regard to NCLEX, Mills, Wilson, and Bar (2001) found that personal perceptions of the ability to pass the NCLEX affected outcomes. Otherwise, studies that specifically addressed self-efficacy expectations and its direct effect on NCLEX success were not found. This study showed that self-efficacy expectations were an important predictor for NCLEX success; however, there is limited research in this area. Therefore, it is recommended that self-efficacy expectations continue to be investigated through quantitative and qualitative studies.

Use of the SVM method for predicting outcomes should be considered. Nursing studies using this type of data analysis could not be located. Yet, SVM provides an innovative method for nurse researchers to investigate predictions. However, large study samples with data collection done over an extended time period should be sought to provide sufficient cases for performing training and testing that SVM requires.

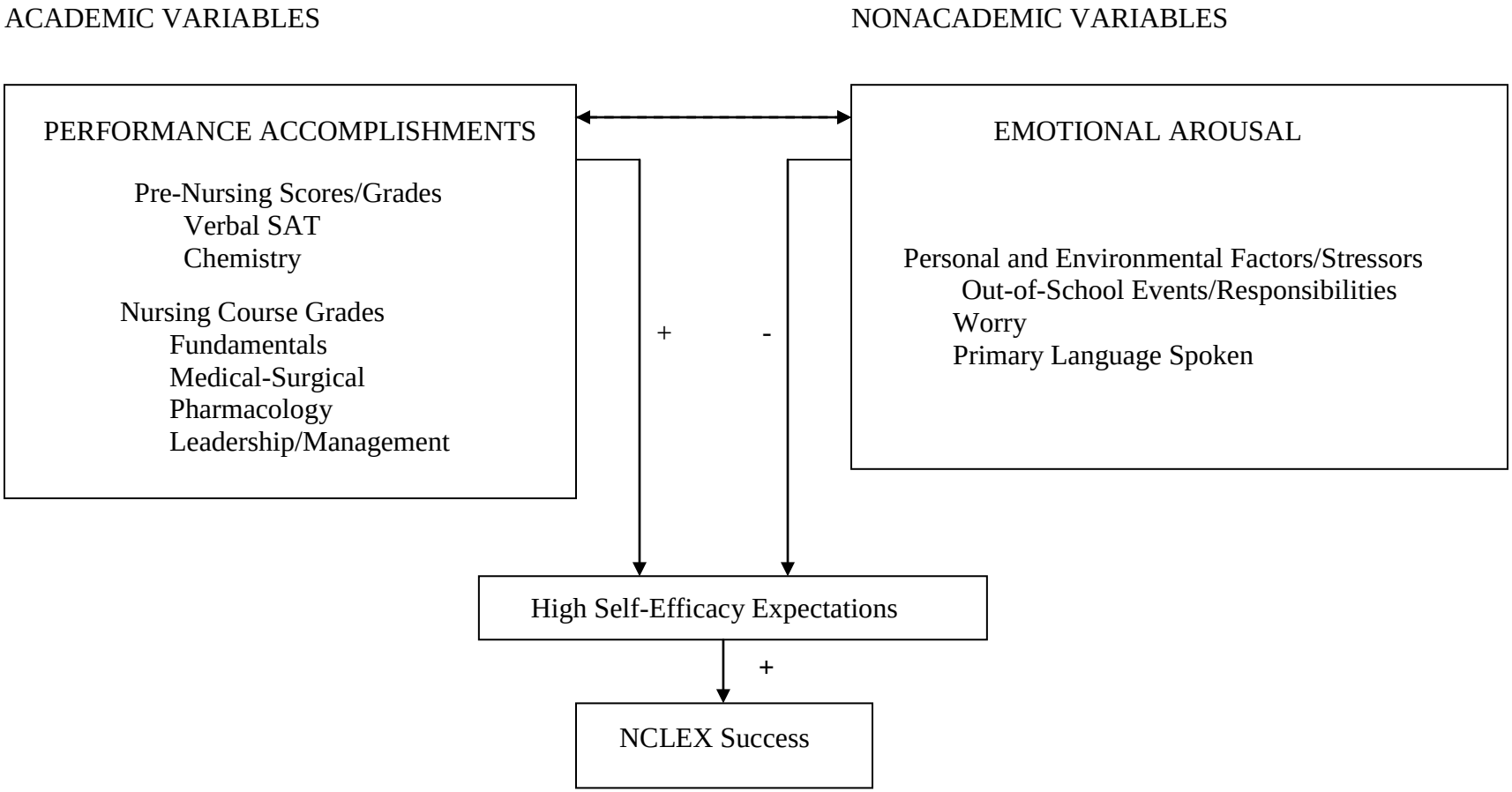
Summary

Nurse educators struggle with the problem of how to adequately prepare both a competent professional nurse and a successful NCLEX candidate. What a nurse educator expects in terms of NCLEX outcomes does not always occur. Educators find that some graduates with high academic grades fail the NCLEX. Likewise, some graduates with low grades pass the NCLEX. Therefore, the idea that factors other than academic ones may be affecting NCLEX success is one that merits further investigation.

The body of nursing knowledge about the predictors to NCLEX success continues to evolve. Yet, those that looked at nonacademic predictors, self-efficacy expectations, and their relationship to NCLEX success are not in abundance in the literature. This study found that relationships exist between academic, nonacademic, and self-efficacy variables and NCLEX success and that self-efficacy expectations play a role in these relationships. So, these results support the view that indeed there are more than just academic achievements to consider when looking at the predictors that result in NCLEX passage.

APPENDIX A

SELF-EFFICACY EXPECTATIONS FOR NCLEX® SUCCESS MODEL



APPENDIX B

DESCRIPTION OF THE STUDY, CONSENT, AND SURVEY

1. Part I: Description of the Study and Consent

DESCRIPTION

This research study is being done to identify selected academic and nonacademic factors (predictors) that affect NCLEX outcomes. The findings of this research study will be very important for developing interventions that will help future nursing students achieve NCLEX success. This survey is a part of the research study and its purpose is to collect data about these academic and nonacademic factors. If you agree to participate in this research study, please read the information below and on the next two pages. Press the NEXT button at the bottom of each page and the next page will appear. Once you read the Consent pages, press the NEXT button at the bottom of the screen to continue or press the EXIT THIS SURVEY button located at the top right corner of the screen to leave this survey.

CONSENT

TITLE OF THE RESEARCH STUDY: Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®)Outcomes Using Artificial Neural Networks Modeling

INVESTIGATORS: Principal Investigator: Dr. Michele Clark; Student Investigator: Linda Silvestri MSN, RN

CONTACT PHONE NUMBERS OF INVESTIGATORS: Dr. Michele Clark: 702-895-5978; FAX: 702-895-4807
Linda Silvestri MSN, RN: 401-364-3344

Purpose of the Research Study

You are invited to participate in a research study. The purpose of this study is to identify selected academic and nonacademic factors (predictors) that affect NCLEX outcomes. The findings of this research study will be very important for developing interventions that will help future nursing students achieve NCLEX success.

Participants Eligible for the Research Study

You are being asked to participate in the study because (1) you are a 2009 nursing graduate who is at least 18 years of age; (2) you graduated from a nationally accredited baccalaureate degree registered nurse program; and (3) you have taken the NCLEX once and received the NCLEX result. Since you have recently completed a nursing program and recently took the NCLEX and received your result, your participation in this study provides current and up-to-date information about factors affecting NCLEX outcomes. If you are a nursing graduate who was already licensed as a registered nurse at the time of graduation or a nursing graduate who took the NCLEX more than once, you are not eligible to participate in this study.

Procedures for the Research Study

There will be approximately 600 nursing graduates participating in this research study. If you volunteer to participate in this research study, you will be asked to complete one 113 item survey, which you should allow approximately 30 minutes to complete. The survey includes questions about (1) your demographic information (your individual characteristics) including your primary language spoken, (2) your pre-nursing scores/grades, (3) your nursing course grades, (4) personal and environmental factors/stressors such as out-of-school events/responsibilities and worry, (5) self-efficacy (self-confidence) expectations related to your beliefs about your ability to accomplish your goals while you were in nursing school, and (6) your NCLEX result after taking it for the first time. You will also be asked to provide an email address so that compensation for participating in this study can be emailed to you. The deadline date for submitting the survey is September 30, 2009. The data collected from all of the participants will then be analyzed to determine the predictors of NCLEX outcomes. The findings of this research study may be published. If findings are published, there will be no information in the publication that can link you as a participant of this study. The data collected in this research study may also be used for future analysis and publication of findings.

Benefits of Participation in the Research Study

There may not be any direct benefits to you as a participant in this research study. However, we hope to learn more about the factors that affect NCLEX outcomes so that nurse educators will understand how to help future nursing students achieve NCLEX success.

Risks of Participation in the Research Study

There are risks involved in every research study. This research study may include only minimal risk. You may become uncomfortable when answering a question. If a question makes you uncomfortable you will be able to skip the question, leaving it unanswered, and proceed to the next question in the survey. There may also be risks associated with using an email address for communicating through the Internet. Survey Monkey is being used for sending the survey to you and for you to submit the survey, and its data base is encrypted to protect you. If your email address contains letters that are a part of your name, remaining anonymous cannot be assured. However, the only persons who have access to your email address are the principal and student investigator, and your email address will never be shared with anyone.

Cost/Compensation Issues for the Research Study

There will be no financial cost to you for participating in this research study. This research study will take approximately 30 minutes of your time. You will be compensated for your time and will receive (1) A study guide to prepare for the NCLEX emailed within 2 weeks after your graduation date, (2) A $5.00 gift certificate from Amazon.com emailed to the address you provide 7 to 10 days after you submit the survey, (3) an individualized study plan and continuous guidance via email for preparing to retake the NCLEX if needed and requested, and (4) an emailed copy of the study results if requested. For assistance with retaking the NCLEX, you are invited to contact Dr. Michele Clark at 702-895-5978 who will forward your request for assistance to the Student Investigator, Linda Silvestri. Then, the Student Investigator will contact you via your provided email. If you do not complete the survey, do not answer all of the questions in the survey, or withdraw from the research study, you will still be compensated for your time if you provide your email address. Your email address is needed so that compensation can be sent to you.

Contact Information

If you have any questions or concerns about this research study, you may contact the Principal Investigator, Dr. Michele Clark at 702-895-5978. You may also contact the Student Investigator, Linda Silvestri MSN, RN at 401-364-3344. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which this research study is being conducted you may contact the UNLV Office for the Protection of Research Subjects at 702-895-2794.

Voluntary Participation Statement

Your participation in this research study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time (by clicking the EXIT THIS SURVEY button at the top right of the survey screen)without prejudice to your relations with the university. You are encouraged to ask questions about this research study at the beginning or any time during the study.

Confidentiality Procedures

All information gathered in this research study will be kept confidentiaand the only persons who will look at the survey responses are the principal investigator and student investigator. No reference will be made in written or oral materials that could link you to this study. The surveys completed online through the Internet will be saved on a four (4) gigabytes SanDisk Cruzer Micro USB flash drive and will be stored in a locked facility in the principal investigator's office at UNLV for 3 years after completion of the study. After the storage time, data on the flash drive will be permanently deleted and the flash drive will be discarded. The surveys completed online will be permanently deleted from the Survey Monkey system once the deadline date for data collection has been reached, data has been saved on the flash drive, and data has been imported into Excel and the software used for analysis. After the data is analyzed the data will be permanently deleted from Excel and the software used for analysis.

Participant Consent

If you read the above information and agree to participate in this study, click the NEXT button at the bottom of the screen to proceed. If you choose not to consent to this study please click EXIT THIS SURVEY at the top right corner of this screen and you will be rerouted out of the survey. Additionally, if at any time you choose not to participate in this study you can click EXIT THIS SURVEY and you will be rerouted out of the survey.

I HAVE READ THE ABOVE INFORMATION. I AM AT LEAST 18 YEARS OF AGE. BY SUBMITTING THE SURVEY, I CONSENT TO PARTICIPATING IN THIS STUDY.

3. Part II: Demographic Data

This part of the survey will ask you questions about demographics (some of your individual characteristics).

1. Please indicate your age in years.

2. Please indicate your gender.

- ◯ Female
- ◯ Male

3. Please indicate the race/ethnicity you identify with.

- ◯ American Indian
- ◯ Black
- ◯ Caucasian
- ◯ Chinese
- ◯ East Indian
- ◯ Eskimo
- ◯ Filipino
- ◯ Hispanic
- ◯ Inuit
- ◯ Japanese
- ◯ Korean
- ◯ Other

4. What language do you primarily speak?

- ◯ English
- ◯ Chinese
- ◯ Japanese
- ◯ Korean
- ◯ Spanish
- ◯ Other

5. Did you grow up in the United States?

- ◯ Yes
- ◯ No

If you answered No to the above question, please indicate in the box below how many years you have lived in the United Sta

6. In which region of the country is the nursing program that you graduated from located?

- ◯ Midwest
- ◯ North Atlantic
- ◯ South
- ◯ West

7. Please indicate if the college or university that you graduated from is a private or public (state) one.

- ◯ Private
- ◯ Public

4. Part III: Academic Data

This part of the survey will ask you questions about some of your pre-nursing scores/grades and nursing course grades.

1. Before entering nursing school, what total score did you receive on the Scholastic Aptitude Test (SAT)? If you took this test more than once, provide your most current score. If you never took the SAT, skip this question and questions 2 and 3 and proceed to question 4. Otherwise, answer this question and proceed to question 2.

2. What score did you receive on the verbal portion of the Scholastic Aptitude Test (SAT)? If you took this test more than once, provide your most current score.

3. What score did you receive on the math portion of the Scholastic Aptitude Test (SAT)? If you took this test more than once, provide your most current score.

4. If you took the American College Test (ACT), what score did you receive? If you took the test more than once, provide your most current score. If you did not take the ACT, then skip this question and proceed to question 5.

5. What grade did you receive in your most recently taken college chemistry course?

- ◯ A = 90-100
- ◯ B = 80-89
- ◯ C = 70-79
- ◯ D = 60-69
- ◯ Not applicable to me

Other (please specify)

6. What grade did you receive in your most recently taken Fundamentals of Nursing course?

- ◯ A = 90-100
- ◯ B = 80-89
- ◯ C = 70-79
- ◯ D = 60-69
- ◯ Not applicable to me

Other (please specify)

7. What grade did you receive in your most recently taken Medical-Surgical Nursing course?

- ◯ A = 90-100
- ◯ B = 80-89
- ◯ C = 70-79
- ◯ D = 60-69
- ◯ Not applicable to me

Other (please specify)

8. What grade did you receive in your most recently taken Pharmacology course?

- ◯ A = 90-100
- ◯ B = 80-89
- ◯ C = 70-79
- ◯ D = 60-69
- ◯ Not applicable to me

Other (please specify)

9. What grade did you receive in your most recently taken Leadership/Management course?

- ◯ A = 90-100
- ◯ B = 80-89
- ◯ C = 70-79
- ◯ D = 60-69
- ◯ Not applicable to me

Other (please specify)

5. Part IV: Nonacademic Data: Personal and Environmental Factors/Stressors

This part of the survey will ask you about your out-of-school events/responsibilities and your measure of worry while you were attending nursing school.

1. Directions:
Check the following items that best describes events or responsibilities that you encountered while you were attending nursing school. Check all that apply.

From the Life Change Events listed in the Miller-Rahe Recent Life Changes Questionnaire. From: Miller, M. & Rahe, R. (1997) Life changes scaling for the 1990s. Journal of psychosomatic research. 43(3), 279-292. Permission for use granted from Dr. Richard Rahe.

- [ ] An injury or illness which kept you in bed a week or more, or sent you to the hospital.
- [ ] An injury or illness that was less serious than above.
- [ ] Major dental work.
- [ ] Major change in eating habits.
- [ ] Major change in sleeping habits.
- [ ] Major change in your usual type and/or amount of recreation.
- [ ] Work: Change to a new type of work.
- [ ] Change in your work hours or conditions.
- [ ] Change in your responsibilities at work: more responsibilities.
- [ ] Change in your responsibilities at work: fewer responsibilities.
- [ ] Change in your responsibilities at work: promotion.
- [ ] Change in your responsibilities at work: demotion.
- [ ] Change in your responsibilities at work: transfer.
- [ ] Troubles at work: with your boss.
- [ ] Troubles at work: with coworkers.
- [ ] Troubles at work: with persons under your supervision.
- [ ] Troubles at work other than with your boss, coworkers, or persons under your supervision.
- [ ] Major business adjustment.
- [ ] Retirement.
- [ ] Loss of job: laid off from work.
- [ ] Loss of job: fired from work.
- [ ] Took a correspondence course to help you in your work.
- [ ] Home and family: Major change in living conditions.
- [ ] Change in residence: a move within the same town or city,

- [ ] Change in residence: a move to a different town, city, or state.
- [ ] A change in family get-togethers.
- [ ] Major change in health or behavior of a family member.
- [ ] Marriage.
- [ ] Pregnancy.
- [ ] Miscarriage or abortion.
- [ ] Gain of a new family member: birth of a child.
- [ ] Gain of a new family member: adoption of a child.
- [ ] Gain of a new family member: a relative moving in with you.
- [ ] Spouse beginning or ending work.
- [ ] Child leaving home to attend college.
- [ ] Child leaving home due to marriage.
- [ ] Child leaving home for other reasons.
- [ ] Change in arguments with spouse.
- [ ] In-law problems.
- [ ] Change in the marital status of your parents: divorce.
- [ ] Change in the marital status of your parents: remarriage.
- [ ] Separation of spouse: due to work.
- [ ] Separation of spouse: due to marital problems.
- [ ] Divorce
- [ ] Birth of a grandchild.
- [ ] Death of spouse.
- [ ] Death of a child.
- [ ] Death of a brother or sister.
- [ ] Death of a parent.
- [ ] Personal and social: change in personal habits.
- [ ] Beginning or ending school or college.
- [ ] Change of school or college.
- [ ] Change in political beliefs.
- [ ] Change in religious beliefs.
- [ ] Change in social activities.
- [ ] Vacation.
- [ ] New, close personal relationship.
- [ ] Engagement to marry.
- [ ] Girlfriend or boyfriend problems.

- [ ]
- [ ] Sexual difficulties.
- [ ] "Falling out" of a close personal relationship.
- [ ] An accident.
- [ ] Minor violation of the law.
- [ ] Being held in jail.
- [ ] Death of a close friend.
- [ ] Major decision regarding your immediate future.
- [ ] Major personal achievement.
- [ ] Major change in finances: decreased income.
- [ ] Major change in finances: increased income.
- [ ] Major change in finances: investment and/or credit difficulties.
- [ ] Loss or damage of personal property.
- [ ] Moderate financial purchase.
- [ ] Major financial purchase.
- [ ] Foreclosure on a mortgage or loan.

2. Answer each of the following questions about worry by checking the statement that best describes you as it relates to your responsibilities and nursing studies while you were attending nursing school. These questions relate to the concept of worry and are taken from the Brief Measure of Worry Severity (BMWS)measure.

From: Gladstone, G., Parker, G., Mitchell, P., Malhi, G., Wilhelm, K., & Austin, M.P. (2005). A brief measure of worry severity (BMWS): Personality and clinical correlates of severe worriers. Journal of Anxiety Disorders. 19(8), 877-892. With permission from Elsevier.

	Not true at all	Somewhat true	Moderately true	Definitely true
1. When I worry, it interferes with my day-to-day functioning (ie. stops me from getting my work done, organizing myself or activities).	○	○	○	○
2. When I think I should be finished worrying about something, I find myself worrying about the same thing over and over.	○	○	○	○
3. My worrying leads me to feel down and depressed.	○	○	○	○
4. When I worry, it interferes with my ability to make decisions or solve problems.	○	○	○	○
5. I feel tense and anxious when I worry.	○	○	○	○

6. I worry that bad things or events are certain to happen.	○	○	○	○
7. I often worry about not being able to stop myself from worrying.	○	○	○	○
8. As a consequence of my worrying, I tend to feel emotional unease or discomfort.	○	○	○	○

6. Part V: Self-Efficacy Expectations

This part of the survey will ask you questions about self-efficacy (self-confidence) expectations, meaning your beliefs about your ability to accomplish your goals while in nursing school. You will also be asked about your NCLEX result.

1. Answer each of the following questions by checking the statement that best describes your beliefs about your ability to accomplish your goals when you were in nursing school. These questions relate to the concept of self-efficacy (self-confidence) expectations and are taken from the General Perceived Self-Efficacy Scale.

	Not at all true	Hardly true	Moderately true	Exactly true
1. I can always manage to solve difficult problems if I try hard enough.	○	○	○	○
2. If someone opposes me, I can find the means and ways to get what I want.	○	○	○	○
3. I am certain that I can accomplish my goals.	○	○	○	○
4. I am confident that I could deal efficiently with unexpected events.	○	○	○	○
5. Thanks to my resourcefulness, I can handle unforseen situations.	○	○	○	○
6. I can solve most problems if I invest the necessary effort.	○	○	○	○
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	○	○	○	○
8. When I am confronted with a problem, I can find several solutions.	○	○	○	○
9. If I am in trouble, I can think of a good solution.	○	○	○	○
10. I can handle whatever comes my way.	○	○	○	○

2. Please indicate your result on the NCLEX.

○ Pass

○ Fail

7. Follow-Up Information

This part of the survey asks you for an email address so that your $5.00 gift certificate from Amazon.com can be sent to you. It also asks if you would like to receive a copy of the results of the study when it is completed, and asks two questions about the study guide for preparing for NCLEX that was sent to you after graduation.

1. Please provide your email address so that your $5.00 Amazon.com gift certificate can be sent to you.

2. Would you like a report regarding the results of the study sent to your email address after the study is completed?

- ◯ Yes
- ◯ No

3. Did you use the study guide that was sent to you after graduation to prepare for NCLEX ?

- ◯ Yes
- ◯ No

4. If you used the study guide to prepare for NCLEX, how helpful was it?

	Extremely helpful	Somewhat helpful	Minimally helpful	Not helpful	N/A
1.	◯	◯	◯	◯	◯

8. Thank You!

I appreciate you taking the time to participate in this research study. Your responses to the survey questions will be invaluable to identify the predictors of NCLEX outcomes and provide nurse educators with the information they need to plan interventions that will assist future nursing students achieve success on NCLEX.
Electronically submitting this survey indicates your consent to participate in this research study and use of the data collected for analysis and possible publication for this study and any future analysis and future publication. All responses will remain confidential and will not be linked to you in any way.To electronically submit this survey, click on the Submit button below.
Sincerely,
Dr. Michele Clark, Principal Investigator
Linda Silvestri MSN, RN Student Investigator
University of Nevada, Las Vegas
If you have any questions, please contact Dr. Michele Clark at 702-895-5978 or Linda Silvestri MSN, RN at 401-364-3344.

APPENDIX C

RECENT LIFE CHANGES QUESTIONNAIRE

The 74 Life Change Event	Life Change Unit
1. An injury or illness which kept you in bed a week or more, or sent you to the hospital.	74
2. An injury or illness that was less serious than above.	44
3. Major dental work.	26
4. Major change in eating habits.	27
5. Major change in sleeping habits.	26
6. Major change in your usual type and/or amount of recreation.	28
7. Work: Change to a new type of work.	51
8. Change in your work hours or conditions.	35
9. Change in your responsibilities at work: more responsibilities.	29
10. Change in your responsibilities at work: fewer responsibilities.	21
11. Change in your responsibilities at work: promotion.	31
12. Change in your responsibilities at work: demotion.	42
13. Change in your responsibilities at work: transfer.	32
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18. Major business adjustment.	60
19. Retirement.	52
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23. Home and family: Major change in living conditions.	42
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30. Miscarriage or abortion.	65
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33. Gain of a new family member: a relative moving in with you.	59
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39. In-law problems.	38
40. Change in the marital status of your parents: divorce.	59
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58. Engagement to marry.	45
59. Girlfriend or boyfriend problems.	39
60. Sexual difficulties.	44
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62. An accident.	48
63. Minor violation of the law.	20
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65. Death of a close friend.	70
66. Major decision regarding your immediate future.	51
67. Major personal achievement.	36
68. Major change in finances: decreased income.	38
69. Major change in finances: increased income.	60
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71. Loss or damage of personal property.	43
72. Moderate financial purchase.	20
73. Major financial purchase.	37
74. Foreclosure on a mortgage or loan.	58

From the Life Change Events listed in the Miller-Rahe Recent Life Changes Questionnaire. From: Miller, M. & Rahe, R. (1997) Life changes scaling for the 1990s. Journal of psychosomatic research. 43(3) 279-292. Permission for use granted from Dr. Richard Rahe.

APPENDIX D

BRIEF MEASURE OF WORRY SEVERITY

Worry Item

1. When I worry, it interferes with my day-to-day functioning (e.g., stops me getting my work done, or organizing my day.
2. When I think I should be finished worrying about something, I find myself worrying about the same thing over and over again.
3. My worrying leads me to feel down and depressed.
4. When I worry, it interferes with my ability to make decisions or solve problems.
5. I feel tense and anxious when I worry.
6. I worry that bad things and events are certain to happen.
7. I often worry about not being able to stop myself from worrying.
8. As a consequence of my worrying, I tend to feel emotional unease or discomfort.

Item Rating Scale: 0 = Not true at all; 1 = Somewhat true; 2 = Moderately true;

3 = Definitely true.

From: Gladstone, G., Parker, G., Mitchell, P., Malhi. G., Wilhelm, K., & Austin, M.P. (2005). A brief measure of worry severity (BMWS): Personality and clinical correlates of severe worriers. *Journal of Anxiety Disorders, 19*(8), 877-892.

APPENDIX E

GENERAL PERCEIVED SELF-EFFICACY SCALE (GSE)

1. I can always manage to solve difficult problems if I try hard enough.
2. If someone opposes me, I find means and ways to get what I want.
3. It is easy for me to stick to my aims and accomplish my goals.
4. I am confident that I could deal efficiently with unexpected events.
5. Thanks to my resourcefulness, I know how to handle unforeseen circumstances.
6. I can solve most problems if I invest the necessary effort.
7. I can remain calm when facing difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem, I can usually find several solutions.
9. If I am in trouble, I can usually think of something to do.
10. No matter what comes my way, I am usually able to handle it.

Response Format: 1 = Not at all true; 2 = Hardly true; 3 = Moderately true; 4 = Exactly true

From: Scholz, U., Gutierrez Dona, B., Sud, S., & Schwarzer, R. (2002). Is general self-efficacy a universal construct? *European Journal of Psychological Assessment, (18)*3, 242-251.

APPENDIX F

PERMISSION TO USE THE RECENT LIFE CHANGES QUESTIONNAIRE (RLCQ)

Re: Permission to use: Holmes and Rahe Stress Scale.
.Print | .New Window
Richard Rahe to silves16 - Jan 14More Details

Dear Linda,

You have my permission to use the SRRS in your research. However, the Social Readjustment Rating Scale (SRRS) was developed in the early 1960s. I revised the scale over the years and the most recent revision is found in the Miller and Rahe article listed on my Publications page on my web site (www.drrahe.com). It's reference number 19. You really need to read that article as it has the history of the SRRS leading up to my Recent Life Changes Questionnaire (RLCQ) that is presented in the Appendix of that article. Also, the points for the life change events in the SRRS, later termed Life Change Units (LCU), are far out of date. The Miller and Rahe article presents the most recent LCU determinations, made in the 1990s. Finally, the RLCQ has more life change events than the SRRS making it a more comprehensive survey of a person's recent life stress.

Good luck in your study.

Dr. Rahe

Richard H. Rahe, M.D.
Professor of Psychiatry
President, Health Assessment Programs, Inc.

On Tue, Jan 13, 2009 at 4:28 PM, <silves16@unlv.nevada.edu> wrote:
Dear Dr. Rahe,
I am a doctoral student in the department of nursing at the University of Nevada, Las Vegas (UNLV), and am working on dissertation. The title of my work is "Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX) Outcomes Using Artificial Neural Networks." This examination is the one that nursing graduates must take and pass in order to become licensed as a registered nurse. One of the variables of my study is personal and environmental factors/stressors and I am specifically want to measure some items related to stress. I am seeking permission to use some of your Life Events and Life Change Values on your Holmes and Rahe Stress Scale as a foundation for developing questions related to this variable in my survey.
For example, your Life Event noted Marital Separation will be phrased "Did you experience a break-up in your marriage?" in my tool. I thank you in advance and look forward to your response.
Sincerely,
Linda A. Silvestri MSN, RN
Doctoral Student, University of Nevada
Email: silves16@unlv.edu
Personal email: **********
Home address: **********
****
Cell: **********

APPENDIX G

PERMISSION TO USE THE BRIEF MEASURE OF WORRY SEVERITY

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APPENDIX H

PERMISSION TO USE THE GENERAL PERCEIVED SELF-EFFICACY SCALE

The General Perceived Self-Efficacy Scale.
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Dear Ms. Silvestri,

Thank you very much for your permission request to use from our *European Journal of Psychological Assessment*, Vol. 18 (3) 2002 the item
- *The General Perceived Self-Efficacy Scale* on p. 251
from the Appendix of the article
- *Is General Self-Efficacy a Universal Construct? Psychometric Findings from 25 Countries* by Urte Scholz, Benicio Gutiérrez Doña, Shonali Sud, and Ralf Schwarzer, pp.. 242–251.

We are happy to grant you permission to use *The General Perceived Self-Efficacy Scale* as outlined in your request.

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-----Ursprüngliche Nachricht-----
Von: silves16@unlv.nevada.edu [mailto:silves16@unlv.nevada.edu]
Gesendet: Montag, 26. Januar 2009 15:03
An: Customer Service, Hogrefe Publishing
Betreff: Re: The General Perceived Self-Efficacy Scale

To whom it may concern,
I am a doctoral student in the department of nursing at the University of

Nevada, Las Vegas (UNLV), and am working on dissertation. The title of my work is "Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX) Outcomes Using Artificial Neural Networks." This examination is the one that nursing graduates must take and pass in order to become licensed as a registered nurse. One of the variables of my study is self-efficacy expectations. I am seeking permission to use the General Perceived Self-Efficacy Scale in Scholz, U., Gutierrez Dona, B., Sud, S., & Schwarzer, R. (2002). Is general self-efficacy a universal construct? European Journal of Psychological Assessment, (18)3, 242-251. I thank you in advance and look forward to your response.

Sincerely,

Linda A. Silvestri MSN, RN
Doctoral Student, University of Nevada
Email: silves16@unlv.edu
Personal email: **********
Home address:
****
****
Cell: **********

APPENDIX I

INFORMED CONSENT FOR THE PILOT SURVEY RESEARCH STUDY

Dear Pilot Study Participant,

You are invited to participate in a pilot survey research study for a future research study being conducted by a doctoral student. The purpose of this study is to identify academic and nonacademic predictors of National Council of Licensure Examination (NCLEX®) outcomes. Your participation involves answering questions in a survey that the researcher is planning to use in the study, and answering questions related to your experience with taking the survey.

You are being asked to participate in the pilot study because (you are a nursing student, you are not a nursing student or nursing graduate, you are a nursing graduate, you are a nurse educator). This pilot study is being conducted to evaluate the survey questions and the effectiveness of the survey as a data collection method. At the end of the survey, questions have been added for you to answer about your experience with taking the survey. These questions ask about the time it took to complete the survey, the part that took the longest, if it was clear and understandable and easy to read, and if there was anything confusing or anything that frustrated or annoyed you. If you volunteer to participate in this pilot survey, you will be asked to do the following:

1. Click on the link provided in this email and complete a 113 item questionnaire.
2. Click on the **Next** button at the end of each page in the survey to proceed to the next page.
3. Note the time it took to complete the survey (in minutes).
4. The survey ends with the Thank You page; however, you need to proceed to the **Next** page to access the Pilot Survey questions.
5. Pilot Survey questions: Answer the questions about your experience with taking the survey in the pilot study survey questions section.
6. Click the **Submit** button at the end of the survey.

If you agree to participate in the pilot test of the survey, we would appreciate it if you could complete the survey within 5 days of receipt of this email. There may be no direct benefits to you as a participant of this study. However, your participation in this pilot test will assist to improve the survey.

There are risks involved in all research studies. This pilot survey study may include only minimal risks, such as you may feel uncomfortable when answering some questions. If a question makes you uncomfortable you will be able to skip the question, leaving it unanswered, and proceed to the next question in the survey. There may also be risks associated with using an email address for communicating through the Internet. Survey Monkey is being used for sending the survey to you and for you to submit the survey. With Survey Monkey, the data base is encrypted to protect you. Additionally, the Internet Protocol (IP) address function is turned off in Survey Monkey to further protect your email

address. There will not be financial cost to you to participate in this pilot survey study. You will not be compensated for your time.

If you have any questions or concerns about this research study, you may contact the Principal Investigator, Dr. Michele Clark at 702-895-5978. You may also contact the Student Investigator, Linda Silvestri MSN, RN at **********. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which this research study is being conducted you may contact the UNLV Office for the Protection of Research Subjects at 702-895-2794. If you are interested in receiving a copy of the final results of the study, please contact Linda Silvestri MSN, RN at silves16@unlv.edu

Your participation in this research study is voluntary. You may refuse to participate in this pilot study or in any part of this pilot study. You may withdraw at any time (by clicking the Exit This Survey button at the top right of the survey screen) without prejudice to your relations with the university. All information gathered in this study will be kept confidential and the only persons looking at the survey responses will be the Principal Investigator or Student Investigator of this study. No reference will be made in written or oral materials that could link you to this study. Your email address will never be shared with anyone and the Internet Protocol (IP) function will be shut off in the Survey Monkey program to protect your email address. The database used in Survey Monkey for the survey for data collection is encrypted to protect your email address. The surveys completed online through the Internet will be saved on a four (4) gigabytes SanDisk Cruzer Micro USB flash drive and this flash drive will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time, the flash drive will be destroyed. The surveys completed online will be permanently deleted from the Survey Monkey system once all of the data has been collected (cut-off date for data collection for the study is September 30, 2009), saved on the flash drive, and imported into the software systems for analysis.

By clicking on the following link you indicate that you have read the above information and agree to participate in this pilot study. You are at least 18 years of age. A copy of this email will serve as your copy of this form.

Click on the following link to enter the survey.

https://www.surveymonkey.com/s.aspx?sm=aLA7gJ1l_2b8HhNFYhbwoREg_3d_3d

Thank you for your participation,

Dr. Michele Clark	Linda Silvestri, MSN, RN
Principal Investigator	PhD Doctoral Student Investigator

PILOT SURVEY QUESTIONS

Pilot Study Questions

100%

Pilot Study Participants:
Please answer the following questions about your experience with taking this survey. Thank you for participating in this pilot study.
Dr. Michele Clark, Principal Investigator
Linda Silvestri, MSN, RN Student Investigator

1. How many minutes did the survey take to complete. This time period includes reading part 1: Description of the study and Consent.

2. Which part of the survey took you the longest?

- Part 1: Description of the Study and Consent
- Part II: Demographic Data
- Part III: Academic Data
- Part IV: Personal and Environmental Factors/Stressors
- Part V: Self Efficacy Expectations

3. Was everything clear and understandable?

- Yes
- No
- If No, please explain in the Other (please specify) box below.

Other (please specify)

4. Was the survey easy to read?

- Yes
- No
- If No, please explain in the Other (please specify) box below.

Other (please specify)

5. Was there anything confusing about the questions or anything else in the survey?

- Yes
- No
- If Yes, please explain in the Other (please specify) box below.

Other (please specify)

6. Was there anything that frustrated you when taking this survey, or anything that annoyed you?

- Yes

○ No

○ If Yes, please explain in the Other (please specify) in box below.

Other (please specify)

7. Do you have any suggestions or comments about the survey that could improve it in any way? Your suggestions and comments are welcome.

APPENDIX K

INSTITUTIONAL REVIEW BOARD APPROVAL

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

Biomedical IRB – Expedited Review
Approval Notice

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: April 8, 2009

TO: **Dr. Michele Clark**, Nursing

FROM: Office for the Protection of Research Subjects

RE: Notification of IRB Action by Dr. John Mercer, Chair JM/cf
Protocol Title: **Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN(R))Outcomes Using Artificial Neural Networks Modeling**
Protocol #: 0902-3013

UCF IRB Approved APR 06 2009 Expires APR 05 2010

This memorandum is notification that the project referenced above has been reviewed by the UNLV Biomedical Institutional Review Board (IRB) as indicated in regulatory statutes 45 CFR 46. The protocol has been reviewed and approved.

The protocol is approved for a period of one year from the date of IRB approval. The expiration date of this protocol is April 5, 2010. Work on the project may begin as soon as you receive written notification from the Office for the Protection of Research Subjects (OPRS).

PLEASE NOTE:
Attached to this approval notice is the **official Informed Consent/Assent (IC/IA) Form** for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through OPRS. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond April 5, 2010 it would be necessary to submit a **Continuing Review Request Form** *60 days* before the expiration date.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at OPRSHumanSubjects@unlv.edu or call 895-2794.

Office for the Protection of Research Subjects
4505 Maryland Parkway • Box 451047 • Las Vegas, Nevada 89154-1047
(702) 895-2794 • FAX: (702) 895-0805

APPENDIX L

LETTER TO DEANS

Dear Dean _____,

Your school of nursing is invited to participate in a doctoral nursing research study entitled *Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) Outcomes Using Artificial Neural Networks.* This study is being conducted by a nursing doctoral student from the University of Nevada, Las Vegas (UNLV). The purpose of this quantitative study is to identify the effects of selected academic and nonacademic variables on National Council Licensure (NCLEX®) outcomes. The study is aimed to provide new knowledge to nurse educators about the predictors for NCLEX outcomes so that they will be able to identify interventions that will facilitate success on NCLEX and identify strategic points for intervention during the nursing program. Study participants will be graduate nurses from the year 2009. Contingent on approval from the Office for the Protection of Research Subjects at UNLV and your institution, we are requesting permission to obtain an "after graduation" email address from senior nursing students graduating in 2009.

Data collection will not be conducted on campus. The "after graduation" email address is needed so that the survey being used in the study can be sent to the interested participants. Senior nursing students will need to be informed about the study. The procedure for this can be discussed so that it will meet the needs of your nursing program. If feasible, a visit to speak to the senior nursing students can be planned. Or, a designated faculty member at your nursing program can describe the study and its purpose to the senior nursing students and distribute the recruitment letter and flyer that will be provided. Participants will receive a survey sent electronically through Survey Monkey and he or she should allow 30 minutes to complete the survey. However, pilot test study participants report that the survey took 10 to 15 minutes to complete. The survey will ask questions about demographic information, grades, personal and environmental factors/stressors, self-efficacy expectations, and the NCLEX result. Interested participants will receive:

1. A study guide to prepare for the NCLEX-RN®; this will be emailed to them within 2 weeks after their graduation date.
2. A $5.00 gift certificate from Amazon.com after submitting the survey.
3. If retaking the NCLEX is necessary, the graduate can request assistance and will receive an individualized study plan for retaking the NCLEX, and continuous guidance via email to prepare for the retake.
4. A copy of the study results; if requested the copy will be emailed.

If you are interested in participating in this study or have any questions about the study, you can contact Linda Silvestri, Student Investigator at silves16@unlv.edu

We thank you for your time and look forward to hearing from you.

Dr. Michele Clark
Principal Investigator
University of Nevada, Las Vegas
Contact: 702-895-5978

Linda Silvestri, MSN, RN
PhD Doctoral Student Investigator
University of Nevada, Las Vegas
Contact: **********

APPENDIX M

LETTER TO OFFICE OF PROTECTION OF HUMAN SUBJECTS

Dear Office of Human Research Subjects Protection,

I am a doctoral student in the department of nursing at the University of Nevada, Las Vegas (UNLV), and am working on dissertation. The title of my work is *Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) Outcomes Using Artificial Neural Networks.* This examination is the one that nursing graduates must take and pass in order to become licensed as a registered nurse. I am currently preparing my Institutional Review Board (IRB) application to submit to UNLV.

I do not intend to conduct research at _____University. However, I need to obtain an "after graduation" email address from senior nursing students so that I will be able to collect academic and nonacademic data after he or she graduates and takes the NCLEX. Confidentiality will be maintained at all times during the study. I also plan to contact the dean/chairperson of the nursing department at _____University to either plan a visit or ask that a nursing faculty designated by the dean/chairperson obtain these email addresses. I also plan to use Survey Monkey to distribute my questionnaire to the participants after they graduate from the university (using their provided after graduation email address).

My question is: if I receive IRB approval from UNLV to conduct this study and can submit proof of this approval, will I be required to also obtain IRB approval from your institution or submit any other information?

I thank you in advance for providing me with this information and look forward to hearing back from you.

Sincerely,

Linda A. Silvestri MSN, RN
Doctoral Student, University of Nevada
Email: silves16@unlv.edu
Personal email: **********
Home address:
****
****
Cell: **********

Dr. Michele Clark
Principal Investigator
University of Nevada, Las Vegas
Contact: 702-895-5978

APPENDIX N

PARTICIPANT RECRUITMENT LETTER

Dear Senior Nursing Student

You are invited to participate in a doctoral nursing research study entitled *Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) Outcomes Using Artificial Neural Networks.* This study is being conducted by a nursing doctoral student from the University of Nevada, Las Vegas (UNLV). The purpose of this study is to collect data about the academic and nonacademic factors that affect success on the NCLEX. You will be asked to answer survey questions on-line and this survey will be accessed via a web link that will be sent to you via email. The survey will ask you questions about demographic information, grades, personal and environmental factors/stressors, self-efficacy expectations, and your NCLEX result. You will take this survey after you take the NCLEX for the first time and receive results. You should allow approximately 30 minutes for completing the survey. However, pilot test participants report that it took 10 to 15 minutes to complete. There is no financial cost to you for participating.

Confidentiality will always be maintained. Your email address will never be shared and the Principal Investigator and Student Investigator are the only persons who will have access to the survey responses. To further protect your privacy, the Internet Protocol (IP) function will be shut off in the Survey Monkey program. Additionally, the database used in Survey Monkey for the survey and data collection is encrypted.

If you become a participant you will receive:

1. A study guide to prepare for the NCLEX-RN®; this will be emailed to you within 2 weeks after your graduation date.
2. A $5.00 gift certificate from Amazon.com after submitting the survey.
3. If retaking the NCLEX is necessary, if requested you will receive assistance and will receive an individualized study plan for retaking the NCLEX, and continuous guidance via email to prepare for the retake.
4. A copy of the study results, if requested.

If you become a participant, you will receive an email reminding you of the research study 3 weeks and again at 4 weeks following your graduation date. Six weeks after your graduation date you will receive an email that will provide the Survey Monkey link to access the survey, followed by a follow-up email one week later.

If you are interested in participating you will need to provide an "after graduation" email address so that the study guide and the survey link can be sent to you. If you are willing to participate in this study, email this information to Linda Silvestri, the Student Investigator of the study at silves16@unlv.edu.

If you have any questions about this research study, please contact the investigators of the study.

We thank you for your time and look forward to hearing from you.

Dr. Michele Clark	Linda Silvestri, MSN, RN
Principal Investigator	PhD Doctoral Student Investigator
University of Nevada, Las Vegas	University of Nevada, Las Vegas
Contact: 702-895-5978	Contact: **********

APPENDIX O

PARTICIPANT RECRUITMENT FLYER

WORRIED ABOUT THE NCLEX®?

Are you a **2009 nursing graduate** from a nationally accredited BSN program?
If so, you may be eligible to participate in a research study!

PURPOSE OF THE RESEARCH STUDY: To collect data to identify academic and non-academic factors that affect NCLEX® success.

WHO IS ELIGIBLE: Nursing graduates, 18 years of age or older who graduated in the year 2009 from a nationally accredited BSN program and took the NCLEX once.

The research study will take **approximately 30 minutes** of your time and there is **NO** financial cost to you for participating!

Confidentiality will always be maintained.
Your email addresses will never be shared with anyone and the only persons who have access to survey responses are the Principal Investigator and Student Investigator of the study.

WHAT YOU WILL BE DOING IN THE RESEARCH STUDY: You will be asked to answer survey questions on-line by September 30, 2009. The survey will be available via a web link that will be emailed to you. You will be asked about demographic information, grades, personal and environmental factors/stressors, self-efficacy (self-confidence) expectations, and your NCLEX result.

HOW TO BECOME A PARTCIPANT:

1. Provide an **"after graduation email address"** and **"your date of graduation"** so that the **study guide to prepare for the NCLEX** and the **survey link** can be sent to you.
2. If you are willing to participate, email this information to: **silves16@unlv.nevada.edu or silvestriunlv@aol.com**

PARTICIPANTS WILL RECEIVE:

1. A study guide 2 weeks after you graduate to help you prepare for the NCLEX.
2. A $5.00 gift certificate for an Amazon.com purchase, sent to you after you submit the survey.
3. A copy of the study findings, if requested.
4. If necessary, personal guidance with developing a plan for preparing for a retake.

CONTACT INFORMATION:

If you have questions about this research study, please contact the investigators.
Principal Investigator: Dr. Michele Clark, University of Nevada, Las Vegas, Nursing Department; Contact number: 702-895-5978
Student Investigator: Linda A. Silvestri, MSN, RN, PhD Candidate, University of Nevada, Las Vegas, Nursing Department; Contact number: **********

APPENDIX P

RESEARCH STUDY REMINDER #1

To be sent 3 weeks following graduation date.

Dear Nursing Graduate,

Congratulations! We are certain that you are very pleased and proud of your most recent accomplishment and are sure that you are getting ready for the NCLEX.

We want to remind you that as a participant in the research study titled *Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) Outcomes Using Artificial Neural Networks* you will be receiving an email with a survey link from Survey Monkey that will contain the questions about the factors affecting NCLEX success. We will send another reminder in about one week and will sent the email with the survey link in about 3 weeks.

If you have any questions about this research study, please contact the investigators of the study.

Thank you for your time and participation in this research study and we wish you success!

Dr. Michele Clark
Principal Investigator
University of Nevada, Las Vegas

Linda Silvestri, MSN, RN
PhD Doctoral Student Investigator
University of Nevada, Las Vegas

APPENDIX Q

RESEARCH STUDY REMINDER #2

To be sent 4 weeks following graduation date.

Dear Nursing Graduate,

We hope that you are doing well with preparing for the NCLEX.

We are sending you this second reminder that as a participant in the research study titled *Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) Outcomes Using Artificial Neural Networks* you will be receiving an email with a survey link from Survey Monkey that will contain the questions about the factors affecting NCLEX success. This will be sent to you in about 2 weeks

If you have any questions about this research study, please contact the investigators of the study.

Thank you for your time and participation in this research study and we wish you success!

Dr. Michele Clark
Principal Investigator
University of Nevada, Las Vegas

Linda Silvestri, MSN, RN
PhD Doctoral Student Investigator
University of Nevada, Las Vegas

APPENDIX R

RESEARCH STUDY SURVEY LINK LETTER

To be sent 6 weeks following graduation date.

Dear Study Participant,

You are invited to participate in a research study titled *Identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) Outcomes Using Artificial Neural Networks.* This study is being conducted by a nursing doctoral student from the University of Nevada, Las Vegas (UNLV). The purpose of this study is to collect data about the academic and nonacademic factors that affect success on the NCLEX. This research study will take 10 to 15 minutes of your time and there is no financial cost to you for participating. The survey will ask you questions about demographic information, grades, personal and environmental factors/stressors, self-efficacy expectations, and your NCLEX result.

If you volunteer to participate in this research study:

1. Click on the link provided in this email and answer the questions in the survey.
2. Click on the **Next** button at the end of each page in the survey to proceed to the next page.
3. Click the **Submit** button at the end of the survey. The survey will automatically close when you click the **Submit** button.

Your participation in this research study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time (by clicking the Exit button at the top right of the survey screen) without prejudice to your relations with the university. All information gathered in this research study will be kept confidential and you will never be asked for identifying information. No reference will be made in written or oral materials that could link you to this study. The surveys completed online through the Internet will be printed out and all paper copies will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time the information gathered will be shredded and destroyed. The surveys completed online will be permanently deleted from the Survey Monkey system once all of the data has been collected, imported into the software system used for analysis of data, and paper copies have been printed.

If you have any questions or concerns about this research study, you may contact the Principal Investigator, Dr. Michele Clark at 702-895-5978. You may also contact the Student Investigator, Linda Silvestri MSN, RN at **********. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which this research study is being conducted you may contact the UNLV Office for the Protection of Research Subjects at 702-895-2794. If you are interested in receiving a

copy of the final results of the study, please contact Linda Silvestri MSN, RN at silves16@unlv.edu

Click on the following link to enter the survey.

https://www.surveymonkey.com/s.aspx?sm=7X_2bxtkzJmXB1K7h558f3Ow_3d_3d

Thank you for your time and participation in this research study and we wish you success!

Dr. Michele Clark
Principal Investigator
University of Nevada, Las Vegas

Linda Silvestri, MSN, RN
PhD Doctoral Student Investigator
University of Nevada, Las Vegas

APPENDIX S

STUDY GUIDE

PREPARED BY:

LINDA ANNE SILVESTRI, MSN, RN
Doctoral Student in Nursing
University of Nevada, Las Vegas

Dear Nursing Graduate,

Preparing for the NCLEX® can be an overwhelming endeavor. You may surround yourself with all of your class notes and textbooks that you used in nursing school and may be saying to yourself: "Where do I start?"

You need to start by getting yourself a review book for NCLEX. There are many review books available and your school library will probably have review books for you to borrow. There is a great deal of information that you have learned during your nursing education and your review book will help you to identify the important points in each content area. Remember that your nursing program has prepared you for the NCLEX. Your nursing faculty has given you all of the tools for success. Now you need to do your part and what you need to do is review and get yourself ready!

You need to prepare by practicing as many practice questions as you can and plan to do at least 3000 questions before taking the NCLEX. As you practice questions, have a notebook next to you and make notes of the content areas that you are having difficulty with. Be sure to always read the rationales and any accompanying test-taking strategy for each practice question because this will help you to understand why the correct option is correct and why certain options are incorrect. Then after you finish your daily 2-hour session of answering questions, go to your review book and your nursing textbooks and review the difficult content.

This study guide provides you with information to help you prepare for the NCLEX. It provides: (1) tips for preparing; (2) laboratory values you need to know; (3) pharmacology tips; (4) important herbs to know; (5) guidelines for positioning clients; and (6) content outlines of topics that you need to review. Medications that are important to review are also listed.

I highly encourage you to access the National Council of State Board of Nursing at www.ncsbn.org because their Web site provides candidates for NCLEX with a great deal of information about the exam.

I wish you the best of luck with preparing and taking the exam. Do your part by reviewing and stay positive! You will surely be successful!

Linda Silvestri, MSN, RN
Doctoral Student, University of Nevada, Las Vegas

TIPS FOR PREPARING
SUGGESTED STUDY PLAN

Preparation is the key to success!
Practice at least 3000 test questions!

1. **Begin with a self-assessment**

   Self-Assessment Questions: Ask yourself the following questions.
   What are my strong areas in nursing content?
   What are my weak areas in nursing content?
   What strong and weak areas were identified in any standardized tests that I took?
   How do I normally study for exams?
   Do I complete exams within the allotted time?
   Am I comfortable with using a computer?
   Do I have balance in life; do I exercise, have fun, relax, and eat a balanced diet?
   Do I have test anxiety?
   How do I control test anxiety?
   Am I able to focus and concentrate during an exam?
   Are my self-expectations too high?
   Do I have a positive attitude?

2. **Develop a plan of preparation**

   Look at your answers to your self-assessment questions.
   List your weak content areas and then your strong content areas.
   Prioritize your plan of study; begin reviewing your weak content areas first.

3. **Implement your preparation plan**

   Obtain an NCLEX-RN review book with a CD. There are numerous books to select from. Also your school library may have review books that you can borrow to study from. Be sure that the review book is current.
   Begin your review by practicing test questions, selecting questions in the content area that is your weakest area. Make notes of content areas that you are unfamiliar with or are having difficulty with. Look up and read about these unfamiliar or difficult areas in your review book and nursing textbooks.
   Spend at least 2 uninterrupted hours of review time daily.

4. **Determine your readiness for NCLEX-RN**

   Use your NCLEX-RN review book and take practice tests from the CD and review your scores and areas of strength and note any remaining weak areas.
   Review any content areas that still need some fine-tuning.

LABORATORY VALUES TO KNOW

Note: Remember that laboratory values will vary depending on the resource used and on the laboratory that performs the test. The laboratory values noted on this page are normal ranges, although some resources may indicate varying values.

ABGS:
Ph: 7.35-7.45
PO2: 80-100 mmHg
PCO2: 35-45 mmHg
SaO2: 96-100%
HCO3: 22-27 mEq/L

BUN: 8-25 mg/dL
Creatinine: 0.6-1.3 mg/dL

Cholesterol Total: 140-199 mg/dL
HDL: 30-70 mg/dL
LDL: less than 130 mg/dL
Triglycerides: less than 200 mg/dL

Glucose: 70-110 mg/dL
Hemoglobin A_{1C}: less than 7.5%

Hemoglobin: 12-15 g/dL female; 14-16.5 g/dL male
Hematocrit: 35-47% female; 42-52% male

Platelets: 150,000 - 400,000 cells/mm3

Electrolytes:
Potassium: 3.5-5.1 mEq/L
Sodium: 135-145 mEq/L
Chloride: 98-107 mEq/L
Bicarbonate: 22-27 mEq/L

Erythrocyte sedimentation rate (ESR): 0-30 mm/hr
White blood cells: 4500-11,000 cells/mm3
Protein: 6-8 g/dL
Ammonia: 35-65 mcg/dL
Bilirubin (total): less than 1.5 mg/dL
Bleeding Time: 1-9 minutes
PTT: 20-36 seconds
PT: 9.5-11.8 seconds

INR: 2-3 (standard warfarin therapy)
Calcium: 8.6-10 mg/dL

Magnesium: 1.6-2.6 mg/dL
Phosphorus: 2.7-4.5 mg/dL
Specific gravity (urine): 1.016-1.022
Digoxin (therapeutic level): 0.5-2 ng/dL
Lithium (therapeutic level): 0.6-1.2 mEq/L

GENERAL PHARMACOLOGY GUIDELINES
AND
TIPS FOR ANSWERING PHARMACY QUESTIONS

1. Learn to recognize medications by their classifications.

2. Learn to recognize the common side effects associated with each medication classification and then relate the appropriate nursing interventions to each side effect; for example, if a side effect is hypertension then the associated nursing intervention would be to monitor the blood pressure.

3. Learn medications that belong to a classification by commonalities in their medication names; for example, medications that are xanthine bronchodilators end with "line" (theophylline).

4. Look at the medication name and use medical terminology to assist in determining the medication action; for example, *lopressor* lowers *(lo)* the blood pressure *(pressor).*

5. Assess for client allergies or hypersensitivity to a medication.

6. Assess the client for existing medical disorders that are contraindicated with the administration of a prescribed medication.

7. Medication absorption, distribution, metabolism, and excretion is affected by age and physiological processes; the older client and the neonate and infant are at greater risk for toxicity than an adult.

8. Nursing interventions always include checking the client's vital signs.

9. Nursing interventions always include monitoring for side effects of the medication.

10. The client should not take an antacid with medication because the antacid will affect the absorption of the medication (Also, avoid administering grapefruit juice with medications).

11. Enteric-coated and sustained-release tablets should not be crushed; additionally, capsules should not be opened.

12. Many medications are contraindicated in pregnancy and during breastfeeding.

13. Nursing interventions always include client education.

14. The client should never adjust or change a medication dose or abruptly stop taking a medication.

15. The client needs to avoid taking any over-the-counter medications or any other medications such as herbal preparations unless they are approved for use by the health care provider. Additionally, herbal products should never be administered to children.

16. The client needs to know how to correctly administer the medication.

17. The client needs to take the prescribed dose for the prescribed length of therapy and understand the necessity of compliance.

18. The client needs to be aware of the side effects of medication and how to check his or her own temperature, pulse, and blood pressure.

19. The client should wear a Medic-Alert bracelet if he or she is taking medications, such as but not limited to anticoagulants, oral hypoglycemics or insulin, certain cardiac medications, corticosteroids and glucocorticoids, antimyasthenic medications, anticonvulsants, and monoamine oxidase inhibitors.

20. The client needs to avoid alcohol and smoking.
21. The client needs to follow-up with a health care provider as prescribed.

COMMONALITIES IN MEDICATION NAMES

Note: If you note a medication name in a question that you are unfamiliar with, look at the medication name and remember that certain medication classifications can be recognized by the letters in their name. Remember on NCLEX, both the generic and the trade name will be presented in the question.

1. **Androgens:** most medication names end with "terone" such as testos*terone*.

2. **Angiotesin-Converting Enzyme (ACE) Inhibitors:** most medication names end with "pril" such as enala*pril* (Vasotec).

3. **Antidiuretic Hormones**: most medication names end with "pressin" such as desmo*pressin* (DDAVP).

4. **Antilipemic Medications**: many medications names end with "statin" such as atorva*statin* (Lipitor).

5. **Antiviral medications**: most antiviral medication names contain "vir" in their names such as ritona*vir* (Nor*vir*).

6. **Benzodiazepines:** includes medications such as alprazolam (Xanax), chlordiazepoxide (Librium), clorazepate (Tranxene); most other benzodiazepines names end with "pam" such as diaze*pam* (Valium).

7. **Beta-adrenergic blockers:** most medication names end with "lol" such as ateno*lol* (Tenormin).

8. **Calcium channel blockers:** most medication names end with "pine" such as amiodi*pine* (Norvasc); some exceptions include diltiazem (Cardizem) and verapamil (Calan).

9. **Carbonic anhydrase inhibitors**: most medication names end with "mide" such as acetazola*mide* (Diamox).

10. **Estrogens:** most estrogen medication contain "est" in their names such as conjugated *est*rogen (Premarin).

11. **Glucocorticoids and corticosteroids:** most medication names end with "sone" such as predni*sone* (Deltas*one*).

12. **Histamine H2 Receptor Antagonist:** most medication names end with "dine" such as cimeti*dine* (Tagamet).
13. **Nitrates:** most medications contain "nitr" in their names such as *nitr*oglycerin (*Nitr*ostat).

14. Pancreatic Enzyme Replacements: most medications contain "pancre" in their names such as *pancre*alipase (*Pancre*ase).

15. Phenothiazines: most phenothiazines medication names end with "zine" such as chlorproma*zine* (Thora*zine*).

16. Proton Pump Inhibitors: most medication names end with "zole" such as lansopra*zole* (Prevacid).

17. Sulfonamides: most medications include "sulf" in their names such as *sulf*asalazine (Azulifidine).

18. Sulfonylureas: most medication names end with "mide" such as chlorpropa*mide* (Diabinese).

19. Thiazide diuretics: most medication names end with "zide" such as hydrochlorothia*zide* (Hydrodiuril).

20. Thrombolytic Medications: most medication names end in "ase" such alteplase (Activase).

21. Thyroid Hormones: most medications contain "thy" in their names such as levo*thy*roxine (Synthroid).

22. Xanthine bronchodilators: most medication names end with "line" such as theophyl*line*.

COMPLEMENTARY AND ALTERNATIVE THERAPIES

Categories of Complementary and Alternative Therapies

Alternative Medical Systems
Mind-Body Interventions
Biologic-Based Therapies
Manipulative and Body-Based Methods
Energy Therapies

Biologic-Based Therapies

Aromatherapy

The use of topical or inhaled oils (plant extracts) that will promote and maintain health.

Herbal Therapies

The use of herbs derived from mostly plant sources that will maintain and restore balance and health.

Macrobiotic Diet

Diet high in whole grain cereals, vegetables, beans and sea vegetables, and vegetarian soups.

Meat, animal fat, eggs, poultry, dairy products, sugars, and artificially produced foods are eliminated from the diet.

Orthomolecular Therapy

Focus on nutritional balance and includes the use of vitamins, essential amino acids, essential fats, and minerals.

Herbs and their intended effects:

Aloe: Anti-inflammatory and antimicrobial effect, accelerates wound healing.

Angelica: Antispasmodic and vasodilator; balances the effects of estrogen.

Bilberry: Improves microcirculation in the eyes.

Black Cohosh: Produces estrogen-like effects.

Cat's Claw: Antioxidant; stimulates the immune system, lowers the blood pressure.

Chamomile: Antispasmodic and anti-imfammatory; produces a mild sedative effect.

Dehydroepiandrosterone (DHEA): Converts to androgens and estrogen; slows the effects of aging and is used for erectile dysfunction.

Echinacea: Stimulates the immune system.

Evening primrose: Assists with the metabolism of fatty acid.

Feverfew: Anti-inflammatory; used for migraine headaches, arthritis and fever.

Garlic: Antioxidants; used to lower cholesterol levels.

Ginger: Antiemetic; used for nausea and vomiting.

Ginko Biloba: Antioxidant; used to improve memory.

Ginseng: Increases physical endurance and stamina; used for stress and fatigue.

Glucosamine: An amino acid that assists in the synthesis of cartilage.

Goldenseal: Anti-inflammatory and antimicrobial and is used to stimulate the immune system; has an anticoagulant effect and may increase blood pressure.

Kava: Antianxiety and skeletal muscle relaxant; produces a sedative effect.

Melatonin: A hormone that regulates sleep; used for insomnia.

Milk thistle: Antioxidant; stimulates the production of new liver cells, reduces liver inflammation, and is used for liver and gallbladder disease.

Peppermint oil: Antispasmodic; used for irritable bowel syndrome.

St John's wort: Antibacterial, antiviral, and antidepressant.

Saw Palmetto: Antiestrogen activity; used for urinary tract infections and benign prostatic hypertrophy.

Valerian: Used to treat nervous disorders such as anxiety, restlessness, and insomnia.

GUIDELINES RELATED TO POSITIONING

Always review physician's orders!
Focus on the client's diagnosis!
Identify the anatomical location of the client diagnosis!
Consider the pathophysiology of the disorder and the goals of care!
Think about what complications that you want to prevent!

1. Elevation of an affected body part reduces edema.

2. Clients who have had neck or head surgery are placed in a semi-Fowler's or Fowler's position.

3. Following a liver biopsy, the client is placed in a right lateral (side-lying) position to provide pressure to the site and prevent bleeding.

4. Clients receiving irrigations or feeding through a nasogastric, gastrostomy, or jejunostomy tube are placed in a semi-Fowler's or Fowler's position to prevent aspiration.

5. The left Sims' position is used to administer a rectal enema or irrigation to allow the solution to flow by gravity in the natural direction of the colon.

6. Clients with a respiratory disorder or cardiovascular disorder are placed in a semi-Fowler's or Fowler's position.

7. Clients with peripheral arterial disease may be advised to elevate their feet and legs at rest because swelling can prevent arterial blood flow, but they should not raise their legs above the level of the heart because extreme elevation shows arterial blood flow; some clients may be advised to maintain a slightly dependent position to promote perfusion.

8. Clients with peripheral venous disease are usually advised to elevate their feet and legs.

9. Clients with a head injury are placed in a semi-Fowler's or Fowler's position.

10. If a client develops autonomic dysreflexia the head of the bed is elevated.

11. In clients with hemorrhagic strokes, the head of the bed is usually elevated to 30 degrees to reduce intracranial pressure and to facilitate venous drainage.

12. For clients with ischemic strokes, the head of the bed is usually kept flat.

13. Following craniotomy, the client should NOT be positioned on the side that was operated on, especially if the bone flap has been removed, because the brain has no bony covering on the affected site; a semi-Fowler's to Fowler's position is maintained with the head in a midline, neutral position to facilitate venous drainage from the head, and extreme hip and neck flexion is avoided.

14. With increased intracranial pressure, the client is placed in a semi-Fowler's to Fowler's position; the head is maintained in a midline, neutral position to facilitate venous drainage from the head, and extreme hip and neck flexion is avoided.

15. In a spinal cord injury, the client is immobilized on a spinal backboard, with the head in a neutral position, to prevent incomplete injury from becoming complete; head flexion, rotation, or extension is avoided and the client is log rolled.

16. In the client who underwent a total hip replacement, positioning will depend on the surgical techniques used, the method of implantation, the prosthesis, and physician's preference; extreme internal and external rotation and adduction is avoided and sidelying on the operative side is not allowed (unless specifically prescribed by the physician).

NURSING CONTENT AREAS

Note: Be sure to access the National Council of State Boards of Nursing at www.ncsbn.org and click on the link that provides the test plan for NCLEX. You have access to this plan and can download it at no cost. This test plan will provide you with detailed information about content on the NCLEX. Be sure to select the RN detailed test plan.

FUNDAMENTAL SKILLS AND MANAGING CARE

Client Rights
- Confidentiality
- Informed Consent
- Advance Directives

Advocacy

Concepts of Management and Supervision
- Supervise assistive personnel
- Effective time management
- Conflict resolution
- Intervene in unsafe situations

Performance Improvement (Quality Assurance)
- Participate in Quality Assurance activity
- Report issues to appropriate personnel

Client Care Assignments
- Assign and delegate care
- Organize information needed for care and assignment making

Continuity of Care
- Transfer report
- Intershift report
- Admission, transfer, discharge process
- Follow-up on unresolved care issues
- Communicate with interdisciplinary team

Establishing Priorities
- Who to assess first
- Prioritize care: who to care for first
- Include client in decision-making

Resource Management and Time Management
- Correct materials and equipment
- Time management

Consultation with Members of the Health Care Team
Identify need for consultation

Referral Process
Communicate need to change referral based on new information
Identify community resources

Ethical Practice and Legal Responsibilities
Ethical decision-making process
Legal issues

SAFETY AND PREVENTING INFECTION

Accident/Error/Injury Prevention
Safety Procedures
Identify client at risk
Infant and child car seats
Allergies
Fire safety
Environmental and safety hazards

Safe use of Equipment
Frayed cords
Loose or missing parts
Report and label faulty equipment
Provide safety with oxygen, mobility aids

Use of Restraints/Safety Devices
Least restrictive, proper function, appropriate application
Follow agency policy

Reporting of Incident/Event/Irregular Occurrence/Variance
Identify need for a report (i.e. medication error, client fall)
Complete properly and follow agency guidelines

Home Safety
Lighting, handrails, kitchen safety
Fire safety
Environment (frayed cords, proper footware, small area rugs)

Medical and Surgical Asepsis
Monitor client area for sources of infection
Use personal protective equipment properly
Hand hygiene
Setting up sterile field

Standard/Transmission Based/Other Precautions

Follow specific precautions: know what protective items need to be worn.
Identify client knowledge of infection control process.
Identify communicable disease and mode of transmission.
Monitor others to ensure they are correctly using equipment to decrease transmission.

Handling Hazardous and Infectious Materials

Biohazards and infectious waste
Safe handling of chemotherapy and radiation therapy sources
Handling blood spills
Infection control policies

External and Internal Disaster Plans

Evacuation plans and follow agency policy
Identify nursing and other roles
Selection of clients for discharge if necessary
Triage plans

Security Plans

Follow/participate in triage and evaluation plan
Infant abduction

NURSING SKILLS AND MEDICAL-SURGICAL CONTENT

Vital Signs

Temperature, pulse, respirations, blood pressure

Laboratory Values: Refer to handout

Fluids and Electrolytes

Fluid volume deficit
Fluid volume excess

Hypokalemia
Hyperkalemia

High potassium foods

Nutrition and Oral Hydration

Intake and output records

Nasogastric tube feedings

Intravenous fluids
- Infiltration
- Phlebitis
- Flow rate

Removing an IV

Blood Administration
- Pre-procedure guidelines and assessments
- Procedure

Transfusion reaction – signs and nursing interventions

Medication Administration
- Rights of medication administration
- Routes
  - Oral
  - Subcutaneous
  - Intramuscular
  - Intravenous
  - Topical and eye, ear, nose drops
  - Enteral
- Mixing NPH and Regular insulin
- Phone in prescriptions to pharmacy
- Count opioids/controlled substances

CPR and the Choking Victim
- Adult
- Child
- Infant

Respiratory Tubes
- Tracheostomy Tube Care
- Suctioning procedure
- Chest Tubes

Complementary and Alternative Therapies

Pain Management
- Non-pharmacological
- Pharmacological

Perioperative Care

Preoperative care
Postoperative care
Hemovac, Jackson-Pratt, Penrose drain
Hemorrhage and shock
Dehiscence and evisceration

Integumentary System

Biopsy

Altered skin integrity and wound care

Signs of infection

Hot and cold packs

Infestations: Scabies

Burns

Topical medications

Oncological Disorders

Self Examination: BSE and TSE

Radiation therapy and chemotherapy

Cancer of blood forming organs: Leukemia, Hodgkin's disease, Multiple Myeloma

Testicular cancer

Breast cancer

Gastric cancer

Intestinal tumors – colostomy – ileostomy

Lung cancer

Laryngeal cancer

Prostate cancer

Bladder cancer

Key medications:
Chemotherapy: major side and adverse effects
Neutropenia and neutropenic precautions
Thrombocytopenia and bleeding precautions

Endocrine System

Hypothyroidism

Hyperthyroidism

Addison's disease

Cushing's disease

Diabetes insipidus

Diabetes mellitus

Key medications:
Corticosteroids and glucocorticoids
Levothyroxine (Synthroid)
Oral hypoglycemics and insulin

Gastrointestinal System
Procedures/diagnostic tests
Endoscopy
Colonoscopy
Liver biopsy
Paracentesis

Ulcers

Dumping syndrome

Vitamin B_{12} deficiency

Ulcerative colitis

Crohn's disease

Diverticulosis and diverticulitis

Appendicitis

Cirrhosis

Cholecystitis

Pancreatitis

Hepatitis

Key Medications:

Antacids
Cimetidine (Tagamet)
Ranitidine (Zantac)
Sucralfate (Carafate)
Lactulose (Cephulac)

Respiratory System

Procedures

Sputum specimen
Bronchoscopy
Thoracentesis
Pulse oximetry

Oxygen therapy

Pneumothorax

Pneumonia

Chronic Obstructive Pulmonary Disease (Emphysema)

Tuberculosis (TB)

Key medications:

Bronchodilators
How to use inhalers
TB medications: (Isoniazid [INH], rifampin [Rifadin])

Cardiovascular System

Diagnostics

ECG
Holter monitoring
Exercise stress test
Cardiac catheterization

CAD, Angina and Myocardial Infarction

Cardiac surgery

Cardiac dysrhythmias: Normal sinus rhythm, Bradycardia, Tachycardia, Atrial Fibrillation, Premature ventricular contractions, Ventricular tachycardia, Ventricular fibrillation

Peripheral arterial insufficiency and peripheral venous insufficiency

Raynaud's disease and Buerger's disease

Aortic aneurysms

Hypertension

Key medications:
Anticoagulants
Diuretics
Antihypertensives
Digoxin (Lanoxin)
Nitroglycerin
Beta-blockers and calcium channel blockers
Antihyperlipidemic medications

Renal System

Urinary catheterization

Renal failure: acute and chronic

Hemodialysis – access devices

Peritoneal dialysis

Polycystic kidney disease

Urinary tract infection

Urinary tract and kidney stones

Benign prostatic hypertrophy

Key medications:
Sulfonamides
Epoetin alfa (Epogen, Procrit)
Cyclosporine (Sandimmune, Neoral)
Tacrolimus (Prograf)

Mycophenolate mofetil (Cell Cept)

The Eye and The Ear

Eyes
- Cataracts
- Glaucoma
- Retinal detachment
- Eye injuries

Ears
- Meniere's syndrome
- Cerumen and foreign bodies

Key medications:
- Mydriatics
- Cycloplegics

Neurological System

Unconscious client

Head injury and increase intracranial pressure

Spinal cord injury
- Spinal shock
- Autonomic dysreflexia

Cerebral aneurysm precautions

Seizures

Stroke

Multiple sclerosis

Myasthenia gravis
- Myasthenic crisis
- Cholinergic crisis

Parkinson's disease

Trigeminal neuralgia

Bell's palsy

Guillain-Barre syndrome

Encephalitis

Menigitis

Key medications:
Antiseizure medications- phenytoin (Dilantin)
Antiparkinsonian medications
NSAIDs
Opioid analgesics

Musculoskeletal System

Assistive devices: walkers, canes, crutches

Immobilizing equipment, splints, braces, boots; casts; traction

Fractures

Fractured Hip

Total knee replacement

Herniated disk

Amputation

Rheumatoid arthritis and osteoarthritis

Osteoporosis

Gout

Key medications:
Skeletal muscle relaxants
Antigout agents
Antiarthritic agents

Immune Disorders
Immune deficiency
Allergy and anaphylaxis
Latex allergy

Systemic lupus erythematousus (SLE)

Acquired Immunodeficiency Syndrome (AIDS)

Key medications:

Antifungals
Antiviral agents

THEORIES OF GROWTH AND DEVELOPMENT

Psychosocial Development: Erik Erikson's Eight Stages

Cognitive Development: Jean Piaget

Stages:

Sensorimotor (0-2 years)
Preoperational (2-7)
Concrete operational (7-11)
Formal operations (11+yrs)

Moral Development: Lawrence Kohlberg

Psychosexual Development: Sigmund Freud

Id, ego, superego (agencies of the mind)
Oral state, anal stage, phallic stage, latency stage, genital stage

MATERNITY NURSING

Obstetrical Assessment

Nagel's rule for estimating delivery date

Pregnancy signs: presumptive, probably, and positive

Maternal risk factors
- German measles (rubella)
- Sexually transmitted infection; HIV
- Substance abuse
- Adolescent pregnancy

Prenatal Period and Risk Conditions

Discomforts of pregnancy

Prenatal Visits/Laboratory Tests

Nutrition

Specific Risk Conditions
- Anemia, cardiac disease
- Chronic hypertension
- Diabetes mellitus
- Preeclampsia and Eclampsia

Labor and Delivery and Associated Complications

Breathing Techniques

Stages of Labor
- Stage 1 assessment and implementation
- Stage 2 assessment and implementation
- Stage 3 assessment and implementation
- Stage 4 assessment and implementation

Obstetric Procedures
- Induction
- Episiotomy
- Cesarean delivery
- Preterm Labor

Placenta Previa

Abruptio Placentae

Prolapsed Cord

Fetal distress

Precipitate Birth

The Postpartum Period and Associated Complications

Maternal physiological changes
- Involution
- Lochia
- Changes in breasts

Postpartum Interventions
- Pericare
- Postpartum Discomforts
- Nutrition
- Breastfeeding

Complications
- Hemorrhage
- Infection
- Subinvolution

Care of the Newborn

Initial Care of the Newborn
- Assessment
- Apgar scoring system
  - Implementation: clean off and dry, keep warm, give to mom, eye prophylaxis within 1 hour

Parent Teaching (formula or breast feeding, bathing, clothing, cord care, circumcision)

Preterm Newborn

Post-term Newborn

Small for Gestational Age/Large for Gestational Age

Respiratory Distress Syndrome (RDS)

Hyperbilirubinemia

Addicted Newborn

Fetal Alcohol Syndrome

Newborn of a Diabetic Mother

Hypoglycemia

PEDIATRICS

Growth and Development

The Hospitalized Child: Characteristics, Implementation, and Common Approaches by Age

Infant and toddler
Preschooler
School-aged child
Adolescent
Communication Approaches by Age Group

Neurological, Cognitive, and Psychosocial Disorders

Hydrocephalus

Spina Bifida

Reye's Syndrome

Meningitis

Seizures

Cerebral Palsy

Mental Retardation

Autism

Attention Deficit Hyperactivity Disorder

Child Abuse

Eye, Ear, Throat, and Respiratory Disorders

Conjunctivitis

Otitis Media

Tonsillectomy and Adenoidectomy

Epiglottitis

Laryngotracheobronchitis (Croup)

Bronchiolitis (such as from Respiratory Syncytial Virus [RSV])

Asthma

Cystic Fibrosis

Sudden Infant Death Syndrome (SIDS)

Cardiovascular Disorders

Congestive heart failure

Intracardiac Shunts
- Left-to-right
- Right-to-Left

Cardiac Surgery

Rheumatic Fever

Kawasaki Disease

Metabolic, Endocrine, and Gastrointestinal Disorders

Fever

Dehydration

Vomiting and diarrhea

Phenylketonuria

Type 1 Diabetes Mellitus

Cleft Lip and Cleft Palate

Esophageal Atresia and Tracheoesophageal Fistula

Pyloric Stenosis

Lactose Intolerance

Celiac Disease

Appendicitis

Hirschsprung's Disease

Intussusception

Imperforate Anus

Ingestion or Poisons: lead, acetaminophen (Tylenol), salicylates

Renal and Urinary Disorders

Glomerulonephritis

Hypospadias and Epispadias

Bladder Exstrophy

Integumentary Disorders

Eczema

Impetigo

Pediculosis Capitis (Lice)

Scabies

Ringworm

Burns: pediatric differences

Musculoskeletal Disorders

Dysplasia of the Hip

Pelvic harness and spica cast

Fractures

Scoliosis

Hematological and Oncological Disorders

Sickle Cell Anemia

Hemophilia

Leukemia

Hodgkin's Disease

Nephroblastoma (Wilm's Tumor)

Neuroblastoma

Ewing's Sarcoma

Communicable Diseases and Acquired Immunodeficiency Syndrome

Rubella (German Measles)

Rubeola (Measles)

Chickenpox (Varicella)

Pertussis (Whooping Cough)

Scarlet Fever

Fifth Disease

Infectious mononucleosis (Epstein-Barr virus)

Enterobiasis (Pinworms)

Acquired Immunodeficiency Syndrome (AIDS)

- Similarities to adults
- Care of the child with AIDS

Recommended Immunization Schedules

Pediatric Medications: Administration Guidelines and Calculations

THE GERONTOLOGICAL CLIENT

Physiological Age-Related Changes and Psychosocial Aspects of Aging

Elder Abuse and Neglect

Use of Restraints

Medication Management

CULTURAL AWARENESS

African American

Asian American

Hispanic American

Native American

Jehovah Witness

Judaism

Amish

PSYCHIATRIC/MENTAL HEALTH NURSING

Principles of the nurse-client relationship

Therapeutic Nurse-Client Relationship
- Orientation
- Working/continuation
- Termination/separation

Therapeutic communications

Coping mechanisms

Defense mechanisms

Types of mental health admissions and discharges
- Voluntary
- Involuntary

Mental Health Disorders

Anxiety Levels: mild, moderate, severe, panic

Generalized Anxiety Disorder vs. Panic Disorder

Post-traumatic Stress Disorder (PTSD)

Bipolar disorders

Schizophrenia

Electroconvulsive Therapy
- Indications
- Preprocedure, intra-procedure, and postprocedure care

Cognitive Impairment Disorders

Substance Abuse Disorders

Alcohol Abuse

Alcohol Withdrawal

Withdrawal from Other Drugs
- Opiates
- Sedatives and depressants
- Antianxiety medications
- Stimulants

Crisis theory and Intervention

Crisis Intervention
- Orientation to reality
- Help express feelings
- Report behavior changes
- Reinforce teaching about social supports

Affective (Mood) Disorders

Depression

Suicidal Behavior
- Clues and assessment about risk
- Suicide precautions

Violent Behavior
- Anger, violence, aggression
- Restraints and seclusion

Psychiatric Medications

- Classes
  - Selective Serotonin Uptake Inhibitors
  - Tricyclic Antidepressants
  - Monoamine Oxidase Inhibitors
  - Antimania Medications
  - Antianxiety Medications
  - Antipsychotic Medications

  - Adverse effects
    - Neuroleptic malignant syndrome
    - Tardive dyskinesia
  - Parkinsonism

APPENDIX T

SAMPLE ASSESSMENT PLAN

1. Determine results on the NCLEX Report form
2. Identify areas of weakness
3. Self-assessment of strengths and weaknesses
4. Determine “what went wrong.”
5. How did the graduate prepare.
6. Develop short-term and long-term goals
7. Decide the best strategy for studying and resources to use.
8. Develop an outline for studying.
9. Use a calendar to plan for daily study time and for a retake date

APPENDIX U

LIFE CHANGE EVENTS: FREQUENCIES AND PERCENTS

The 74 Life Change Event	Frequency	Percent
1. Health: An injury or illness which kept you in bed a week or more, or sent you to the hospital.	32	17.5
2. An injury or illness that was less serious than above.	67	36.6
3. Major dental work.	22	12
4. Major change in eating habits.	50	27.3
5. Major change in sleeping habits.	82	44.8
6. Major change in your usual type and/or amount of recreation.	88	48.1
7. Work: Change to a new type of work.	71	38.8
8. Change in your work hours or conditions.	72	39.3
9. Change in your responsibilities at work: more responsibilities.	52	28.4
10. Change in your responsibilities at work: fewer responsibilities.	7	3.8
11. Change in your responsibilities at work: promotion.	12	6.6
12. Change in your responsibilities at work: demotion.	2	1.1
13. Change in your responsibilities at work: transfer.	6	3.3
14. Troubles at work: with your boss.	14	7.7
15. Troubles at work: with coworkers.	12	6.6
16. Troubles at work: with persons under your supervision.	3	1.6
17. Troubles at work other than with your boss, coworkers, or persons under your supervision.	6	3.3
18. Major business adjustment.	0	0
19. Retirement.	0	0
20. Loss of job: laid off from work.	6	3.3
21. Loss of job: fired from work.	1	.5
22. Took a correspondence course to help you in your work.	1	.5
23. Home and family: Major change in living conditions.	49	26.8
24. Change in residence: a move within the same town or city,	33	18
25. Change in residence: a move to a different town, city, or state.	35	19.1
26. A change in family get-togethers.	46	25.1
27. Major change in health or behavior of a family member.	64	35
28. Marriage.	8	4.4
29. Pregnancy.	9	4.9
30. Miscarriage or abortion.	4	2.2
31. Gain of a new family member: birth of a child.	13	7.1

32. Gain of a new family member: adoption of a child.	0	0
33. Gain of a new family member: a relative moving in with you.	3	1.6
34. Spouse beginning or ending work.	11	6.0
35. Child leaving home to attend college.	6	3.3
36. Child leaving home due to marriage.	0	0
37. Child leaving home for other reasons.	2	1.1
38. Change in arguments with spouse.	16	8.7
39. In-law problems.	8	4.4
40. Change in the marital status of your parents: divorce.	8	4.4
41. Change in the marital status of your parents: remarriage.	3	1.6
42. Separation of spouse: due to work.	2	1.1
43. Separation of spouse: due to marital problems.	3	1.6
44. Divorce	2	1.1
45. Birth of a grandchild.	0	0
46. Death of spouse.	0	0
47. Death of a child.	0	0
48. Death of a brother or sister.	1	.5
49. Death of a parent.	12	6.6
50. Personal and social: change in personal habits.	66	36.1
51. Beginning or ending school or college.	60	32.8
52. Change of school or college.	22	12
53. Change in political beliefs.	4	2.2
54. Change in religious beliefs.	4	2.2
55. Change in social activities.	51	27.9
56. Vacation.	62	33.9
57. New, close personal relationship.	67	36.6
58. Engagement to marry.	21	11.5
59. Girlfriend or boyfriend problems.	63	34.4
60. Sexual difficulties.	13	7.1
61. "Falling out" of a close personal relationship.	64	35
62. An accident.	11	6
63. Minor violation of the law.	5	2.7
64. Being held in jail.	0	0
65. Death of a close friend.	11	6
66. Major decision regarding your immediate future.	47	27.5
67. Major personal achievement.	55	30
68. Financial: Major change in finances: decreased income.	61	33.3

69. Major change in finances: increased income.	3	1.6
70. Major change in finances: investment and/or credit difficulties.	13	7.1
71. Loss or damage of personal property.	11	6
72. Moderate financial purchase.	15	8.2
73. Major financial purchase.	13	7.1
74. Foreclosure on a mortgage or loan.	2	1.1

From the Life Change Events listed in the Miller-Rahe Recent Life Changes Questionnaire. From: Miller, M. & Rahe, R. (1997) Life changes scaling for the 1990s. Journal of psychosomatic research. 43(3) 279-292. Permission for use granted from Dr. Richard Rahe.

APPENDIX V

ELECTRONIC COMMUNICATION WITH DR. RAHE

----Original Message---
From: Dr. Rahe
To: silves16@unlv.edu.nevada.edu Sent: Sat. October 10, 2009 3:32 pm
Subject: Re: Use of the Recent Life Changes Questionnaire

Dear Linda,
In answer to your question about LCU prediction, it is best to use the total LCU scores for 6 months and 1 year prior to study.
The high Spearman correlations in the Miller and Rahe article were for comparisons of demographically divided groups- such as men's scores compared to those for women, youth compared to elders, etc. Our subjects were responding to the list of 43 recent life events. Your subjects were reporting their own personal recent life change events, so wouldn't want to run Spearman correlations for demographic subgroups.
The best reliability test would be a test-retest comparison between subjects sub group and total LCU scores on two testings not too far apart in time (ideal time period between tests would be 2 to 4 weeks). Do you have such data? I have an unpublished test-retest run 4 weeks apart that showed reliabilities for the subscales from 0.71 to 0.85. You could quote this as Rahe… unpublished data.

You are taking your PhD work a long way from home. Do you like Las Vegas?

Dr. Rahe

On Fri. October 9, 2009 at 7:57 pm

Dear Dr. Rahe,
I am a doctoral candidate in the department of nursing at the University of Nevada, Las Vegas, and am working on data analysis for dissertation. I wrote to you in January of 2009 and you provided me permission to use your Recent Life Changes Questionnaire (RLCQ) as a component of my survey. The title of my work is "identifying the Predictors of the National Council Licensure Examination for Registered Nurses (NCLEX) Outcomes Using Artificial Neural Networks." The NCLEX examination is the one that nursing graduates must take and pass in order to become licensed as a registered nurse. One of the variables of my study is personal and environmental factors/stressors and your RLCQ was used to measure items related to stress so that I could identify those predictors (health, work, home and family, personal and social, financial) that affect NCLEX outcomes (pass or fail). One statistical analysis procedure that I will use is logistic regression. I have a few questions and am wondering if you could answetr them and provide me with some direction.

1. I noted in an article that the higher the score on the RLCQ the greater the negative impact on the individual. I am wondering if it is best to consider each area (health,

work, home and family, personal and social, financial) separately or all area together. Additionally is there a specific LCU sum or score that you recommend as indicating a negative effect. Would it be best to look at mean scores to determine this?

2. In your article, you noted that extremely significant Spearman rho correlations coefficients of 0.84 to 0.96 were consistently demonstrated with the RLCQ. [Miller, M. & Rahe, R. (1997) Life Changes Scaling for the 1990s. Journal of Psychosomatic Research, 43(3) 279-292).
   To test reliability of the RLCQ, would you recommend using Spearman rho correlation coefficients or Cronbach's alpha? Additionally, would you recommend testing reliability of each subscale (health, work, home and family, personal and social, financial) or the entire scale?
3. Could do you direct me to publications that are significant and may be helpful as they relate to my questions?

   I want to thank you in advance for your expert guidance and I look forward to your responses.
   Sincerely,
   Linda A. Silvestri MSN, RN, PhD Candidate
   University of Nevada, Las Vegas

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