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THE USE OF ACADEMIC PERFORMANCE AS A PREDICTOR  
OF SUCCESS OF THE NATIONAL COUNCIL  
LICENSING EXAMINATION

by

Patricia O'Brien Dardis

A thesis

submitted in partial fulfillment  
of the requirements for the degree of  
Master of Science, Major in Nursing  
South Dakota State University

January 1984

THE USE OF ACADEMIC PERFORMANCE AS A PREDICTOR  
OF SUCCESS OF THE NATIONAL COUNCIL  
LICENSING EXAMINATION

This thesis is approved as a creditable and independent investigation by a candidate for the degree Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Title: THE USE OF ACADEMIC PERFORMANCE AS A PREDICTOR OF SUCCESS  
OF THE NATIONAL COUNCIL LICENSING EXAMINATION

Student: Patricia O'Brien Dardis

Type of Study Project  Thesis

Area of Focus of Study

education  
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 patient care management  
 other

Abstract (approximately 150 words)

The purpose of this study was to determine the relationship between a baccalaureate nursing student's academic performance and scores received on the National Licensing Examination for Registered Nurses (NCLEX-RN); and to develop an equation to predict NCLEX-RN scores.

The sample consisted of 25 generic students who graduated in 1982 and 1983 from a small private baccalaureate liberal arts college located in the Midwest. An Ex Post Facto research design, using twenty independent variables that relate to academic performance (ACT, GPA, and NLN scores), and one dependent variable (NCLEX-RN), was utilized. Statistical analysis using Pearson's - r and Multiple Regression Analysis was employed to analyze the data.

Each of the independent variables correlated significantly to the dependent variable, with clinical nursing theory GPA's demonstrating the most significant Pearson - r's. Multiple Regression Analysis resulted in the development of a regression equation that accounted for eighty-four percent of the variability in obtained NCLEX-RN scores.

I give my permission to the College of Nursing, SDSU to publish this abstract in a collection of abstracts from master's projects and theses.

Signature

Date

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## CHAPTER 1

### Statement of the Problem and Objectives of the Study

#### Introduction

Graduate nurses are required to achieve a minimum score of 1600 on the National Council Licensing Examination for Registered Nurses (NCLEX-RN) in order to be legally employed as registered nurses. Schools of nursing are quick to emphasize that the sole purpose of their program is not to produce graduates capable of passing the licensing exam, but also to produce graduates who practice professional nursing that reflects the objectives of the school. However, each is faced with the fact that licensing exams continue to be at least one criterion for evaluating their graduates.

With a fifty-three percent increase in the enrollment in baccalaureate nursing education programs between 1970 and 1980,<sup>(1)</sup> maximum utilization of a program's faculty and clinical resources becomes a critical issue. In fairness to both faculty and students, only those students with potential for success on the NCLEX-RN should be admitted and retained in the nursing program. Doing so will avoid the development of a program that is diluted in breadth and quality; therefore, will allow faculty to gear their teaching to students who are likely to be successful.

Most baccalaureate programs screen applicants before

admission to upper division nursing courses using a set of admission criteria developed by the school of nursing, in addition to that of initial college admission. By identifying variables which predict success and using the variables as criteria for admission and retention in a nursing education program, it would be reasonable to expect fewer absolute failures, higher average scores on the NCLEX-RN and greater student faculty satisfaction.

#### Problem Statement

The purpose of this study was to research the following problem statement: What is the relationship between a baccalaureate nursing student's academic performance and scores received on the National Council Licensing Examination for Registered Nurses (NCLEX-RN).

#### Significance of the Problem

In February, 1982, the structure of the licensing examination for graduate nurses changed from a five part exam, known as the State Board Licensing Examination (SBE), to a one part examination, known as the National Council Licensing Examination for Registered Nurses (NCLEX-RN). Presently there are no documented studies that attempt to identify predictors of success on the NCLEX-RN in relation to academic performance.

The fact that approximately thirteen percent of all nursing school graduates either do not take the exam or do

not pass it,<sup>(2)</sup> indicates the need for nursing schools to determine a nursing student's potential for success on the NCLEX-RN. A valid predictor of success would afford the following advantages: 1) admission criteria may be reinforced or re-evaluated allowing for admission of academically qualified students; 2) students who meet admission criteria, but indicate limited potential for success after admission, may receive the necessary academic advising; 3) students who show no potential for success, may then be counseled in career areas where they would be more likely to succeed; 4) development of an academic program that is diluted in breadth and quality would be avoided and nurse educators could then gear their teaching and standards to a higher academic level.

#### Objectives of the Study

The objectives of this study are:

1. To determine if a relationship exists between American College Testing scores, grade point average, National League for Nursing scores and National Council Licensing Examination scores for registered nurses.
2. To develop an equation to predict National Council Licensing Examination scores.

#### Definition of Terms

Academic Performance - A student's scholastic achievements consisting of variables representing:

1. American College Testing (ACT) - A standardized five

part national examination taken by high school graduates who desire to apply for admission to a college. The examination measures cognitive knowledge in four areas: 1) Social Sciences, 2) Natural Sciences, 3) English and 4) Mathematics. A score is given that reflects ability in each of the four areas plus a composite score.

2. Grade Point Average (GPA) - The arithmetic means of any number (one or more) of grades earned while attending college consisting of the following:

a) Freshman: All academic courses completed after the freshman year, usually consisting of 32 semester credits.

b) Sophomore: All academic courses completed after the sophomore year, usually consisting of 32 semester credits.

c) Physical Science: Academic courses completed in anatomy and physiology (10 semester credits), microbiology (4 semester credits) and chemistry (8 semester credits).

d) Social Sciences: Academic courses completed in psychology (6 semester credits) and sociology (3 semester credits).

e) Nursing Clinical Theory Courses: Academic courses completed in nursing that relate to theory and its application to clinical situations. Involves courses taken beginning Semester I junior year and ends with the termination of Semester I senior year. Totals 36 semester credits. Seventy percent of each course grade is based on examination scores; thirty percent reflects written work related to

clinical application of theory. Clinical performance is evaluated on a Pass/Fail basis.

3. National League for Nursing Achievement Examination (NLN) - A standardized examination, instituted in February, 1982, that is given to all nursing students at the beginning of their senior year. The examination compares an individual student's mastery of knowledge in 1) Psychiatric Nursing, 2) Medical-Surgical Nursing, 3) Pediatric Nursing, and 4) Childbearing Family, with a norm group of students from a variety of programs throughout the United States. Both percentile rank and individual raw scores are utilized in computing results for each of the four divisions.

Baccalaureate Liberal Arts College - An academic environment that a nursing student enters after graduation from high school (or equivalent), which grants academic credit for course work completed with a passing grade. A Bachelor of Arts degree in nursing is granted by the college after the student has completed all requirements for the nursing major.

Generic Student - A nursing student who begins and completes all course work at one college. The composite of credits earned, leads to a Bachelor of Arts degree in nursing.

National Council Licensing Examination (NCLEX-RN)- A standardized national examination administered to a graduate of a baccalaureate nursing program which is designed to measure minimum competency of safe practice of nursing. A passing score of 1600 of 3200 is required for licensure.

Nursing Student - A college student who is actively enrolled in courses required for a Bachelor of Arts degree in nursing.

Success - Is defined as a student who graduates, earning a bachelor's degree in nursing, and passes the NCLEX-RN.

### Organization of the Study

This study has been designed to identify academic variables that predict success on the NCLEX-RN. The study is organized as follows:

1. Chapter 1 includes a statement of the researched problem, the significance of the problem to nursing, objectives of the study and a definition of terms as they relate to the content of the study.
2. Chapter 2 consists of a selected review of the literature that involves the variables of the study. It presents a conceptual framework that supports and discusses the relationship between the variables of the study. It outlines the dependent and independent variables and states the hypotheses.
3. Chapter 3 includes an outline of the research design utilized, a description of the sample included in the study, the method of collecting data and the statistical procedures used in analyzing the collected data.
4. Chapter 4 encompasses a discussion that involves the results of the analyzed data.
5. Chapter 5 summarizes the research problem with a



discussion of major research findings and conclusions as they relate to the objectives of the study. The implications and limitations of the study are presented. The chapter is concluded with recommendations for further research.

## CHAPTER 2

### Review of the Literature

The review of the literature will be presented in three sections. Section one will discuss the use of ACT scores in predicting success on the NCLEX-RN; section two will discuss the use of GPA in predicting success on the NCLEX-RN; and section three will discuss the use of NLN scores in predicting success on the NCLEX-RN.

Based on a search of the literature using Eric, Medline, and a manual approach, there was no documented research on the NCLEX-RN concerning its relationship to the variables of this study. This may be explained by the fact that the NCLEX-RN format is new (instituted February, 1982). Therefore, the research cited in this review will concern the relationship of the State Board Examination Scores (SBE) to the previously described variables indicating academic success.

#### American College Testing Exam (ACT)

The ACT exam is a standardized achievement exam prepared by the American College Testing Program. Student scores on the four academic subtests - English, Math, Social Studies, and Natural Sciences, in addition to a composite score, provide an indication of general educational development and ability to do college-level work.<sup>(3)</sup>

ACT scores have been utilized in assessing a student's

academic ability since 1959.<sup>(4)</sup> However, its relevance and accuracy in predicting academic success in nursing students, has been used minimally in research, as reflected by one documented study (Perez, 1977) that discusses this relationship. Despite this, documentation is available in the literature that discusses the relationship between the Scholastic Aptitude Test (SAT) and SBE performance.

The SAT, like the ACT, evaluates how well prepared the student is to do the academic work required by most colleges.<sup>(5)</sup> Research between the SAT and ACT have revealed the two test batteries to be equally predictive of college grades.<sup>(6,7,8)</sup> Because the two exams have consistently demonstrated similar predictive qualities, both ACT and SAT's relationship to SBE scores will be discussed.

Perez (1977) studied the ACT and SBE scores of 240 baccalaureate nursing graduates at a private liberal arts college. Correlation coefficients revealed moderately strong relationships at  $p < .01$  between the ACT Social Science reading score and all five SBE scores (.38 - .53); and between the ACT Composite score and all SBE scores (.41 - .52). Other ACT scores in this study demonstrated a less significant relationship with SBE scores: SBE scores and ACT English at .26; SBE scores and ACT Math at .28; and ACT Natural Science reading score at .35.<sup>(9)</sup> In assessing the results of these correlations, one might ask, why the Social Science reading score is more positively correlated to SBE scores than the

Natural Science reading score. Perez speculated that this may be attributed to the fact that schools of nursing are placing greater emphasis on the psychological and social aspect of patient care, and that the social science reading exam places greater emphasis on reading than knowledge; therefore, a student's reading ability might well be a predictor of NCLEX-RN scores.<sup>(10)</sup>

The validity of SAT scores in predicting NCLEX-RN scores has been extensively discussed in the literature. Muhlenkamp (1971) reviewed SAT and SBE scores of 45 baccalaureate students who graduated from a large midwestern university in 1967. A positive correlation was reported between SAT Verbal scores and SBE scores in Psychiatric Nursing of .50 at a significance level of  $p < .01$ .<sup>(11)</sup> Reed (1972) reported similar significant correlations at  $p < .05$  between SAT Verbal scores and the SBE score in Psychiatric Nursing at .69, Pediatric Nursing at .64, Surgical Nursing at .60, Medical Nursing at .57, and Obstetrical Nursing at .49.<sup>(12)</sup> These data is supported by Miller (1968), where SAT Verbal scores and SAT Mathematics scores were utilized as independent variables to predict the dependent variables of SBE scores. At a significance level of  $p < .05$ , correlations of .35 to .49 were reported between SAT Verbal and all SBE scores.<sup>(13)</sup> Again, the strongest correlation was between SAT Verbal and the SBE score on Psychiatric Nursing. Less significant relationships were reported between SAT Mathematics and the five SBE scores at

$p < .05$  at .11 to .21.<sup>(14)</sup> Hayes (1981) was unable to report positive correlations between SAT Mathematics and SBE scores, but like Muhlen Kamp, Reed, and Miller, the consistent finding between SAT Verbal and SBE scores was reported at a  $p < .05$  level of significance.<sup>(15)</sup>

#### Grade Point Average (GPA)

In a review of the research, it has been reported that the variable, GPA, was a valid predictor of SBE scores. The strength of cognitive predictors (indicating knowledge or achievement), has been well documented in the research by Brandt, Baldwin, Miller, Reed, Shelley, Perez, Seither, Melcolm, and Yocom and Scherubel. Of all cognitive predictors, the variable GPA has been researched the most extensively in its relationship to SBE scores.

Seither (1980) studied the relationship between GPA and SBE scores of 198 baccalaureate nursing students at a large midwestern university. Stepwise multiple regression analysis was applied to determine the relationship between all five SBE scores and GPA in biological sciences, behavioral sciences, and GPA for all nursing courses at  $p < .0001$  level of significance. The GPA in the biological sciences was the best predictor of each SBE score with the exception of Psychiatric Nursing, with R-squared factors of .15 to .27. GPA in nursing courses was the best predictor of SBE score in obstetrical nursing (R-square = .39).<sup>(16)</sup>

Brandt (1967) correlated GPA nursing theory and practice

grades to SBE scores of 156 students at the University of Washington. Correlations were reported at a  $p < .01$  level of significance between all theory nursing course grades at .29 - .55. A noticeable exception was the GPA in psychiatric nursing theory, which met the significance level for only one of the SBE scores. That score was the SBE score in Psychiatric Nursing, which revealed a correlation coefficient of .38 at a  $p < .01$  level of significance.<sup>(17)</sup> Brandt reported a less significant relationship between GPA in nursing practice courses and SBE scores. GPA in nursing care of mother and child demonstrated the most meaningful relationships to SBE scores. With  $p < .01$  level of significance, Product moment correlations of .29 - .31 were reported. At this same level of significance, correlations of .21 between GPA in medical-surgical nursing and SBE scores for both Surgical and Obstetric Nursing were also reported. All other nursing practice course GPA's failed to meet the .01 level of significance.<sup>(18)</sup>

Miller (1968), in researching the relationships between GPA and SBE scores of 116 associate degree nursing students, reported GPA to be predictive of SBE scores, significant at  $p < .05$  with multiple correlations of .52 between cumulative GPA and SBE scores for Pediatric Nursing; to .19 between GPA in Medical/Surgical Nursing and SBE scores for Psychiatric Nursing.<sup>(19)</sup> Reed (1972), used GPA to predict success by using multiple regression analysis. At a  $p < .05$  level of significance, correlations of .45 to .68 were reported between

GPA's at the conclusion of the second, third and fourth semester and all five SBE scores.<sup>(20)</sup>

Perez (1977) reported consistent correlations significant at  $p < .05$ , between all five subtests of the SBE and freshman year GPA at .35 to .44; sophomore year GPA at .41 to .46; physical science GPA at .29 to .42; and social science GPA at .41 to .46.<sup>(21)</sup> Yocom and Scherubel (1982) supported Perez's reported findings in a retrospective study composed of 147 generic students who graduated from a large midwestern baccalaureate nursing program. Using Pearson's product moment correlations, meaningful correlations at  $p < .05$  to  $p < .001$  were reported between individual nursing course grades and all SBE subtests.<sup>(22)</sup>

Melcolm, in 1981, used Pearson product moment correlation to determine if a relationship existed between GPA and SBE scores of 539 baccalaureate students. At a  $p < 0.01$  level of significance, significant relationships were reported between SBE scores and graduation GPA at .49 and cumulative nursing theory grades at .46. Less significant correlations at  $p < .01$  level of significance were reported between all SBE scores and GPA for clinical theory at .20.<sup>(23)</sup>

Not all research findings reported the positive correlations that have been previously discussed. Baldwin (1968), using Pearson's product moment correlation, compared nursing theory grades to the SBE scores of seventy-four diploma graduates in 1964. Reported coefficients were considered too

low to be useful in prediction.<sup>(24)</sup> Shelly (1976), in a study of 117 students' records from a southern diploma school of nursing, using correlation analysis, reported GPA in psychology, psychiatric nursing, nutrition, gynecology, maternity nursing, nursing of children, and English to be insignificant in predicting SBE scores at a  $p < .01$  level of significance. However, significant relationships at a  $p < .001$  level of significance were reported between all SBE scores and GPA in fundamentals of nursing, medical/surgical nursing, zoology, and chemistry at .30 to .49.<sup>(25)</sup>

#### National League for Nursing (NLN)

In a search of the literature, the usefulness of NLN scores in predicting SBE scores had been extensively researched.

Deardorff, Denner, and Miller (1976) correlated NLN achievement scores of 682 graduates in an associate degree program using NLN raw scores as independent variables. NLN achievement scores of Sick Children, Medical Nursing, and Post Partum segments in each case were significant at  $p < .05$  in predicting SBE performance with multiple R correlations of .52 to .82.<sup>(26)</sup> Melcolm (1977), in a similar study, reported correlations between all NLN and SBE scores of .33 to .69, at a  $p < .01$  level of significance. The most significant relationships were reported between the NLN Psychiatric Nursing exam and the Psychiatric portion of the SBE at .69, and NLN Maternal Child Nursing exam and the Obstetrical portion on the SBE at .67, at a  $p < .01$  level of significance. Less significant



correlations were reported between the NLN Medical/Surgical Nursing exam and the SBE scores in Psychiatric Nursing at .33,  $p < .01$ .<sup>(27)</sup>

Muhlen Kamp, in 1971, utilized multiple regression analysis to determine the relationship between NLN and SBE scores of baccalaureate nursing students. High multiple correlations significant at  $p < .01$  were reported between NLN Maternal Child Nursing scores and SBE scores in Surgical Nursing at .73; Obstetrical Nursing at .83; and Pediatric Nursing at .76.<sup>(28)</sup>

Determining the relationship of NLN scores to SBE scores, by utilizing correlation studies, appears to be a common vehicle by which prediction based on relationships can be accomplished. Bell, Baldwin and Reed desired not only to determine relationships, but developed multiple regression equations that could be used in projecting any one nursing student's NCLEX-RN score by computing those NLN scores that demonstrated significant relationships to SBE. Bell (1976), in a study involving 101 baccalaureate nursing students, developed and cross-validated multiple regression equations using NLN raw scores to predict SBE scores. Cross-validating the equation has merit in that it supports the equation's validity in predicting scores for other sample groups.<sup>(29)</sup> Multiple regression equations at a  $p < .01$  level of significance reported positive correlations between the NLN score on Nursing of Children, and all five SBE scores at .54 to .65.<sup>(30)</sup> Cross-validation, using the multiple regression

equation on a separate group of nursing students, reported that sixty-eight percent scored within one standard deviation of their predicted score.<sup>(31)</sup> These results demonstrate accuracy of predicted scores produced by the multiple regression equation and validity of the tool itself.

Similar positive correlations were reported by Baldwin (1968) when a random sample of seventy-four student scores on the NLN and SBE were tested using Pearson product moment correlation coefficients. At a  $p < .01$  level of significance, correlations of .42 to .54 were reported between each NLN Achievement Exam score and all the five subtests of the SBE.<sup>(32)</sup> These reported results were high enough to suggest that moderately accurate predictions of SBE performance could be made from NLN Achievement Examination scores.<sup>(33)</sup> To statistically predict SBE scores, Baldwin developed and applied linear regression equations to predict SBE scores for thirty-nine students. Reported results yielded sixty-eight percent of the variability in scores can be accounted for by the regression equation.<sup>(34)</sup>

Brandt (1966) and Seither (1980), also reported findings with moderate to high correlations between NLN and SBE scores. Brandt reported correlations in the literature at a  $p < .05$  level of significance with coefficients of .17 to .53 between all NLN and SBE scores.<sup>(35)</sup> Seither's findings report that only NLN Medical/Surgical Nursing scores correlated with SBE scores in Medical and Obstetrical Nursing at a  $p < .001$  level

of significance, with correlations of .51 and .48 respectively.<sup>(36)</sup>

### Summary of Literature Review

Prior research has identified a variety of variables that have been efficacious in predicting success on the SBE. The variables most frequently reported as predictors of success were GPA, NLN scores and SAT (ACT) scores.

While several studies reported significant correlations of SAT scores with SBE scores, only one study used ACT scores; therefore, minimal supporting evidence regarding the relationship of ACT scores to SBE scores is available in the literature. Perez (1977)<sup>(37)</sup> reported the Social Science reading score and the ACT composite to demonstrate the most meaningful correlations to SBE scores at a  $p < .01$  level of significance. Since the relationship of SAT and ACT scores in predicting student academic success is well documented, the predictive value of SAT to SBE scores was considered. Muhlenkamp, Reed and Miller<sup>(38,39,40)</sup> reported correlations at the  $p < .05$  level of significance between SAT Verbal scores and all five subtests of the SBE. These three researchers also reported the most significant correlation between the SAT Verbal score and the SBE test on Psychiatric Nursing.

The literature review on the predictive quality of GPA to SBE scores emerged as the most extensively researched variable. Biological science GPA,<sup>(41,42)</sup> nursing theory GPA<sup>(43,44,45,46)</sup>; freshman GPA<sup>(47,48)</sup>; and sophomore

GPA<sup>(49,50)</sup> demonstrated the most predictive value to SBE scores, excluding Psychiatric Nursing, at  $p < .001$  to  $p < .05$  levels of significance. Of the literature researched, nursing clinical GPA's were consistently the least significant in predicting SBE scores.

The literature review on NLN scores and their worth in predicting SBE scores also reported significant value. In a search of the literature, NLN scores consistently demonstrated the strongest correlations of all variables researched. NLN achievement scores of Obstetrical Nursing<sup>(51,52,53)</sup> provided substantial correlations to all SBE scores at a  $p < .01$  to  $p < .05$  levels of significance. The value of the NLN examination of Psychiatric Nursing in predicting SBE scores, while significant, demonstrated the lowest correlations. The reason for the strong consistent relationship between NLN scores and SBE scores may be in fact that NLN achievement tests and the SBE are standardized paper and pencil examinations.<sup>(54)</sup>

The literature review supports the use of ACT, GPA and NLN scores as useful diagnostic tools for the advisement of students with regard to potential for success on the NCLEX-RN.

#### Conceptual Framework

Every student that enrolls in a baccalaureate nursing program has the terminal objective of successfully completing the program and passing the NCLEX-RN.

Those students who have functioned at a high academic

level throughout the entire nursing curriculum are at a definite advantage to also successfully pass the NCLEX-RN exam. Those students, however, who have not demonstrated high academic achievement, risk failure on the NCLEX-RN unless intervention is initiated.

Studies in the literature document the value of individual nursing students' ACT scores, GPA and NLN scores in predicting their SBE (now NCLEX-RN) score. Perez (1977) reported ACT scores to significantly correlate with SBE scores at  $p < .01$ .<sup>(55)</sup> The merit of GPA in forecasting SBE performance has been reported at a  $p < .01$  level of significance by Brandt and Melcolm.<sup>(56,57)</sup> According to Melcolm, Muhlen Kamp, Bell and Baldwin<sup>(58,59,60,61)</sup> SBE scores are significantly correlated to NLN scores at  $p < .01$  levels of significance; therefore, NLN scores demonstrate value in predicting SBE scores.

Since GPA, ACT scores and NLN scores demonstrate positive correlations in predicting SBE scores, they can then be used as critical variables in determining a student's success on the NCLEX-RN.

### Hypothesis

Based on the review of literature and conceptual framework, the following hypotheses were tested in this study:

1.  $H_0$  There is no relationship between a baccalaureate nursing student's ACT scores and NCLEX-RN score.  
 $H_1$  There is a relationship between a baccalaureate nursing student's ACT and NCLEX-RN score.

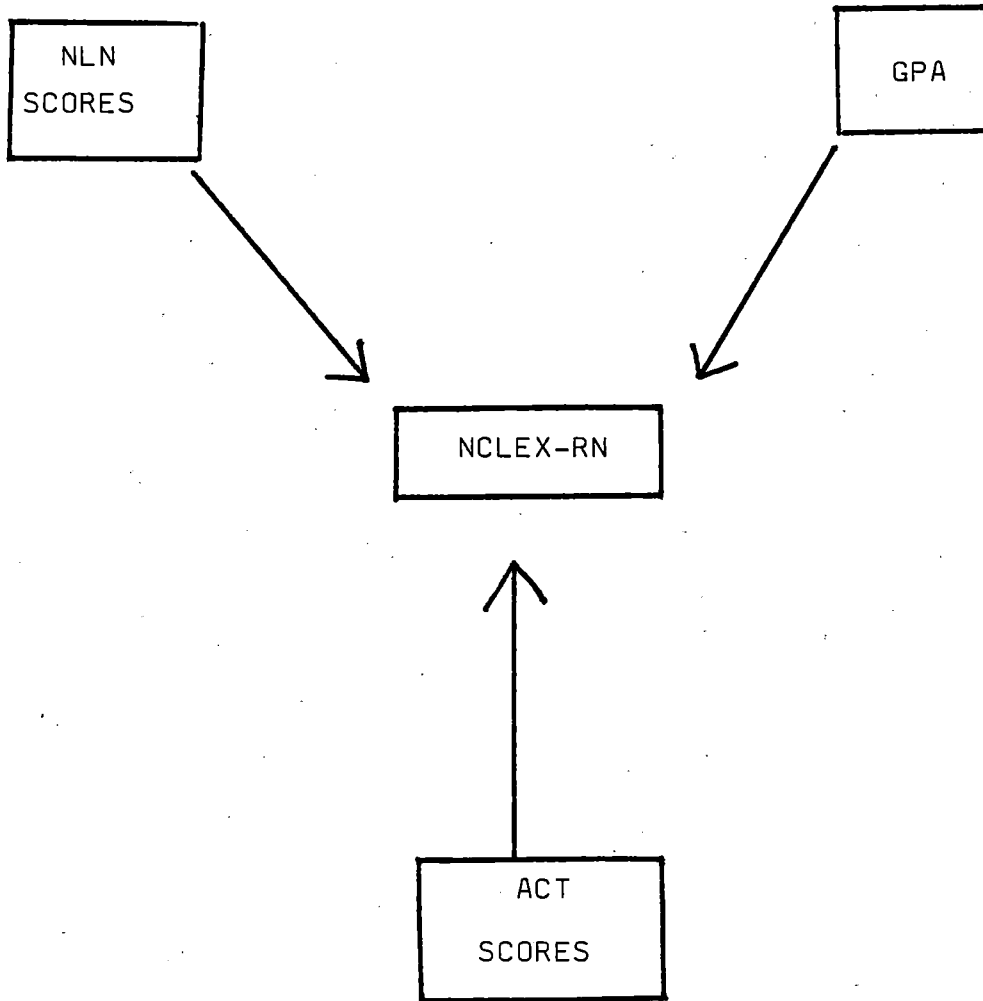


Figure 1

Conceptual Framework  
Concepts Influencing Success on NCLEX-RN

2.  $H_0$  There is no relationship between a baccalaureate nursing student's GPA and NCLEX-RN score.
- $H_1$  There is a relationship between a baccalaureate nursing student's GPA and NCLEX-RN score.
3.  $H_0$  There is no relationship between a baccalaureate nursing student's NLN scores and NCLEX-RN score.
- $H_1$  There is a relationship between a baccalaureate nursing student's NLN and NCLEX-RN score.

### Variables

Twenty-one variables were utilized in this study including twenty independent and one dependent. The dependent variable (y) is each subject's individual score earned on the NCLEX-RN exam. The independent variables (x) are individual subject scores as they relate to:

ACT: x1 - Composite

x2 - Natural Sciences

x3 - Social Sciences

x4 - Math

x5 - English

GPA: x6 - Child Adult Health I, N-331

x7 - Child Bearing Family, N-332

x8 - Child Adult Health II, N-333

x9 - Child Adult Mental Health, N-334

x10 - Child Adult Health III, N-424

x11 - Community Health, N-425

x12 - College Social Sciences

x13 - College Physical Sciences

- x14 - College Freshman Year
- x15 - College Sophomore Year
- x16 - Cumulative Nursing for N-331,332,333,334  
424,425

- NLN:
- x17 - Nursing of Children
  - x18 - Psychiatric Nursing
  - x19 - Medical/Surgical Nursing
  - x20 - Childbearing Family



## CHAPTER 3

### Methodology

The study was designed for the purpose of identifying academic variables that would predict success for nursing students of a private baccalaureate liberal arts college on the NCLEX-RN. A description of the research design, selection of sample, method of collecting data and procedure for analysis is described.

#### Research Design

Descriptive statistics utilizing a cross-sectional design was utilized in this study. All data involving the stated variables reflecting academic success were collected at one time, which led to the explanation of the relationships between these variables. (62)

#### Selection of the Sample

The college used in this study is a small, private, liberal arts college located in the Midwest. Its average total student population is 500. It offers, among other professional degrees, a Bachelor of Arts degree in nursing to students who have successfully completed the requirements of the college and the nursing program. Any student who applies to the college as a freshman can declare a major in nursing at that time. While the student is completing all freshman and sophomore level pre-requisite courses, he/she is considered

a pre-nursing student. After the completion of all pre-requisite courses, the student may apply for admission to the nursing major. A 2.0 overall GPA and a minimum grade of "C" is required for all nursing major pre-requisite courses for admission. Students who receive a grade less than "C" in any nursing clinical theory course fail that particular course and are not entitled to retake the course or proceed in the major unless extenuating circumstances prevail (Appendix A).

The population from which the sample was obtained, consisted of all students who graduated in 1982 and 1983 from the college with a major in nursing. The sample used in this study consists of all generic nursing students who graduated from the college in 1982 and 1983. Sixteen students graduated in 1982 and nine students graduated in 1983.

Due to a change in the structure of the licensing examination for professional nurses in July, 1982, from a five-part separately scored exam, (SBE), to an exam that provides one single score, (NCLEX-RN), utilizing records of subjects who graduated in 1982 and 1983 will eliminate the extraneous variable of using two exam formats in the sample.

#### Method of Collecting Data

Permission was obtained from the President of the college to obtain data from the academic records of 1982 and 1983 graduates with a major in nursing. Data were collected from each subject's academic record on file in the registrar's

office at the college by one researcher over a period of four consecutive days. The data were coded in a manner to maintain confidentiality and anonymity (Appendix B). Each subject's scores for all dependent and independent variables were tabulated and recorded, using the following system:

NLN: Raw scores were collected for each subtest of the exam which totaled four independent variables; ACT: Individual scores for each portion of the exam and the composite score were collected, which totaled five independent variables; GPA: Using a four-point scale, each GPA variable was collected, which consisted of eleven independent variables. If any course was retaken, only the first grade earned was computed in the GPA.

#### Procedure for Analysis

The relationships between each of the independent variables (x) and NCLEX-RN score (y) were determined by Pearson's product moment coefficient to ascertain the variables that demonstrated a significant relationship at a  $p < 0.05$ .

Stepwise multiple regression analysis was utilized to determine the variables (x) that demonstrated predictive power for the NCLEX-RN (y). The regression equation developed from this analysis was used to predict the scores that subjects received on the NCLEX-RN in 1982 and 1983. The predicted scores were cross-validated with the actual NCLEX-RN scores earned by the sample.

The formula for the regression equation was:

$$y = a + b_1 x_1 + b_2 x_2 + \dots b_K x_K$$

The specified level of significance was .05.

## CHAPTER 4

### Analysis of Data

This chapter includes a description of the sample and analysis of data.

A statistical analysis using Pearson's product moment correlation coefficients and stepwise multiple regression was done by computer using the Tektronix statistics package (TEK-4051). Correlation coefficients were computed between each of the twenty independent variables ( $x_1 - x_{20}$ ) and the dependent variable ( $y$ ). Using stepwise multiple regression procedures, a prediction equation was derived from regression analysis. This equation can be used to predict NCLEX-RN scores by including the variables that regression analysis found to possess predictive power.

#### Characteristics of Sample

The population from which the sample for this study was derived consisted of a small liberal arts college located in the Midwest. The data consisted of ACT, GPA and NLN scores of all generic students ( $N=25$ ) who graduated from the college in 1982 and 1983 with a major in nursing. Subjects were included in the sample irrespective of sex, age, race, number of academic credits earned prior to entering the nursing major and previous work experience in a health related field.

### Testing of the Hypotheses

The procedure for reporting the findings is as follows:

1. The hypotheses will be stated in null form for the purpose of testing.
2. Pearson product moment correlation coefficient will be presented. The level of significance used in this study was .05.
3. The results will be discussed.

### Relationship Between ACT Scores and NCLEX-RN

$H_0$ : There is no relationship between a baccalaureate nursing student's ACT scores and NCLEX-RN score.

To test this hypothesis, each student's ACT subcomposite and composite score ( $x_1 - x_5$ ) was correlated with her/his NCLEX-RN score ( $y$ ).

Correlation coefficients demonstrated meaningful relationships between all ACT scores and the NCLEX-RN score at a  $p < .05$  level of significance. The ACT composite score revealed the highest coefficient at .62, ACT Natural Science score at .58, Social Science score at .57, English score at .55 and Math score at .46 (Appendix C). Perez reported meaningful correlations between ACT scores and SBE scores at .26 to .58 at a  $p < .05$  level of significance.<sup>(63)</sup>

The results of the correlation coefficients significant at  $p < .05$  conclude that a baccalaureate nursing student's NCLEX-RN scores are positively correlated to her/his ACT scores; therefore,  $H_0$  was rejected.

Relationship between GPA and NCLEX-RN

$H_0$ : There is no relationship between a baccalaureate nursing student's GPA and NCLEX-RN score.

To test this hypothesis, each student's GPA score ( $x_6 - x_{16}$ ) was correlated with her/his NCLEX-RN score ( $y$ ).

Brandt, Miller, Reed, Perez, Seither, Melcolm and Yocom (64,65,66,67,68,69,70) reported that GPA had statistical worth in demonstrating relationships and predictive power to SBE scores.

Analysis of the data revealed that all eleven GPA variables were significant at  $p < .05$ . The correlation coefficients were generally tangential. Child Adult Health III and Cumulative Nursing Clinical Theory GPA revealed the most substantial correlation coefficients of .73 and .72 respectively. Community Health at .47 and social science GPA at .46 demonstrated the least significant correlations to NCLEX-RN scores (Table 1).

The results of these correlation coefficients conclude that a baccalaureate nursing student's NCLEX-RN score is positively correlated to her/his GPA; therefore,  $H_0$  was rejected.

Relationship Between NLN Scores and NCLEX-RN

$H_0$ : There is no relationship between a baccalaureate nursing students NLN raw scores and NCLEX-RN score.

Table 1

Correlation Matrix Between Twenty Independent  
Variables and One Dependent Variable

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ACT:	1.	Composite	.62
	2.	Natural Science	.58
	3.	Social Science	.57
	4.	Math	.46
	5.	English	.55
GPA:	6.	Child Adult Health I	.60
	7.	Childbearing Family	.58
	8.	Child Adult Health II	.59
	9.	Child Adult Mental Health	.57
	10.	Child Adult Health III	.73
	11.	Community Health	.48
	12.	College Social Sciences	.48
	13.	College Physical Sciences	.59
	14.	College Freshman Year	.56
	15.	College Sophomore Year	.61
	16.	Cummulative Nursing	.72
NLN:	17.	Nursing of Children	.60
	18.	Psychiatric Nursing	.41
	19.	Medical/Surgical Nursing	.46
	20.	Childbearing Family	.66

---

All variables are significant at  $p < .05$ .



To test this hypothesis, each student's NLN raw score ( $x_{17} - x_{20}$ ) was correlated with NCLEX-RN score ( $y$ ).

NLN achievement exam scores in prior research have consistently provided significant relationships to SBE scores (now NCLEX-RN). Brandt, Baldwin, Deardorff and Seither<sup>(71,72,73,74)</sup> support the relationship of NLN scores in Medical/Surgical Nursing and SBE scores by reporting coefficients that were high enough to suggest that moderately accurate predictions of SBE (now NCLEX-RN) performance could be made by using this variable.

In this study, statistically significant relationships were revealed between NLN raw scores and NCLEX-RN scores at a  $p < .05$  level of significance. NLN scores in Childbearing Family at .66 and Nursing of Children at .60 demonstrated the highest correlation coefficients.

Results of these correlation coefficients conclude that a baccalaureate nursing student's NCLEX-RN score is positively correlated to her/his NLN scores; therefore,  $H_0$  was rejected.

#### Stepwise Multiple Regression Analysis

The data were analyzed using stepwise multiple regression analysis (page 26). At each step, one variable was added to the equation which made the greatest reduction in the standard error or estimate in predicting the NCLEX-RN score. The computer program required that each independent variable ( $x_1 - x_{20}$ ) with an F-ratio of 3.5 or above, be

added to the equation; and the independent variables with F-ratios of 2.0 or below be deleted.

The independent variables included in the equation to be predictive were: Child Adult Health III ( $x_{10}$ ), NLN raw score in Medical/Surgical Nursing ( $x_{19}$ ), ACT score in Natural Science ( $x_2$ ) and GPA for the freshman year ( $x_{14}$ ). Of the remaining independent variables, none contributed significantly to the prediction equation. The regression equation derived from regression analysis is:  $y = 22.01 (x_2) + 287.21 (x_{10}) - 166.08 (x_{14}) + 7.12 (x_{19}) + 835.93$ .

$y$	=	NCLEX-RN score
$x_2$	=	ACT Natural Science score
$x_{10}$	=	GPA for Child Adult Health III
$x_{14}$	=	GPA for College Freshman year
$x_{19}$	=	NLN raw score in Medical/Surgical Nursing
835.93	=	constant

The regression equation for predicting NCLEX-RN scores was applied to each subject's scores in this study. The predicted NCLEX-RN score was compared to the obtained NCLEX-RN score (Table 3). A remarkable eighty-four percent variability in obtained NCLEX-RN scores was accountable for by the regression equation (Figure 2). Correlation coefficients, standard deviations and T-scores for the variables included in the equation are outlined in Table 2.

Table 3

Residuals of Actual and Predicted NCLEX-RN  
Scores for Twenty-Five Subjects

I:	y	y EST	RESID
1:	1972	1977.96965062	-5.96965061499
2:	1550	1711.69757826	-161.697578263
3:	2063	2056.98535733	6.0146426743
4:	2123	2132.12837038	-9.12837038341
5:	1509	1576.8942446	-67.8942445961
6:	1882	1979.28005866	-97.280058661
7:	1882	1804.28818218	77.7118178169
8:	2264	2306.26093038	-42.2609303758
9:	1540	1640.96272577	-100.962725772
10:	1960	1843.37726502	116.622734984
11:	2274	2257.01108285	16.9889171548
12:	1590	1617.40942228	-27.4094222789
13:	1630	1698.21656361	-68.2165636098
14:	1530	1471.2696378	58.7303622031
15:	1992	1898.66682511	93.3331748886
16:	2173	2226.25119561	-53.2511956103
17:	2060	2273.52387067	-213.523870672
18:	1684	1599.18818477	84.8118152295
19:	2146	2102.62037916	43.3796208429
20:	1403	1497.33219542	-94.3321954199
21:	2084	1890.3070126	193.692987404
22:	2251	2055.60353216	195.396467844
23:	2292	2076.11556336	215.884436639
24:	1909	1956.28600272	-47.2860027194
25:	2036	2149.3541687	-113.354168704

y is actual obtained NCLEX-RN score.

y EST is estimated NCLEX-RN score utilizing regression  
equation based on predictor variables.

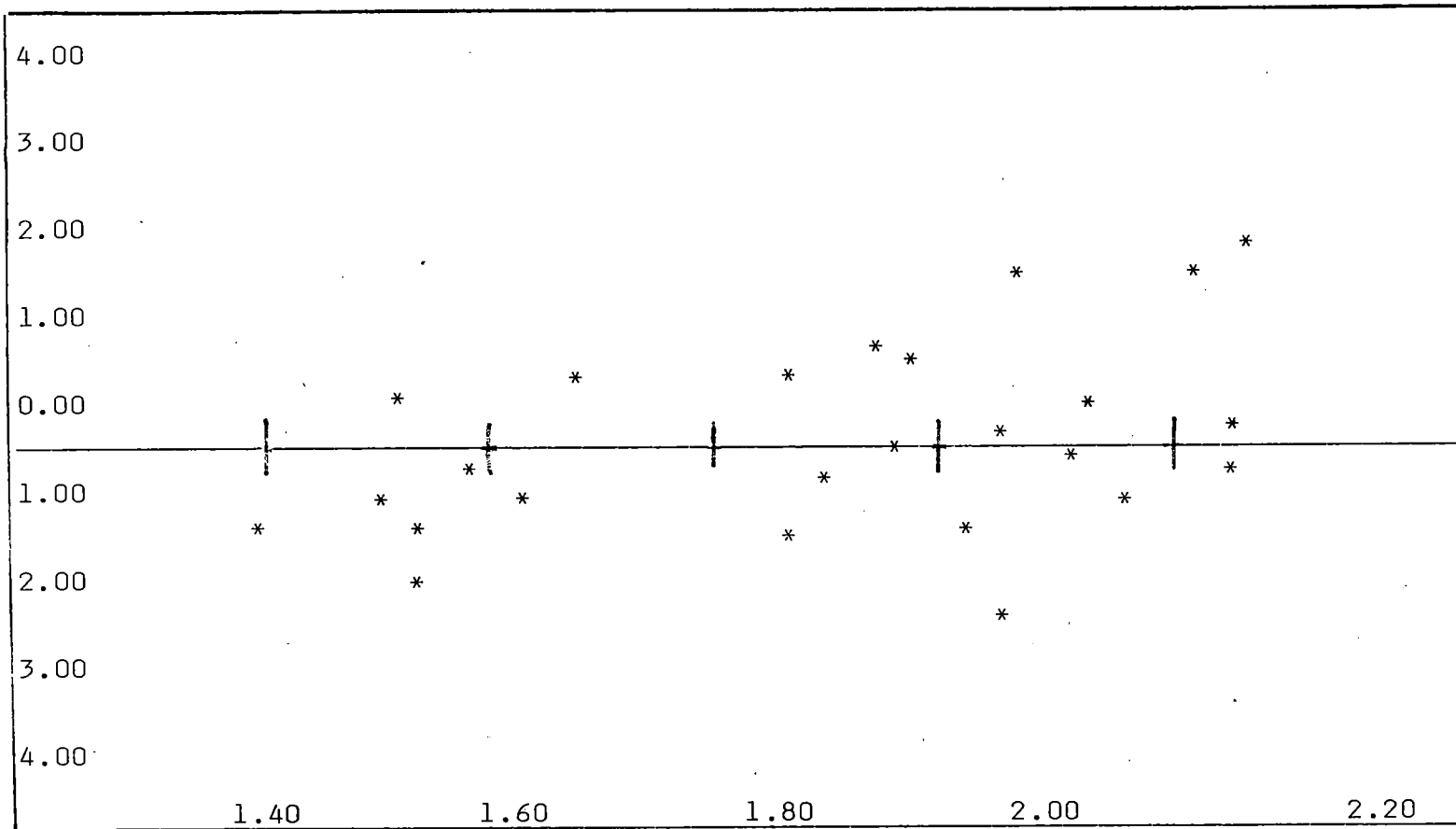


Figure 2

Scattergram and Regression Line Representing  
Actual Versus Obtained NCLEX-RN Scores

Table 2  
Coefficients 25 Data Sets

I	COEFFICIENT	STD ERROR	T
0. Constant	835.927794183		
2. ACT, Natural Science	22.0061475664	5.53515311074	3.97570710803
10. GPA, Child Adult Health III	287.214814633	43.0740430013	6.66793257891
14. GPA, College Freshman Year	-166.080283721	73.9948158502	-2.24448539824
19. NLN, Medical/Surgical Nursing	7.12219802971	1.49802244717	4.75440007135

## CHAPTER 5

### Summary, Conclusions, Implications and Recommendations

This chapter presents a summary of the research problem and the findings of research hypotheses. It includes a discussion of the major findings and recommendations for further research. Implications of the research and limitations of the study are also discussed.

#### Summary of Research Problem

This study was conducted to assess the relationship between ACT scores, GPA, NLN scores and NCLEX-RN scores and to develop a regression equation for predicting success on the NCLEX-RN. The literature search included reviewing prior research that relates to ACT scores, GPA, and NLN scores and their relationship to SBE scores. The variables for this study consisted of ACT, GPA, NLN and NCLEX-RN scores of all generic students who graduated from the college in 1982 and 1983 (N = 25). Descriptive statistics were utilized.

Approximately thirteen percent of all nursing school graduates either do not take the licensing examination, or do not pass it.<sup>(75)</sup> In view of the significance of this, it is important to understand why it occurs. Generating knowledge of the variables that demonstrate relationships between a nursing student's academic performance and NCLEX-RN scores can be useful for admission criteria, which would help reduce

attrition. It may also serve as a guide as the student nurse prepares to take the licensing exam.

Findings: Objective 1

Objective 1 of this study was to determine if a relationship exists within ACT, GPA, NLN and NCLEX-RN scores.

The study presented three hypotheses for investigation. Each null hypothesis was rejected at the  $p < .05$  level of significance and the research hypothesis was accepted. The accepted research hypotheses were:

1. There is a relationship between a baccalaureate nursing students ACT and NCLEX-RN score.
2. There is a relationship between a baccalaureate nursing students GPA and NCLEX-RN score.
3. There is a relationship between a baccalaureate nursing students NLN and NCLEX-RN score.

Correlation coefficients significant at  $p < .05$  were demonstrated between the independent variables ( $x_1 - x_{20}$ ) and the NCLEX-RN score ( $y$ ). No one independent variable group demonstrated a significantly higher arithmetic mean correlation coefficient, (ACT = 55.2, GPA = 55.8, NLN = 53.2) however, when each variable was analyzed independently the strongest relationships were demonstrated between the NCLEX-RN score ( $y$ ) and Child Adult Health III ( $x_{10}$ ) at .73 and cumulative nursing clinical theory GPA ( $x_{16}$ ) at .72. The weakest relationships were demonstrated between the NCLEX-RN score ( $y$ ) and NLN scores in Psychiatric Nursing ( $x_{18}$ ) at .41, Medical/

Surgical Nursing ( $x_{19}$ ) at .46; GPA in Community Health ( $x_{11}$ ) at .48, College Social Sciences ( $x_{12}$ ) at .48 and ACT in Math ( $x_4$ ) at .46.

#### Findings: Objective 2

Objective II of this study was to develop an equation to predict NCLEX-RN scores.

Stepwise multiple regression analysis reported GPA in Child Adult Health III ( $x_{10}$ ), NLN raw score in Medical/Surgical Nursing ( $x_{19}$ ), ACT score in Natural Science ( $x_2$ ) and freshman year GPA ( $x_{14}$ ) to possess predictive power. Cross-validation of predicted NCLEX-RN scores with obtained scores of each subject ( $N = 25$ ), revealed that eighty-four percent of the variance can be accounted for by using the regression equation developed for this sample.

#### Conclusions: Objective 1

ACT, GPA and NLN scores have demonstrated significant relationships to NCLEX-RN. The correlation coefficients obtained were substantially higher than those reported in prior research at  $p < .05$  level of significance. GPA in Child Adult Health III and Cumulative Clinical Nursing theory GPA demonstrated the strongest coefficients; therefore, it can be concluded that a student's academic performance in clinical nursing theory courses and NCLEX-RN scores are strongly correlated.



### Conclusion: Objective 2

Stepwise multiple regression analysis applied to the variables of this study yielded a regression equation that revealed eighty-four percent of the variability in scores can be accounted for by that equation. This significantly high  $R^2$  suggests that this regression equation can be employed, with some validity, for predicting student success on the NCLEX-RN and that the concomitant value of ACT scores, GPA and NLN scores have proven to be useful predictors of success with a significant degree of precision.

### Implications

The significantly strong Pearson R correlations between variables support the use of ACT, GPA and NLN scores as criteria during the selection process for admission to the nursing major and for academic advising.

Admission criteria that relate to GPA should be evaluated, with emphasis placed on freshman year, sophomore year, college social science and college physical science GPA's. The use of ACT scores as a criteria for admission to the nursing major also needs to be considered. Individual student's ACT composite, Natural Science, Social Science, English and Math scores should also be evaluated closely as they are considered criteria for admission to the nursing major.

The multiple regression equation approach based on valid predictor variables has demonstrated usefulness in predicting

student scores on the NCLEX-RN. The main contribution of the regression equation to predict NCLEX-RN scores rests with the fact that students who demonstrate limited potential for success on the NCLEX-RN can be informed. This will allow for the development of an effective plan of review that is based on research findings rather than intuitive assumptions.

### Limitations

The limitations of this study include:

1. Small non-random sample of baccalaureate degree nursing graduates enrolled in one program does not allow the results to be generalized.
2. Subject's scores were included in the study irrespective of age, sex, race, number of academic credits earned prior to entering the nursing major, prior work experience and degree of motivation.
3. Sample included two graduating classes allowing for variance in grading system and/or instructor.

### Recommendations

Recommendations for further study include:

1. Nursing faculty should continue to determine factors that predict success on the NCLEX-RN. By identifying variables that relate to licensing exam scores, pertinent intervention models may be developed that will reduce attrition and increase NCLEX-RN scores for graduates of baccalaureate degree programs.

2. Replication of this study should be conducted using a random sample from a variety of educational institutions that prepare professional nurses.

3. Regression analysis should be applied to the variables of this study up to the Junior year. The resulting equation and subsequent score can be utilized as admission criteria to the nursing major by setting a minimum score for entrance.

4. Regression analysis should be applied to the variables on this study up to the Senior year. The resulting equation and subsequent score can serve to advise the student of projected NCLEX-RN score; therefore, identifying students at risk for failure early on.

5. Replication of this study should be conducted incorporating the variables of student motivation, age, sex, race, number of academic credits earned prior to entering the nursing major and prior work experience in health related fields.

## NOTES

<sup>1</sup>NLN Nursing Data Book, National League for Nursing, publication No. 19-1852, (New York, New York, 1980), p. 60.

<sup>2</sup>Cheryl L. Reed and John F. Feldhusen, "State Board Examination Score Prediction for Associate Degree Nursing Program Graduates", Nursing Research, 21, No. 2 (1972), 149.

<sup>3</sup>American College Testing Program Annual Report, 1977, p. 4.

<sup>4</sup>American College Testing Program Annual Report, p. 3.

<sup>5</sup>Student Bulletin for the Scholastic Aptitude Test, 1983-84, p. 3.

<sup>6</sup>William R. Passions, "Predictive Validities of the ACT, SAT and High School Grades for First Semester GPA and Freshman Courses," Educational and Psychological Measurement, 27, No. 4 (1967), 1144.

<sup>7</sup>Oscar T. Lenning and E. James Maxey, "ACT Versus SAT Prediction for Present Day Colleges and Students," Educational and Psychological Measurement, 33, No. 2 (1973), 405.

<sup>8</sup>Lawrence M. Aleamoni and Linda Oboler, "ACT Versus SAT in Predicting First Semester GPA," Educational and Psychological Measurement, 38, No. 2 (1978), 397.

<sup>9</sup>Therese Lendell Perez, "Investigation of Academic Moderator Variables to Predict Success on State Board of Nursing Examinations in a Baccalaureate Nursing Program," Journal of Nursing Education, 16, No. 8 (1977), 20.

<sup>10</sup>Perez, p. 22.

<sup>11</sup>Ann Muhlen Kamp, "Prediction of State Board Scores in a Baccalaureate Program," Nursing Outlook, 19, No. 1 (1971), 57.

<sup>12</sup>Reed, p. 151.

<sup>13</sup>Carol L. Miller, John F. Feldhusen and J. William Asher, "The Prediction of State Board Examination Scores of Graduates of an Associate Degree Program," Nursing Research, 17, No. 6 (1968), 556.

<sup>14</sup>Miller, p. 556.

<sup>15</sup>Evelyn R. Hayes, "Prediction of Academic Success in a Baccalaureate Nursing Education Program," Journal of Nursing Education, 20, No. 6 (1981), 7.

<sup>16</sup>Frances F. Seither, "Prediction of Achievement in Baccalaureate Nursing Education," Journal of Nursing Education, 19, No. 3 (1980), 33.

<sup>17</sup>Edna Brandt, Bettimae Hastie and Delores Schumann, "Predicting Success on State Board Examinations," Nursing Research, 15, No. 1 (1966), 67.

<sup>18</sup>Brandt, p. 67.

<sup>19</sup>Miller, p. 556.

<sup>20</sup>Reed, p. 152.

<sup>21</sup>Perez, p. 20.

<sup>22</sup>C.J. Yocom and J.C. Scherubel, "Selected Pre-Admission and Academic Correlates of Success on State Board Examinations," Journal of Nursing Education, (in press), 6.

<sup>23</sup>Norma Melcolm, "The Prediction of State Board Test Pool Examination Scores Within an Integrated Curriculum," Journal of Nursing Education, 20, No. 5 (1981), 26.

<sup>24</sup>Jean P. Baldwin, Jean K. Mowbray and Raymond G. Taylor, Jr., "Factors Influencing Performance in State Board Test Pool Examinations," Nursing Research, 17, No. 2 (1968), 172.

<sup>25</sup>Betty Shelly, David Kennamer and Martha Raile, "Correlation of NLN Achievement Test Scores with State Board Test Pool Examination Scores," Nursing Outlook, 24, No. 1 (1976), 53.

<sup>26</sup>Martha Deardorff, Peter Denner and Carol Miller. "Selected National League for Nursing Achievement Test Scores as Predictors of State Board Examination Scores," Nursing Research, 25, No. 1 (1976), 37.

<sup>27</sup>Melcolm, p. 26.

<sup>28</sup>Muhlen Kamp, p. 57.

<sup>29</sup>John A. Bell and Cynthia Fenton Martindill, "A Cross-Validation Study for Predictors of Scores on State Board Examinations," Nursing Research, 25, No. 1 (1976), 55.

<sup>30</sup>Bell, p. 55.

<sup>31</sup>Bell, p. 56.

<sup>32</sup>Baldwin, p. 171.

<sup>33</sup>Baldwin, p. 171.

<sup>34</sup>Baldwin, p. 171.

<sup>35</sup>Brandt, p. 68.

<sup>36</sup>Seither, p. 33.

<sup>37</sup>Perez, p. 20.

<sup>38</sup>Muhlen Kamp, p. 57.

<sup>39</sup>Reed, p. 151.

<sup>40</sup>Miller, p. 556.

<sup>41</sup>Seither, p. 33.

<sup>42</sup>Perez, p. 20.

<sup>43</sup>Seither, p. 33.

<sup>44</sup>Brandt, p. 67.

<sup>45</sup>Yocom, p. 6.

<sup>46</sup>Melcolm, p. 26.

<sup>47</sup>Reed, p. 152.

<sup>48</sup>Perez, p. 20.

<sup>49</sup>Reed, p. 152.

<sup>50</sup>Perez, p. 20.

<sup>51</sup>Muhlen Kamp, p. 57.

<sup>52</sup>Deardorff, p. 37.

<sup>53</sup>Melcolm, p. 26.

<sup>54</sup>Melcolm, p. 28.

<sup>55</sup>Perez, p. 20.

<sup>56</sup>Brandt, p. 67.

<sup>57</sup>Melcolm, p. 26.

<sup>58</sup>Melcolm, p. 26.

<sup>59</sup>Muhlen Kamp, p. 57.

<sup>60</sup>Bell, p. 55.

<sup>61</sup>Baldwin, p. 172.

<sup>62</sup>Denise Polit and Bernadette Hungler, Nursing Research: Principles and Methods, Philadelphia, J.B. Lippincott Company, 1978, p. 265.

<sup>63</sup>Perez, p. 20.

<sup>64</sup>Brandt, p. 67.

<sup>65</sup>Miller, p. 556.

<sup>66</sup>Reed, p. 152.

<sup>67</sup>Perez, p. 20.

<sup>68</sup>Seither, p. 33.

<sup>69</sup>Melcolm, p. 26.

<sup>70</sup>Yocom, p. 6.

<sup>71</sup>Brandt, p. 67.

<sup>72</sup>Baldwin, p. 172.

<sup>73</sup>Deardorff, p. 37.

<sup>74</sup>Seither, p. 33.

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APPENDIX A  
NURSING MAJOR CURRICULUM SEQUENCE

Pre-Nursing

Freshman Year

Semester IChemistry 109-4 (Chem.  
110 prerequisite)General Psychology 101-3  
(Psych 203 prerequisite)

Sophomore Year

Semester IHum. Anatomy & Physiology  
208-5 (Nrsg. prerequisite)Developmental Psych 203-3  
(Nrsg. prerequisite)Semester IIChemistry 110-4 (Nrsg.  
prerequisite)Microbiology 216-5  
(Nrsg. prerequisite)Sociology-3 (Nrsg.  
prerequisite)Semester IIHuman Anatomy &  
Physiology 209-5 (Nrsg.  
prerequisite)Nursing 210-4 (Required  
of pre-nursing students)Nursing Major

Junior Year

Semester I

\*Nursing 331-6

\*Nursing 332-6

Senior Year

Semester I

\*Nursing 424-6

\*Nursing 425-6

Semester II

\*Nursing 333-6

\*Nursing 334-6

Semester II

Nursing 426-8

Nursing 427-2

Nursing 498-2

\*Nursing Clinical Theory Courses.

APPENDIX B  
DATA COLLECTION TABLE











APPENDIX C  
PERMISSION LETTER

September 19, 1983

Ms. Patricia Dardis  
Department of Nursing

Dear Pat:

Your request of September 15 to use data from the Registrar's Office records regarding graduates of the Nursing Program is in hand, and I am happy to grant your request. As stated in your letter, confidentiality of information is to be maintained.

When your research is completed, I would ask that copies of your results be shared with

Every good wish to you as you complete your Masters program at South Dakota State University.

Cordially,