

CORRELATION AND PREDICTION OF STATE BOARD EXAMINATION
SUCCESS FROM SELECTED ADMISSION CRITERIA

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TABLE OF CONTENTS

ACKNOWLEDGMENTS	iii
LIST OF TABLES	vi
CHAPTER	
1. INTRODUCTION	1
Statement of Problem	2
Statement of Purpose	3
Background and Significance	3
Theoretical Framework	7
Hypotheses	10
Definition of Terms	11
Limitations	12
Assumptions	12
Summary	13
2. REVIEW OF THE LITERATURE	14
Aspects of Selection	14
Nonacademic Variables	19
Academic Variables	22
Summary	29
3. PROCEDURE FOR COLLECTION AND TREATMENT OF DATA .	30
Setting	30
Population and Sample	31
Protection of Human Rights	31
Instrument	32
Data Collection	32
Treatment of Data	33
4. ANALYSIS OF DATA	34
Description of Sample	34
Presentation of Findings	35
Summary of Findings	43

CHAPTER

5. SUMMARY OF STUDY	44
Summary	44
Discussion of Findings	45
Conclusions and Implications	46
Recommendations	47
APPENDIX A: AGENCY PERMISSION FORMS	48
APPENDIX B: RAW DATA SHEET	51
APPENDIX C: TABLE OF FREQUENCY DISTRIBUTIONS BY STUDENTS	53
LIST OF REFERENCES	55

LIST OF TABLES

Table

1. Range of Scores on the SBTPE According to Groups	35
2. ADN Success on SBTPE Subtests by Groups	36
3. ADN Success on SBTPE by Groups	37
4. State Board Examination Subtest Means and Standard Deviations Broken Down By Groups . .	38
5. Analysis of Variance of Group A and Group B on State Board Test Scores	39
6. Correlation of Admission Criteria, Total Sample, with SBTPE Subtests	40
7. Regression Equations with Multiple Correlations and Standard Error of Estimate for Predicted Scores on SBTPE	42

CHAPTER 1

INTRODUCTION

Selection of nursing students who will successfully complete a nursing program continues to be of interest to nurse educators. One of the most important problems that faces the nursing profession is the necessity to attract and encourage able applicants to pursue nursing (Abdellah, 1970; Clemence & Brink, 1978). Problems of recruitment, selection, and retention of nursing students are of paramount concern.

Because of the increase in the number of students applying to nursing programs over the past few years, more interest has been given to selective admissions. Criteria have been set up to select those students who are best qualified and also to predict those candidates who will be likely to succeed or complete the program. If a greater number of students are selected who will successfully complete the nursing program, there will be less waste of time and energy to both faculty and to the student who is not successful. Financial and emotional costs to the unsuccessful student are also factors to consider.

One question educators must then be concerned with is, "What criteria should be set for admission to allow for the best selection and prediction of students who will complete the nursing program and succeed on the State Board Examination?" Once these criteria have been determined and instituted, they should be evaluated as part of the total curriculum evaluation.

The aim of this study was to evaluate the reliability of various admission criteria used in an Associate Degree Nursing program. By identifying those admission criteria which are most predictive of success, the problem of selecting students who will successfully complete the program will be minimized.

Statement of the Problem

If selection of nursing students who will successfully write the State Board Test Pool Examination could be decided early, losses in time, energy, and resources to students and faculty might be reduced. Determination of useful criteria to predict this success continues to be problematic.

Therefore, the problem of this study was: What is the relationship between selected admission criteria and performance on the State Board Test Pool Examination in

nursing students admitted to an Associate Degree Nursing program in Texas?

Statement of the Purpose

The purposes of this study were:

1. To determine if results from the State Board Test Pool Examination could be related to selected admission criteria.
2. To determine if selected admission criteria could be used as predictors of performance on the State Board Test Pool Examination (SBTPE).

Background and Significance

The process of selection of nursing students for admission to nursing schools is a controversial subject. While some programs have open door policies or minimal criteria, others have very selective procedures. However, even in schools with an open door policy, certain restrictions still prevail (Nash, 1977).

Opponents of the use of selective criteria for admissions base their argument on moral, ethical and humanitarian values (Franklin, 1975). These opponents advocated that academically less able students must be given an equal opportunity for education. They also question the validity of predictive instruments used in schools which have established selective criteria.

Proponents of selectivity in admission to colleges cited increased enrollment of students as a factor contributing to the need for selection (Franklin, 1975; Lavin, 1965). It is argued that economically it is not feasible to enroll students who are poor academic risks. Also, more qualified students may be denied because of lack of space. An increased attrition rate in nonselective schools is also cited.

In 1959, a special committee of State Boards of Nursing (Franklin, 1975) decided that schools should admit only those students whose qualifications permit them to pursue successfully the studies in the purpose of the program. They advocated a method of selection based on faculty determined standards in order to insure admission of applicants who have potential of succeeding in the nursing program. The decision for selectivity versus non-selectivity, therefore, is the right of each individual nursing school. Philosophy and objectives of the school and institution with which it is affiliated serve as the guidelines in this choice.

Franklin (1975), in a study of admission criteria in 14 Junior College Nursing programs in New York, found a greater percentage of schools used some type of selection process. Of these schools, proportionately more graduates from the

selective schools passed the State Board Examinations. In addition, attrition rate was lower.

The most universal selection criterion for admission to schools of nursing is some measure of an individual's academic performance. Grade point average, achievement tests, high school rank, and aptitude tests are often used as indicators of probable success in the program (Nash, 1977). Objective data such as these are considered less biased than subjective criteria such as personal interviews and references. Subjective data have also been less useful as valid predictors of future success.

Standardized tests such as the American College Testing Program (ACT) or Scholastic Aptitude Test (SAT) are the two most common aptitude tests used by colleges for selection of students. Standardized content and administration procedures enable comparison of an individual test score with the scores of norm groups who have taken the test (Gronlund, 1976). Their usefulness as predictors of success has been cited by various investigators. Reed and Feldhusen (1972), in studying various factors used to predict success on the SBTPE, found SAT verbal score and student's age in months were the best predictors. Multiple correlation of the variables with the subtests on the SBTPE ranged from $r = .49$ to $.69$.

In a longitudinal study of attrition and academic performance, Wittmeyer, Camiscioni, and Purdy (1971) used ACT scores, prenursing point hour ratio, and two personality inventories as predictor variables. These were correlated with completion versus noncompletion of the nursing program and performance in nursing. The performance measure was composed of the overall average for the five licensure examinations of the SBTPE. Results indicated that students with higher average scores on the SBTPE had higher prenursing point hour ratios along with higher ACT Social Studies Reading scores.

Clemence and Brink (1978) investigated the predictive validity of selective admission criteria in relation to certain outcome criteria. Predictor variables included admission grade point average (GPA), prerequisite courses, and demographic data. Outcome variables were completion versus noncompletion of the nursing program and passing the SBTPE. Ethnicity, admission GPA and certain prerequisite courses were found to be significantly related to the outcome variables. Psychology course grades were significantly related to the SBTPE success only. GPA was the most significant factor in relation to success versus nonsuccess in the program. Demographic variables, aside from ethnicity, were not found to be significant.

This study examined selected admission criteria used in the selection of students in an Associate Degree Nursing program. Criteria included were age at the time of admission and ACT composite score, all of which have been used in other studies as predictors of success on SBTPE. The ACT composite scores were correlated with the terminal variable, SBTPE scores, to examine the relationship between these variables. Analysis of variance (ANOVA) was employed to determine if there was a significant difference between mean scores on the SBTPE of students with ACT composite scores of 17 and above and those students with ACT scores of less than 17. Multiple regression factors were then studied to determine if the variables age and ACT score could be used as predictors of SBTPE scores.

Theoretical Framework

Interest in prediction of academic success has increased in the field of education over the past years. Lavin (1965) attributed this interest to growth in student population, increased need in selectivity of students for special programs, and increased interest in the study of education in the social sciences. This area is also of interest to nursing as schools strive to select those candidates who will be most successful. In nursing, however, the concern is not only for academic achievement. More

importantly the aim is to predict those individuals who will become safe practitioners. The SBTPE is a measure that is assumed to test for minimal professional competency, as well as basic knowledge (Clemence & Brink, 1978), and is used to evaluate performance.

The traditional criterion of performance has been student grades. Grades have been of practical importance in screening out students who might be unable to complete a program of study. Another measure of performance used in addition to or as an alternative to grades is the standardized achievement test. Since these tests do not vary from one institution to another, they have the advantage of being a more reliable predictor of performance (Lavin, 1965). Nonintellectual factors used as predictors have also been of interest, and more recently investigators have been concerned with the interaction of academic, personality, and social variables.

The selection of predictor variables to predict a future outcome, such as success on the SBTPE, concerns criterion-related validity. A measure's criterion-related validity or predictive validity is established by how well its predictions agree with subsequent outcomes (Stanley & Hopkins, 1976). The accuracy of the prediction is usually represented by the correlation coefficient between the

variables. Therefore, if a predictive variable has a high degree of validity it can be a more useful tool for selection of successful students.

The theory known as correlation was developed by Sir Francis Galton and Karl Pearson during the late 19th century (Stanley & Hopkins, 1976). Measures of correlation report the degrees of relationship of the variables, but do not imply causality. Pearson's original r summarized the magnitude and direction of the relationship between the variables.

Because human behavior and the components that contribute to the mastery of knowledge are too complex to base on a single variable, multiple correlation prediction studies may be done to improve the accuracy of the prediction (Van Dalen, 1979). Lavin (1965) reported a multiple correlation of .65 between traditional predictors, such as high school GPA and high school rank, and academic performance. Once a correlation coefficient is calculated, the information can be analyzed by using a regression equation for prediction of success. With the recent recognition of multivariate prediction techniques, accuracy of prediction has been increased. Owen and Feldhusen (1970) conducted a study to determine if there were differences in the predictive efficiency among three models used for prediction of

achievement in nursing education. Results from the study indicated that the addition of multiple variables increased predictive efficiency.

The ability to determine predictive variables that correlate highly with indicators of success continues to be a useful adjunct in the selection of nursing students. Nursing educators need to continue to base their research on criterion-related validity and the theory of correlation, as well as past studies, as they search for the best predictors of successful completion of nursing programs.

Hypotheses

The following null hypotheses have been formulated. If the null hypothesis is rejected the alternate hypothesis will be accepted.

H_{01} : There is no difference in performance on the State Board Test Pool Examination (SBTPE) between Associate Degree Nursing (ADN) students who have a composite American College Testing program (ACT) score of less than 17 and those students with an ACT score of 17 or above.

H_{11} : Nursing students in an Associate Degree Nursing program admitted with an ACT composite score of 17 or greater will perform better on the SBTPE

than those students admitted with an ACT score of less than 17.

H₀₂: There is no relationship between age of the student and ADN students' performance on the SBTPE.

H₁₂: There is a positive relationship between age of the student on admission and performance on the SBTPE in students in an ADN program.

H₀₃: There is no relationship between ACT composite scores and performance of ADN students on the SBTPE.

H₁₃: There is a positive relationship between ACT composite scores and SBTPE performance in students in an ADN program.

H₀₄: Performance on the SBTPE cannot be predicted from the age of the student and ACT scores in ADN students.

H₁₄: Age and ACT scores are predictive of performance on SBTPE in ADN students.

Definition of Terms

The following are definitions formulated for this study:

1. American College Test Composite score (ACT)--a single general measure of academic ability obtained by

averaging scores of a battery of four tests: English Usage, Mathematics Usage, Social Studies Reading, and Natural Sciences Reading.

2. Associate Degree Nursing program (ADN)--a two-year nursing program designed to educate the technical nurse (Moses, 1976).
3. Performance--refers to the individual scores the student receives on the SBTPE and not just to passing the exam with a score of greater than 350.
4. State Board Test Pool Examination (SBTPE) scores--Those standardized scores obtained on the State Board Test Pool Examination which are utilized as the basis for determining eligibility for "safe practice" as a registered professional nurse. The minimum passing score is 350, which is 1.5 standard deviations below the standardized mean of 500 (Franklin, 1975).

Limitations

The following is noted as a limitation of this study: The population is limited to students in an Associate Degree Nursing program in Texas, therefore findings cannot be generalized.

Assumptions

The following assumptions are basic to the pursuit of this investigation:

1. The ACT scores are reflective of the academic ability of the students.
2. The SBTPE is an indicator of level of performance in nursing.

Summary

If selection of nursing students who will successfully write the State Board Test Pool Examination could be detected early, losses in time, energy, and resources to students and faculty might be reduced. Determination of useful criteria to predict this success continued to be problematic.

The study examined admission criteria of age and composite score on the ACT to determine their usefulness in predicting SBTPE success. If these criteria can be used to predict SBTPE scores, then better selection and admission of students who are most likely to succeed may be accomplished.

CHAPTER 2

REVIEW OF THE LITERATURE

An extensive amount of literature was found to deal with the prediction of nursing student performance. A number of variables including academic, personality and biographic factors have been investigated. While some studies were interested in prediction for the purpose of selecting candidates who are the most likely to succeed in nursing, i.e., pass the SBTPE, others were concerned with predicting which students may need remedial work once they are in a nursing program.

For the purpose of this study, the literature review is divided into three sections. The first section deals with aspects of selection of candidates. The second discusses the use of nonacademic variables, i.e., personality and demographic factors, to predict outcomes. Section three deals with literature related to academic variables used to predict success.

Aspects of Selection

Policies of admission vary from institution to institution. Some schools have very minimal selection criteria and accept anyone who applies to the program. The

number of students admitted, however, may be limited by classroom space, personnel, and available facilities (Nash, 1977). Other institutions are very selective in admitting students. This selectivity is usually based on criteria that the faculty have identified as being necessary for student success (Schwirian, 1976). Nash (1977) stated that the underlying rationale behind established selection criteria is to allow for the most productive and successful education of its students.

In 1959, a special committee of State Boards of Nursing of the American Nurses' Association (Franklin, 1975) examined the question of applicant selection for nursing programs. It recommended that consideration be given to:

- (1) previous scholarship in educational institutions and scholastic aptitude;
- (2) personal and social fitness;
- (3) participation in extra-class social activities;
- (4) physical and mental health;
- (5) voice, speech, oral and written English; and
- (6) potentiality for employment after graduation.

These requirements, however, are very selective and potentially could screen out all but a very select group of applicants. Use of these criteria also is not congruent with the general philosophy of the junior college movement. Brick, as cited by Franklin (1975), stated that while there is a growing trend to establish selective admission

standards in junior colleges, this policy is not synonymous with the junior colleges' philosophy. In other words, less able candidates should be admitted in order to make higher education available to all. Besides the issue of minority students, admissions committees must consider and evaluate the qualifications of the student population from which selection takes place. These and other factors should be reflected in the theoretical framework of the nursing program.

In schools of nursing the most universal selection criterion for admission is some measure of the student's academic performance (Nash, 1977). This is doubtless attributable to the recognized view that academic factors produce the best result as predictors of success in the program. Additional criteria used by admissions committees are class rank, interview impressions, scholastic averages, and test scores.

A study by Nash (1977) reported that schools of nursing considered their own application form as the most important item in the selection process, followed by a health form, class rank, entrance examinations and an interview. A breakdown of the three types of nursing programs revealed that the ADN program viewed the application form most valuable in selection, followed by health form, high school rank,

examinations, interview, statement of motivation, references, and biographic inventory.

Franklin (1975) questioned the importance of selective versus nonselective admission criteria in relationship to outcome criteria. The basis of her study was to determine if there was a significant difference in attrition, final grade point average and SBTPE scores in ADN schools which had nonselective or selective admission procedures. The study, conducted in New York, included 17 ADN schools, 12 of which were classified as selective, and 5 as nonselective. The most frequent methods used for selection in this study were a minimum cut-off score on admission tests and references. Ten out of the 12 schools that were considered selective in nature used these criteria. Eight of the schools required an interview and six of these stated that they would exclude a student on this basis. Eight of the schools also required a minimum high school grade, while six required a minimum class rank. Nine schools had certain prerequisite courses for admission criteria.

Franklin's study also investigated the relationship of admission criteria to the SBTPE subtests. A significant difference at $p \leq .01$ was found between the nonselective and selective schools. Schools without selective criteria had a significantly higher proportion of failures on the SBTPE compared to selective schools.

Health data, high school rank, high school grade point average, applicant interview, and college GPA were the five most frequent selection criteria given by schools in a study by Schwirian (1976). Eighty-two percent of the ADN schools in this study replied that health data were given the most important emphasis in selection followed by college GPA, high school GPA, high school rank, interviews, ACT scores and biographical data.

Another method of selection is use of minimal cut-off scores on standardized tests. In some schools students are accepted or rejected on this basis. This procedure is questioned by some educators (Kovacs, 1970). The argument is that there is a potential loss of students who might have been successful. Smith, as cited by Kovacs (1970), demonstrated that students with perseverance and drive succeeded in spite of low entrance test scores. This area was also investigated by Kovacs (1970) in three collegiate schools of nursing. A score of 500 on the SAT verbal and SAT mathematics components or a combined SAT score of 1000 was used as the cut-off score. Student's records were reviewed and demonstrated that 46 to 59% of the students who withdrew from the school should have been eliminated if the cut-off scores had been in effect. Of the withdrawals, 73 to 93% of the academic withdrawals would not

have been admitted as well as 29 to 46% of the nonacademic withdrawals. Although no conclusions are drawn by the investigator regarding the use of cut-off scores, she poses some questions for the nursing profession. First, can the profession raise the standard of nursing practice without greatly decreasing the number of qualified graduate nurses? Secondly, does the cost of education of students who do not succeed or complete the program offset the cost and value of those who do not become registered nurses? Her summation is that in nursing our concern is not only in educating numbers, but also in upgrading nursing practice through gradual increase in the standards of admission.

The use of selective criteria for admission of students is controversial, however most schools of nursing do adhere to some method of selection of candidates. The inclusion of both academic and nonacademic factors may be the best overall method of selection (Lavin, 1965). These variables will be discussed further in subsequent sections of the review of literature.

Nonacademic Variables

Much importance has been placed on use of academic criteria as predictors of success (Lavin, 1965). This is particularly important to admission committees that must screen applicants. However, other factors may influence

student performance. Lavin (1965) recognized a need to develop additional criteria for evaluation of student performance. While grades are considered important, he emphasized that other dimensions of student behavior need to be considered.

Miller, Feldhusen, and Asher (1968) included nonacademic factors in a study to develop prediction equations for the SBTPE. Occupation and education of the father and mother, age in months at time of admission, two anxiety test scores, and two memory test scores were studied in addition to academic criteria.

Analysis of the data included multiple correlation of 22 predictor variables with each state board subtest. Four academic and two nonacademic variables were found to be most efficient in predicting the SBTPE scores. Significant non-academic variables were father's educational level and student age in months upon admission ($R = 0.57$ to 0.61). These variables were included in the multiple regression equations for the Medical, Obstetric and Pediatric subtests.

Results from a similar study found student age in months on admission and SAT verbal score were the most frequently significant predictors of SBTPE scores (Reed & Feldhusen, 1972). Multiple correlations ranged from $R = 0.49$ to 0.69 . Other nonacademic variables used in this

investigation were the school the student attended and the interaction of the school the student attended with high school rank. These variables were included in three of five SBTPE prediction equations with a multiple $R = 0.60$ to 0.69 .

Personality factors were included in Wittmeyer, Camiscioni, and Purdy's (1971) study of attrition and prediction of academic performance of students completing nursing. The 16 Personality Factor Inventory (16 PF) and the Myer-Briggs Type Indicator (MBTI) were used. Addition of the personality factors to academic predictors increased the ability to predict the criterion variables. However, the investigators noted that although the MBTI and 16 PF increased the ability to predict, it was unlikely that the amount of gain in selective efficiency would justify administration to all applicants. They recommended that the personality tests could, however, be used as a tool to screen applicants with low prenursing point-hour ratios.

Personality and family background variables were included with academic variables in a study by Mueller and Lyman (1969). The criterion variables were scores on the SBTPE subtests. The 16 PF measured personality traits while family background factors included education of parents, occupation of father, birth order, number of siblings, and

size of high school graduating class. The highest correlation was with aptitude and ability predictors ($p \leq .01$ to $.001$). Personality factors correlated at a lower level of significance ($p \leq .05$ and $p \leq .01$). None of the family background factors were statistically significant.

Clemence and Brink (1978) studied the relationship between admission criteria and passing the SBTPE. Admission data included admission GPA, course requirements and demographic data. Only one demographic variable, ethnicity, was significantly correlated to the SBTPE. This was found to be significant at $p \leq .05$; however, no correlation coefficients were quoted.

Academic Variables

In predicting success in students, the variables most often used as predictors were categorized as academic factors. These variables usually included previous grades, class rank, and scores on standardized tests. These may be used alone to predict an outcome or in combination with nonintellectual factors.

Two commonly used standardized tests are the ACT and SAT. In reviewing the literature, however, this investigator found the SAT was more frequently noted. The increased usage of the SAT may be attributed to individual

selection or preference of the institutions involved in the studies. Schwirian (1976) noted that the SAT was more frequently used in the North Atlantic region whereas the ACT was more prominent in the midwest. The National League for Nursing (NLN) tests are also frequently cited in nursing studies and therefore will be included in this discussion.

Brandt, Hastie, and Schumann (1966) conducted a study to determine if success on the SBTPE could be predicted from theory and achievement test grades. The sample consisted of 156 nursing students at the University of Washington. Predictor variables included the NLN achievement tests, the University of Washington Natural and Social Science tests, and course grades. The Pearson Product-Moment Correlation of nursing course grades and the SBTPE ranged from $\underline{r} = .08$ to $.55$. The highest correlation of course grades to the SBTPE was between the Principles of Medical-Surgical Nursing and the Medical SBTPE subtest $\underline{r} = 0.55$ with $\underline{p} \leq .01$. Correlation between the NLN tests and SBTPE subtests ranged from $\underline{r} = 0.17$ to 0.53 . The highest correlation of the NLN tests and SBTPE was the Public Health Principles NLN test with the Medical SBTPE subtest, but the most consistent relationship was between the Basic Medical-Surgical NLN test and SBTPE subtests ($\underline{r} = 0.42$ to 0.49). They concluded that grades received in nursing theory course

scores of the Natural Science and Social Science tests, and scores on the NLN Basic Medical-Surgical Achievement test may be useful in predicting performance on State Board Examinations.

A similar study by Shelly, Kennamer and Raile (1976) investigated the relationship between selected course grades, final grade averages, 17 NLN achievement test scores and the SBTPE scores. Their sample included 117 students in a diploma school of nursing from 1968 to 1973. Findings indicated a higher degree of correlation between the NLN test scores and the SBTPE than with the course grades. The comprehensive NLN achievement test, Pharmacology in Clinical Nursing, was found to have the most significant correlation with Medical, Surgical, and Obstetric SBTPE subtests ($r = 0.63$ to 0.68). The NLN Psychiatric Nursing achievement test scores correlated higher than other NLN achievement tests with the Psychiatric Nursing SBTPE ($r = 0.66$).

NLN achievement tests were also used as predictor variables in a study by Bell and Martindill (1976). Subjects were 101 nursing students in a baccalaureate program in Houston, Texas. Cross validation was done with a sample of nurses ($n = 33$), who graduated a year later. Correlation coefficients between five NLN tests and the SBTPE

subtests ranged from $\underline{r} = 0.30$ to 0.85. Regression analysis was used to determine the best equations to predict each SBTPE subtest. Multiple correlations for the regression equations ranged from $\underline{R} = 0.65$ to 0.73 with the Medical Nursing subtest having the highest correlation. The standard error ranged from 67 to 74.

ACT test scores and prenursing point-hour ratio were academic predictor variables included in a study by Wittmeyer, Camiscioni, and Purdy (1971) who studied attrition at Ohio State University School of Nursing. A second goal of their study was to predict the academic performance of students completing the nursing program. Criterion variables were completion versus noncompletion of the nursing program and performance in nursing. The sample consisted of 119 students. The authors concluded that students with higher average scores on the SBTPE had higher prenursing point-hour ratios and ACT Social Studies Reading scores. The correlation of prenursing point-hour ratios with the average SBTPE scores was $\underline{r} = 0.47$ with $\underline{p} \leq .001$, where correlation of ACT Social Studies Reading score was $\underline{r} = 0.24$ with $\underline{p} \leq .05$.

Reed and Feldhusen (1972) used preadmission and college predictor variables to determine if students complete the nursing program and to predict SBTPE scores. Academic

predictors included SAT scores, percentile high school rank, SAT mathematics score squared and the product of SAT verbal score and high school rank. Nonacademic variables such as age in months on admission and school the student attended were also used in combination with academic variables. Results of the study indicated that students who did not take the SBTPE were predictably different from those who did. Taking the SBTPE was best predicted by the interaction of high school rank and SAT verbal scores where $r = 0.24$.

Use of the SAT was also studied in 1968 by Miller, Feldhusen, and Asher who developed prediction equations for state board scores of 116 graduates of an ADN program at Purdue University. Data were categorized into mechanical or clinical variables. The mechanical variables that were academic in nature included SAT verbal and mathematics scores, rank in high school graduating class, number of college credits earned prior to entering the nursing program, and the graduating index for the nursing program. Clinical variables included grades in various nursing courses and high school grade averages in English, mathematics, science and over-all average.

Analysis of the data included multiple correlations of all the 22 academic and nonacademic predictor variables. Stepwise multiple linear regression equations were formulated

with the most significant predictors. Six variables were significantly correlated with three or more SBTPE scores. Of these, four were academic and included the SAT verbal score, high school graduation rank, the number of college credits before entering the nursing program, and the overall average at the end of the nursing program. The multiple correlations demonstrated optimum correlations between each SBTPE score and a weighted combination of independent variables ($R = 0.56$ to 0.61).

Tillinghast (1968) found the SAT to be more predictive of performance on the SBTPE than high school grade averages. Predictor variables in this study included the SAT-Verbal, SAT-Mathematics, SAT-Total scores and high school GPA. The criterion measures were the SBTPE subtests and grade point average in the school of nursing. The study included 219 students graduating from a baccalaureate program from 1962 to 1966. Intercorrelations for each class between admission variables and criterion variables were computed. Scores on the SAT were significantly correlated with scores on the SBTPE in 60 of 75 possible instances. The SAT-Total had the best correlation to the SBTPE subtest scores and was significant at $p \leq .05$ in all but three instances. Correlations ranged from $r = 0.15$ to 0.81 . The high school GPA was more predictive of the grade point

average in the school of nursing and was significant at $p \leq .05$ for each class ($r = 0.27$ to 0.60).

Mueller and Lyman (1969) also formulated regression equations to predict success or failure on the SBTPE. The purpose was to identify potential failures early enough to take discriminatory action. Correlations and intercorrelations of 38 potential predictors were determined. These included measures of ability and aptitude, personality and family background. The sample consisted of 65 graduates of the Jewish Hospital of Cincinnati School of Nursing. The data were entered into a stepwise regression analysis. Variables were partialled out until the F-test was insignificant at $p \leq .05$. Seven variables were retained in each regression equation with the multiple R ranging from 0.81 to 0.84 and standard error of measurement of 50.8 to 53.9. The highest multiple correlation, $R = 0.84$, was with six of the academic predictor variables, Medical-Surgical II, Disaster Nursing, Verbal ability, Comprehensive Pharmacology, Medical-Surgical I, and rank in high school class with the criterion variable the SBTPE Medical subtest. Cross-validation applied to the graduates of the subsequent class of 45 yielded 40 correct predictions to the pass-fail criterion.

Summary

The review of the literature discussed aspects of selection of students, nonacademic variables and academic variables used to predict outcomes. In schools using selective criteria, academic factors were found to be most important. These variables were cited as the best overall predictors of success, however nonacademic criteria improved the multiple correlations of predictor variables in many instances.

CHAPTER 3

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

This investigation was a retrospective, longitudinal, explanatory study. It was designed to compare admission criteria of students in an Associate Degree Nursing program with SBTPE performance and to determine if certain admission criteria can be used as predictors of performance on the SBTPE.

Setting

The setting for the study was an Associate Degree Nursing program located in a city in southeast Texas. The city has a population of 15,000 and is adjacent to a large metropolitan area.

The nursing department is part of a Junior College located in this city. In addition to the Associate in Science Degree program in nursing, the college offers academic courses leading toward a degree from a senior college, technical courses, and adult education programs. Total enrollment in the college is over 2,700 students. Enrollment in the nursing program averages 100 students per year with 75 students graduating and writing the SBTPE.

Population and Sample

The population consisted of students graduating from the nursing program in 1978 and 1979. The sample included two groups of nursing students. The first group, which was designated and subsequently referred to as Group A, were students with an ACT composite score of 17 or more, whereas the second group, Group B, was composed of students admitted to the school with an ACT composite score of less than 17.

Records of all nursing students graduating in 1978 and 1979 were reviewed by the investigator. Students were then designated to either Group A or Group B according to their ACT composite score. Each student was then assigned an identification number in order to maintain anonymity. Random sampling of the groups was then achieved by using a table of random numbers (Kerlinger, 1973). The investigator blindly pointed to a number on the table of random numbers and proceeded down the chart until 29 individuals were selected for Group A. This procedure was then repeated until 30 individuals were selected for Group B.

Protection of Human Rights

Prior to initiating the study, permission was obtained from the Human Rights Research Committee at Texas Woman's University. Permission was then obtained in writing from

the acting director of the school of nursing of the institution involved (Appendix A). The anonymity of the students was maintained by assigning a code number to each student. The code number was then used throughout the study.

Instrument

An original tally sheet, the Raw Data Sheet, was designed by the investigator for data collection (Appendix B). The Raw Data Sheet provided for both group and individual student identification (code number), student age, ACT composite scores and the SBTPE Medical, Surgical, Obstetrical, Pediatric, Psychiatric subtest scores and the mean SBTPE scores. Establishment of reliability and validity was not necessary since the data were of a factual nature.

Data Collection

Data were collected by the investigator from the students' records and recorded on the Raw Data Sheet. Data included the students' age, ACT composite score, and the SBTPE subtest scores. After group designation was determined each student was given a code number so that their identity would remain anonymous.

Treatment of Data

Frequencies and percentages of students passing or failing the SBTPE were determined for each group of students. Mean scores and standard deviations of subtests on the SBTPE were also calculated for each group.

A two factor analysis of variance (ANOVA) with repeated measures was used to test mean differences between the two groups and the SBTPE subtests. A .05 level of significance was set. Multiple regression formulae were used to determine if SBTPE scores could be predicted from the admission criterion variables of age and composite ACT score.

CHAPTER 4

ANALYSIS OF DATA

A retrospective, longitudinal, explanatory study was conducted to determine the relationship between selected admission criteria and performance on the State Board Test Pool Examination (SBTPE) of students in an Associate Degree Nursing (ADN) program. Random sampling was utilized for selection of students. Data collected included student's age, American College Testing program (ACT) composite score and scores on the SBTPE. Analysis of data was accomplished through the use of BMDP and SPSS computer programs. Four hypotheses were formulated and tested.

Description of Sample

Fifty-nine students were included in the study. Students graduating in 1978 and 1979 were designated to groups according to their ACT composite score. Group A consisted of students with an ACT composite score of 17 or greater, whereas Group B was composed of students with an ACT composite of less than 17. Random sampling of each group was then accomplished by a Table of Random Numbers (Kerlinger, 1973). Group A's sample size was 29 where Group B had 30 subjects.

Presentation of the Findings

The mean score on the ACT composite for all students included in the study was 16.2 with a standard deviation of 4.9. ACT scores for Group A ranged from 17 to 27 with a mean score of 20, mode of 19, and median of 19. Scores ranged from 7 to 17 for Group B with a mean ACT score of 12, a median of 12, and a bimodal distribution of 11 and 14. A frequency distribution of students for each ACT composite score is given in Appendix C. The students' ages ranged from 20 to 59 years with a mean age of 31.8 and a standard deviation of 8.5 years.

Scores on the SBTPE subtests for both groups of students ranged from 180 to 714. Scores for Group A were consistently higher than those for Group B. Table 1 gives the range of scores for each subtest for the two groups.

Table 1

Range of Scores on the SBTPE According to Groups

SBTPE Subtest	Group A	Group B
Medical	417-656	180-609
Surgical	412-677	218-621
Pediatrics	390-689	237-621
Obstetrical	308-714	266-588
Psychiatric	359-656	186-628

All subtests of the SBTPE were failed by four students in Group B, whereas Group A had only one student fail one subtest, Obstetrical Nursing. The SBTPE subtest most frequently failed by students in Group B was the Medical exam (37% failed, $\underline{n} = 11$). See Table 2 for a breakdown of students who passed or failed the SBTPE subtests.

Table 2
ADN Success on SBTPE Subtests by Groups

Groups	Medical		Surgi- cal		Pediat- ric		Obstet- ric		Psychi- atric	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
<u>A</u> ($\underline{n}=29$)										
Passed	29	100	29	100	29	100	28	97	29	100
Failed	0	0	0	0	0	0	1	3	0	0
<u>B</u> ($\underline{n}=30$)										
Passed	19	63	23	77	22	73	26	87	21	70
Failed	11	37	7	23	8	27	4	13	9	30

Frequencies and percentages of students passing and failing the SBTPE were calculated for each group. Group A had a larger number of students, 28 (97%), passing the SBTPE compared to Group B which had 16 students (53%) passing (Table 3).

Table 3

ADN Success on SBTPE by Groups

ACT Composite Score	Group A		Group B	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Passed SBTPE	28	97	16	53
Failed SBTPE	1	3	14	47
Total	29	100	30	100

Mean scores and standard deviations for the SBTPE subtests were calculated for both groups. Even though one student in Group A failed the Obstetrical exam, this subtest had the highest mean score of 537 with a standard deviation of 90. The lowest subtest mean score for Group A was in Pediatric Nursing, 517, with a standard deviation of 80. In Group B, the highest mean score, 448, was also in Obstetrical Nursing while the standard deviation was 85. The lowest mean score was in Medical Nursing where the mean was 401 and standard deviation 102. Table 4 gives the mean scores on the SBTPE subtests for both groups of students.

Each hypothesis was tested and will be discussed separately. The first hypothesis was:

H_{01} : There is no difference in performance on the SBTPE between Associate Degree Nursing students

Table 4

State Board Examination Subtest Means and Standard Deviations Broken Down by Groups

ACT Scores	State Board Subtest Mean Scores				
	Medical Nursing	Surgical Nursing	Pediatric Nursing	Obstetric Nursing	Psychiatric Nursing
<u>Group A (n=29)</u>					
X	521	522	517	537	521
S _x	66	77	80	90	85
<u>Group B (n=30)</u>					
X	401	429	421	448	408
S _x	102	104	108	85	115

who have a composite ACT score of less than 17 and those students with an ACT score of greater than 17.

H₁₁: Nursing students in an Associate Degree Nursing program admitted with an ACT composite score of greater than 17 will perform better on the SBTPE than those students admitted with an ACT score of less than 17.

The SBTPE scores from each group of students were subjected to a two-factor analysis of variance with repeated measures on each SBTPE subtest. A statistically significant difference was found between Groups A and B with $p \leq .000$

($F = 2159.7$). The analysis of variance breakdown is shown in Table 5.

Table 5

Analysis of Variance of Group A ($n=29$) and Group B ($n=30$)
on State Board Test Scores

Source of Variance	SS	df	MS	F	Significance
Between Groups	66091519.0	1	66091519.0	2159.7	0.000
Error	1744293.3	57	30601.6		
Across Trials	34231.9	4	8557.9	2.74	0.030
B G	8861.0	4	2215.3	.71	0.587
Error	712665.1	223	3125.7		

Since there was a significant difference between the groups, the null hypothesis was rejected and the alternate accepted.

The second hypothesis tested was:

H_{02} : There is no relationship between age of the ADN student and performance on the SBTPE.

H_{12} : There is a positive relationship between age of the student on admission and performance on the SBTPE of students in an ADN program.

Correlation coefficients were calculated using the Pearson Product-Moment Correlation Coefficient (r).

Correlations between age and scores on SBTPE subtests ranged from $\underline{r} = 0.04$ to 0.15 (Table 6).

Table 6

Correlation of Admission Criteria, Total Sample ($\underline{n}=59$),
with SBTPE Subtests

Admission Criteria	State Board Test Pool Scores				
	Medical	Surgical	Pediatric	Obstetric	Psychi- atric
Age	.14	.09	.13	.15	.04
ACT	.62*	.57*	.51*	.49*	.61*

*Significant at $\underline{p} \leq .001$

Using a table of correlation coefficients for a two-tailed test (Polit & Hungler, 1978), the calculated \underline{r} 's were not significant at $\underline{p} \leq .05$. The null hypothesis, that there is no correlation between age of the student and performance on the SBTPE, therefore was accepted.

The third hypothesis tested was:

H_{03} : There is no relationship between ACT composite scores and performance of ADN students on the SBTPE.

H_{13} : There is a positive relationship between ACT composite scores and SBTPE performance in students in an ADN program.

The Pearson Product-Moment Correlation Coefficient (\underline{r}) was again used to determine the relationship that existed between ACT scores and SBTPE scores. The relationship between ACT composite scores and all SBTPE subtest scores was found to be significant at $\underline{p} \leq .001$ using a table of correlation coefficients for a two-tailed test (Polit & Hungler, 1978).

Table 6 shows the correlation coefficients for each subtest. The highest correlation of ACT scores was with scores on the Medical Nursing subtest, $\underline{r} = 0.62$. The least correlation was with Obstetrical Nursing, $\underline{r} = 0.49$. It is interesting to note that the Obstetrical Nursing subtest was the only test failed by a student in Group A. The third null hypothesis was rejected and the alternate retained.

The multiple correlations of age and ACT composite scores with the SBTPE subtests are given in Table 7. By using both predictor variables the multiple correlation ranged from $\underline{R} = 0.57$ to 0.69 with $\underline{p} \leq .001$.

The findings from the third hypothesis allowed the investigator to proceed to the fourth hypothesis:

H_{04} : Performance on the SBTPE cannot be predicted from the age of the student and ACT scores in ADN students.

H_{14} : Age and ACT scores can be used to predict performance on SBTPE in students in an ADN program.

Table 7

Regression Equations with Multiple Correlations and
Standard Error of Estimate for Predicted Scores
on the SBTPE

Predicted SBTPE Score		Multiple <u>R</u>	Standard Error
Surgical	$Y'^a = 13.3(\text{ACT}) + 3.2(\text{Age})$ + 160	.62	81.8
Medical	$Y' = 14.8(\text{ACT}) + 3.9(\text{Age})$ + 96.8	.69	76.6
Pediatric	$Y' = 12.7(\text{ACT}) + 3.5(\text{Age})$ + 152	.58	88.9
Obstetric	$Y' = 11.4(\text{ACT}) + 3.4(\text{Age})$ + 199	.57	81.5
Psychiatric	$Y' = 15.7(\text{ACT}) + 2.9(\text{Age})$ + 119.4	.64	90.3

^a Y' = predicted score

Multiple regression analysis was employed to determine the best linear prediction equations for each SBTPE subtest. Table 7 gives the regression formulae to predict each SBTPE subtest as well as the standard error and Multiple R.

The greatest correlation was in predicting the Medical Nursing subtest where R = 0.69 with a standard error of 76.5. The smallest correlation was in predicting the

Obstetrical Nursing exam where $R = 0.57$ and the standard error was 81.5. The fourth null hypothesis was rejected and the alternate accepted.

Summary of Findings

Descriptive statistics demonstrated that the average age of subjects in the study was 31.8. Average ACT composite scores for both groups of students was 16.2. Scores on the SBTPE subtests ranged from 180 to 714.

Subjects in Group A, students with an ACT composite of 17 or better, scored significantly better on the SBTPE than did those who had an ACT score of less than 17. Group A also had more students pass the SBTPE. Age, however, was not found to be a significant factor in the students' performance on the SBTPE.

There was a positive multiple correlation of age and ACT composite score with SBTPE subtest scores. This allowed for multiple regression formulae to be formulated in order to predict individual SBTPE subtest scores.

CHAPTER 5

SUMMARY OF STUDY

This study was designed to determine the relationship of selected admission criteria to performance on the State Board Test Pool Examination. The study also was planned to determine if these scores could be predicted from certain admission criteria.

Summary

The data for the study were collected from the records of 59 students in an ADN program in Texas. The students were randomly selected according to their ACT composite scores. Students with an ACT score of 17 or above composed Group A. The second group, Group B, included students with an ACT score of less than 17. Four hypotheses were tested. Data, collected by the investigator and recorded on the Raw Data Sheet, included age of the student on admission, ACT composite score, and SBTPE sub-test scores.

Analysis of the data was facilitated by use of BMDP and SPSS computer programs. Statistical analysis included analysis of variance and a multiple linear regression technique.

Discussion of Findings

One of the major findings of this study is that there was a significant difference in performance on the SBTPE according to the ACT composite score. Students with admission ACT composite scores of 17 or better were more likely to be successful on the SBTPE and their scores were significantly higher than students with ACT scores of less than 17.

The ACT score was also a better predictor of SBTPE subtest scores. This was consistent with two other studies in which a standardized test score, the SAT verbal score, was a significant predictor of SBTPE scores (Reed & Feldhusen, 1972; Miller, Feldhusen, & Asher, 1968). Similarly, Wittmeyer, Camiscioni and Purdy (1971) reported that students with higher scores on the ACT Social Studies test scored higher in the SBTPE.

This study demonstrated no significant correlation between the age of the student on admission and the SBTPE scores. Contrary to these findings, Miller et al. (1968) found that student's age in months upon admission was significantly correlated with the SBTPE scores. Age, along with five other variables, were used to predict SBTPE scores. Reed and Feldhusen (1972) also used age in months on admission and SAT verbal scores to predict SBTPE scores

since these were the most significant predictors in their study.

Conclusions and Implications

The investigator has drawn the following conclusions from the findings:

1. From the analysis of data presented the major conclusion drawn was that ACT composite score was the best predictor of success on the SBTPE. The ACT composite score, therefore could be useful for selection and admission of students in an ADN program in Texas.

2. Age, on the other hand, was not highly correlated to SBTPE score; therefore, based on the findings of this study, age should be used with caution as a factor in selection of students.

3. Regression formulae can be formulated to predict SBTPE scores. This would be helpful in determining, from admission data, those students who would most likely succeed on the SBTPE. Since the multiple correlation coefficient was improved by addition of age to the formula both ACT composite score and age could be used to predict SBTPE subtest scores. This information could also be useful in planning for remedial courses for students whose predicted scores are low.

Recommendations for Further Study

The following recommendations are proposed:

1. The study should be replicated using a larger sample size.
2. Replication of the study should be done at the same school for further validation of the study.
3. A cross validation study should be conducted in the same school utilizing the regression formulae.

APPENDIX A

AGENCY PERMISSION FORMS

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
DENTON, TEXAS 76204

DALLAS CENTER
1810 INWOOD ROAD
DALLAS, TEXAS 75235

HOUSTON CENTER
1130 M. D. ANDERSON BLVD.
HOUSTON, TEXAS 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE _____
GRANTS TO _____
a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other _____

Date: _____ Signature of Agency Personnel _____
Signature of Student _____ Signature of Faculty Advisor _____

* Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.

GP:GEM 13
07026074 cd

Dear Director,

I am a student in the Graduate School of Nursing at Texas Woman's University. I am in the process of writing a thesis in partial fulfillment of the requirements for the degree of Master of Science. My study is, "Correlation and Prediction of State Board Examination Success from Selected Admission Criteria." The study will attempt to determine the relationship of the American College Testing Program (ACT) composite score to scores on the State Board Examination. Further study will be done to determine if the State Board scores can be predicted from the student's age on admission and the ACT composite score.

The data would be collected from the student's record. Each student would be designated by a code number to maintain their anonymity. The total number of students needed to complete the study is 60, with one group of 30 students scoring below 17 on the ACT composite and the other group of 30 scoring above 17 on the ACT. The anonymity of the students will be maintained at all times. Data collection would start at the end of August, 1979.

A copy of the final study will be presented upon your request. Thank you for your consideration in this matter.

Yours truly,

Mary E. Duncan

APPENDIX B

RAW DATA SHEET FORM

Group A B

[illegible]

APPENDIX C

TABLE OF FREQUENCY DISTRIBUTIONS BY STUDENTS

Table A

Frequency Distribution of ADN Students on the ACT
According to Groups

Group A		Group B	
ACT Score	f	ACT Score	f
17	5	7	1
18	4	8	2
19	6	9	2
20	3	10	2
21	4	11	5
22	1	12	4
23	1	13	3
24	2	14	5
25	0	15	4
26	1	16	2
27	2		
Total	29		30
Mean	20		12

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