THE OTIS-LENNON MENTAL ABILITY TEST AND GENERAL APTITUDE TEST BATTERY (G) AS PREDICTORS OF SUCCESS ON STATE BOARD TEST POOL EXAMINATION FOR PRACTICAL NURSING CANDIDATES

by

Mildred Alfy Mason

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APPROVED:

Lester G. Duenk, Chairman

Clifton D. Bryant

Samuel D. Morgan

Thomas H. Hohenshil

Pathe S. Vivekananthan

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Blacksburg, Virginia

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INTRODUCTION

Background of the Problem

Selection of students is one of the continuing problems in nursing education (Abdellah, et al., 1973: 444). The problem of selecting practical nursing students increased rapidly for seven reasons: (1) growth of a relatively large number of practical nursing programs in a short period of time, (2) relationship of quality nursing care in the United States to the selection of potential licensed practical nurses, (3) increasing cost of operating educational programs, (4) high attrition rates, (5) personal impact of failure or dropout on the student and his/her family as well as the faculty, (6) increasing number of applicants competing for available training stations or slots, and (7) the desire as well as necessity to keep the selection process culturally fair. Each facet of the existing problem of selecting practical nursing students was considered sequentially and individually in the following discussion.

1. Growth of Practical Nursing Programs. The four types of basic nursing programs which prepare individuals for beginning practice in nursing were located mainly in (1) four-year degree granting institutions, (2) hospitals, (3) community colleges, and (4) vocational

schools. A baccalaureate degree, diploma, associate degree or a certificate was issued by the respective agency. Schools for practical nurse education represented one of the four types of basic preparatory programs. Graduates of the first three programs listed were eligible to write a state licensing examination to become licensed by the state to practice as a registered nurse (R.N.). Graduates of the practical or vocational nursing program were eligible to write a state licensing examination to practice as a licensed practical nurse (L.P.N.). The states of Texas and California provided comparable licensure using the legal title, licensed vocational nurse (L.V.N.).

A previous study by Mason (1967: 6-9) reported that the growth of practical nursing programs in the United States started in New York in 1893 with the establishment of a course in practical nursing by the Y.W.C.A. This study indicated that, prior to World War II, approximately twelve schools were functioning. The total number of practical nursing programs grew from 46 in 1945 (1967: 8) to 159 in 1951 ("Factors in the Success of Students in Schools of Practical Nursing," Nursing Outlook, August 1954: 423). The number increased from 1,081 in 1966 (Mason, 1967: 8) to 1,310 in 1972 ("Educational Preparation for Nursing--1971," Nursing Outlook, September 1972: 599-602).

The total number of all programs preparing for R.N.'s from 1968 to 1972 increased by 84 to reach a grand total of 1,377. During a comparable period of time, the report in Nursing Outlook indicated that

practical/vocational programs increased by 119 making a grand total of 1,310 (1972: 599-602). In other words, the total number of practical nursing programs was almost as great as the combined total of associate degree, diploma, and baccalaureate degree programs.

2. Relationship of Quality Nursing Care. The rapid growth of practical nursing programs in the United States indicated that an increasing amount of nursing care would be given by L.P.N.'s. Apparently, the nursing needs of the nation would be directly influenced by the quality of care given by licensed practical/vocational nurses. It appeared there was necessity for selecting students most likely to develop the abilities conducive to rendering quality nursing care.

3. Increasing Costs. Increasing costs of operating practical nursing programs contributed to the need for improvement in predicting success. In addition to cost borne by the educational agency and hospital, the student and his/her family also shared this financial burden. Contemporary emphasis on accountability also focused additional attention to the financial burden and related output.

4. Attrition. Levitt, Lubin, and DeWitt reported attrition rates in professional nursing programs as one-third (1971: 255). An earlier study by Rottecamp reported the attrition rates to be one-half (1968: 44-47). An early study of the attrition rates in practical nursing programs indicated

similar findings ("Practical Nursing Schools and Their Students," Nursing Outlook, January 1953: 50-51). Heslin and Katzell found the main reason that practical nursing students left the program was academic failure (1962: 26).

In a study of professional nursing programs by the New York State Department of Health, Office of Nursing Manpower, Hess and Coon obtained data that indicated the need for selective recruitment. They recommended that selective recruitment should be directed toward obtaining better qualified applicants (1973: 473). Reducing attrition by preadmission testing was found to be effective to a considerable extent in collegiate nursing programs by Bachman and Standler (1971: 807-808). Another study indicated the need to improve prediction of academic success in nursing education as a basis for improving the selection process and identifying students who need remedial instruction (Owen and Feldhusen, 1970: 517). Improved prediction of academic success in practical nurse education through improved selection could be expected to reduce the attrition rate.

5. Personal Impact. The problem of selecting practical nursing students who will complete the program becomes increasingly acute as one observes the personal impact of failure or voluntary withdrawal of individual students. Families of students as well as their teachers seemed to experience emotional turmoil when a student failed or otherwise had to

leave the program. Student peers also appeared to experience varying degrees of emotional disturbance when a classmate failed or left the school for other reasons.

6. Increased Number of Applicants. The increased number of applicants, especially on a local level, for a given number of training positions presented a problem which differed from the one experienced earlier in Norfolk when recruitment was a major factor. The necessity for applicants to compete for available training positions increased the need for selection instruments with greater predictability.

7. Cultural Fairness. A major current issue regarding mental ability testing is fairness to minorities, (Robb, Bernardoni, and Johnson, 1972: 20-22) and the use of mental ability tests in selecting or placing members of minority groups (Linn and Werts, 1971: 1-4). Recognition was made in this study of the continuing debate regarding the relationship of mental ability to heredity and/or environment. The publication of an article by Arthur Jensen concluded that a genetic difference between non-Caucasians and Caucasians accounted for the difference in intelligence and the ineffectiveness of compensatory education (1969: 1-123) reactivated the controversy. Rekindling of this controversy between heredity and environment's influence on mental ability was attacked and criticized by numerous individuals such as Senna (1973) and others as having inadequate evidence.

A contemporary study of mental ability testing should take into consideration cultural fairness. Thorndike said that the fairness of a test relates to its fair use. He contended that emphasis should be placed on the fair use of scores instead of the scores themselves (1971: 63-70).

Guidelines from the Office of Federal Contract Compliance, U. S. Department of Labor, indicated that the relationship between a selection test and at least one relevant criterion must be statistically significant (United States Department of Labor, "Part 60-3, Employee Testing and Other Selection Procedures," 1971: E2). The relevant criterion in this study was scores from the state board licensing examination for practical/vocational nurses. Race was considered as a separate variable in this study.

In reviewing the case, Griggs, et al., versus Duke Power and Light Company, the Supreme Court of the United States, Number 124, October Term, 1970, Plotkin, discussed decisions which were pertinent to psychological testing. One decision which seemed especially relevant to this study was that the use of psychological tests must be based on a meaningful study of their relationship to job performances. Evidence of predictive validity must be present (1972: 202-204). Lawrence Plotkin indicated his belief that labor unions and employers turned to psychological tests to perpetuate racial exclusion after federal legislation was enacted to eliminate discrimination. On March 8, 1971, Chief Justice Warren E. Burger wrote the unanimous decision of the Supreme Court stating that

psychological tests could be used for employment only when they had a positive relationship to job performance (1972: 202-204).

Hecht contended most research indicated that members of minority groups were prevented from the practice of nursing at the point of beginning basic educational program instead of at the point of writing the examination for licensure. Certain prospective practitioners of nursing were not afforded the opportunity to fail or to succeed in the program preparatory for the licensing examination (Hecht, 1973: 46).

Shimberg reported that specific information regarding the race and ethnic background of applicants and license-holders in health occupations was difficult to obtain. State officials estimated a high proportion of minority applicants in practical nursing (1972: 42). A survey by the National League for Nursing indicated that 15.8 percent of the graduates of practical/vocational nursing programs in 1971-1972 were blacks ("Educational Preparation for Nursing--1971," Nursing Outlook, September 1972: 599-602). Although this was not primarily a study of cultural fairness, some consideration was given to the topic by including race as one of the demographic variables. Licensure as a result of passing the SBTP was a prerequisite for job performance.

Local Changes

In 1968, teachers in the practical nursing programs of Norfolk City Schools realized a need for a group test of mental ability which could

be administered and scored by the teacher, required a short period of time for testing, was recently standardized, and was relatively inexpensive. The Pre-Admission and Classification Examination (PACE), a national test prepared by the National League for Nursing, was being used in addition to the General Aptitude Test Battery (GATB). A cost of $6.00 each and time periods of approximately four to six weeks were negative factors associated with PACE. Some applicants could not afford the cost and many applicants could not wait four to six weeks to learn whether or not they were accepted.

The supervisor of group testing for Norfolk City Schools recommended the Otis-Lennon Mental Ability Test for consideration. The revised version was being standardized at that time and Norfolk City Schools was one of the research sites. Use of the test as one guide for selection was adopted in 1969 by the practical nursing faculty of Norfolk City Schools. The need for change at the time of this study is discussed later in this chapter when GATB is considered.

Statement of the Problem

The problem of this investigation was encompassed in two major questions:

1. Was success on the practical nurse licensing examination (SBTP) related to pre-entrance test scores of applicants as determined by the Otis-Lennon Test of Mental Ability (OLMAT) and the General Aptitude

Test Battery (G)? This was analyzed in regard to race and age.

2. Was there a difference between OLMAT and GATB (G) scores as predictors of success on SBTP?

Theoretical Framework

Definitions of terms pertinent to this study, factors measured by the standardized instruments, basic decision theory, and the concept of test validity served as the broad theoretical framework. Each psychometric instrument and the skills needed by potential practical nursing candidates were described. Basic assumptions, including interrelatedness and limitations which culminate in the hypotheses, were considered. The primary and secondary hypotheses served as the scientific guidelines for study.

Definition of Terms

Terms pertinent to this study were:

1. Aptitude Test. An instrument used to measure what an individual can accomplish at a particular point in time as a basis for predicting how much he can learn in the future under ideal conditions (Nunnally, 1970: 277). Anastasi further defined an aptitude test as one which measures relatively homogeneous and clearly defined segments of ability (1968: 14). In this study, an aptitude test was considered to be an instrument used to measure segments of mental ability of practical nursing

candidates as a basis for predicting success as determined by satisfactory scores on the licensing examination.

2. Caucasian. Pertaining to the white race of mankind as classified by teachers having personal knowledge of students in the subject population.

3. Cultural Fairness. A concern for the proportions of people from different cultures selected for a given purpose (Darlington, 1971: 71-82).

4. DIQ. Deviation intelligence quotient; transformed standard score (Otis and Lennon, 1969: 13).

5. General Aptitude Test Battery (GATB). A standardized test administered by a counselor at the local Employment Commission. Part G, which measures general learning ability, was included in this study (U. S. Department of Labor, Manual for General Aptitude Test Battery...1967).

6. General Mental Ability. This study considered general mental ability to be an individual's ability to reason with or manipulate verbal, symbolic, and figural concepts (U. S. Department of Labor, Manual for General Aptitude Test Battery...1967).

7. General Mental Ability Test. A psychological test used to measure an individual's ability to reason with or manipulate verbal, symbolic, and figural concepts (Anastasi, 1968: 327-329).

8. L.P.N. (Licensed practical nurse). An individual licensed by the state board of nursing to practice as a practical nurse in that state. This term used in all states except Texas and California.

9. L.V.N. (Licensed vocational nurse). An individual licensed by the state board of nursing to practice as a vocational nurse in that state. This term used in either Texas or California.

10. Mature Practical Nursing Student. An individual between 37 and 56 years of age enrolled in an approved practical nursing program.

11. Non-Caucasian. Pertaining to the non-white race of mankind as classified by teachers having personal knowledge of students in the subject population.

12. Otis-Lennon Mental Ability Test (OLMAT). A standardized easy scoring test of mental ability which can be administered by the teacher or counselor (Otis and Lennon, 1969: 7-9).

13. State Board Test Pool Examination (SBTP). The standardized test used in all states by the state board of nursing to license practical nurses.

14. Young Practical Nursing Student. An individual between 17 and 36 years of age enrolled in an approved practical nursing program.

Factors Measured by Standardized Instruments

The standardized tests used in this study were the General Aptitude Test Battery (GATB), Otis-Lennon Mental Ability Test (OLMAT), and the

State Board Test Pool Examination (SBTP). A discussion of factors measured by each test and a brief description of each follows.

GATB. The General Aptitude Test Battery, published by the United States Department of Labor, one of the most widely used standardized tests to screen applicants for practical nursing (Shimberg, 1972: 46). Dvorak, Droege, and Seiler described the nine vocational aptitudes measured by GATB in an early report (1965: 137). The Manual for the USTES...described all of the aptitudes measured. The four specific aptitudes which were measured for prospective licensed practical nurses until 1971, as described in the manual, are as follows:

G. General Learning Ability. Ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. This portion is closely related to doing well in school.

V. Verbal Aptitude. Ability to understand meaning of words and ideas associated with them, and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. The ability to present information or ideas clearly.

Q. Clerical Perception. Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation.

K. Motor Coordination. Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Probably related to reaction time (1970).

In a personal interview with Holloman (1974), the researcher was told that, in January, 1972, two of the four aptitudes used to select practical nursing candidates were deleted. These were Verbal Aptitude (V) and Motor Coordination (K). They were replaced by Numerical Aptitude and Manual Dexterity (1974). The Manual for the USTES... describes these as:

N. Numerical Aptitude. Ability to perform arithmetic operations quickly and accurately.

M. Manual Dexterity. Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions (1970).

The two aptitudes used continuously over a period of time to select practical nursing candidates with GATB were General Learning Ability (G) and Clerical Perception (Q) (Holloman, 1974). GATB (G) reflected scores made on arithmetic reasoning, vocabulary, and three-dimensional space (Thorndike and Hagen, 1969: 353-357). GATB (Q) measured clerical perception according to the Manual for the USTES... (1970).

Criteria established by the United States Department of Labor indicated that occupational norms were established on the basis of minimum

qualifying scores for each of the significant aptitude measures which, in combination, predicted job performance. When planning a test development study, the United States Department of Labor indicated that the experimental sample should be as large as possible. A larger sample produces greater confidence. National test norms should be established only on final samples of at least 60 persons. Thirty persons must be selected from a minority group and 30 persons selected from a non-minority group (1973: 22).

Norms for L.P.N.'s on the GATB were established on New York City residents in 1964 for the test and in 1969 for the criterion of supervisory rating with the Descriptive Rating Scale. The sample in New York consisted of 94 L.P.N.'s of which 90 were female and 4 were male. According to the U. S. Department of Labor's Technical Report..., the estimated minority was 71 blacks and 11 Spanish-Americans. Twelve (12) were non-minority (1970). The group used to establish these norms seemed to vary from the previously stated criteria of 30 from non-minority.

In a review of GATB, Weiss indicated that GATB norms were in need of revision (1972: 1055-1061). Weiss gave recognition to a current belief that GATB was the best researched of available multiple aptitude tests but indicated that GATB had not kept up with the times (1972). In summarizing the review of GATB, Weiss (1972: 1061) pointed out that:

> Because of its large amount of validity data, it should be useful to vocational counselors; but it suffers from stagnation which limits its usefulness in many situations.

Several studies indicated that the subscore, G, of GATB was a significant predictor of success in practical nursing. Two examples of these were cited in Meadow (1964: 222-229) and King, Pitts, and Weber (1969). The earlier study by Meadow indicated that the GATB subscore G was an important variable in predicting success on SBTP and job performance (1964: 224). Meadow further reported a positive significant relationship between the National League for Nursing Pre-Admission and Classification Examination (PACE) scores and GATB (G) (1964: 224-226). PACE was not used in the present study because this test was considered to be out of date by its publishers (Sachs, 1973). Later research by King, et al., confirmed Meadows' earlier findings regarding GATB (G) as a predictor of success for practical nursing candidates on SBTP (1969).

Traxler conducted a study to discover the power of GATB to predict academic success in selected vocational subjects. Greater predictive validity was found in subject areas in which success was more dependent upon manual abilities than verbal ones. The predictive validity was comparable for males and females (1966: 970-A).

Although practical nursing has a large component of nursing skills which require manual abilities, this vocation also has a large basic component which requires general mental abilities. Potential candidates for practical nursing need such abilities and skills as being able to reason with or to manipulate verbal, symbolic, and figural concepts. These mental abilities are basic to interpreting technical literature, nursing care

plans, and physicians' orders. Communication with patients, associates, and other members of the health team is dependent upon certain basic mental abilities. Another example in which the practical nurse needs general mental abilities is exemplified in the use of arithmetic reasoning to perform basic skills such as calculating dosages for drugs.

The practice of providing actual scores to vocational and other schools was changed by the United States Employment Testing Service in January 1972. Results of GATB are made available to practical nursing programs in the form of one of three possible letters--H, M, and L. The letter H indicates that the individual's scores are equal to or greater than those of workers judged to be successful in the job. The letter M means that the candidate's scores are closely related to workers considered to be successful on that job, however, the probability of success is somewhat less than that for the person in the H category. The letter L means that the candidate's scores are similar to those of workers found to be unsuccessful on the job. The aptitude scores required for the category of H are described as follows by the United States Department of Labor:

1. G---87 plus 1 SE^m 6 = 93
2. N---80 plus 1 SE^m 6 = 86
3. Q---85 plus 1 SE^m 9 = 94
4. M---80 plus 1 SE^m 11 - 91 (U. S. Department of Labor, Introduction to Employment... (1973: 22).

Lesser scores are required for M and L categories. In general, G scores ranging from 90 to 120 were recorded on previous practical nursing students in Norfolk. In the opinion of the writer, omission of actual scores on the GATB report deprives admission committees of one apparently valid predictor of success in practical nursing.

Verbal Aptitude scores for individuals taking GATB for entrance into practical nursing programs were not available at this time. As stated earlier, use of the Verbal Aptitude portion was deleted in 1972. Not having information regarding verbal ability included in the composite letter report deprives admission committees of valuable information needed to make a decision regarding acceptance or non-acceptance of candidates. A study by Johnson of the relationship of certain cognitive and non-cognitive variables in relation to practical nursing success found that GATB (V) had a positive correlation with achievement in six out of the ten courses in the total practical nursing curriculum. The verbal scale correlated significantly with the overall theoretical average for the sample of practical nursing students (1973: 150). Elimination of Verbal Aptitude scores in the practical nursing, GATB profile, and a change in reporting policy, served as reasons for studying another measure of general mental ability to use as a guide regarding the selection of practical nursing students.

As stated earlier, research has indicated that the general learning ability (G) portion of GATB was a significant predictor of success in

practical nursing. GATB (G) scores have been compared with scores of OLMAT as predictors of success on the licensing examination in this study.

OLMAT. The Otis-Lennon Mental Ability Test, according to Grotelueschen, represents the fourth major edition in the Otis series which dates back to 1918. The original edition of the Otis series was the first group test of mental ability designed primarily for educational use. The fourth edition, published in 1969, perpetuated the practical characteristics of its predecessors in regards to ease and speed of both administration and scoring. Raw scores are easily convertible to DIQ with its related percentile rank and stanine scores by use of the Norms Conversion Booklet (1969: 111).

Authors of the test indicate that OLMAT was designed to provide a comprehensive assessment of the general mental ability of pupils in American schools. Special emphasis was placed on measuring the pupil's facility to reason and to deal abstractly with verbal, symbolic, and figural test content. This series was constructed to measure the general intellective ability factor, intelligence, (Otis and Lennon, 1967: 4) or the examinee's ability to reason with or manipulate verbal, symbolic, and figural concepts (1969: 13).

Otis and Lennon indicated that OLMAT was composed of four factors. They were:

1. Verbal comprehension consists of items designed to measure

synonym-definition, opposites, sentence completion, and scrambled sentences. Thirty-one percent of the items in the portion of the advanced level of OLMAT are purported to measure verbal comprehension.

2. Verbal reasoning is composed of verbal analogies, verbal classification, inference, logical selection, and word-letter matrix. Thirty-one percent of the items in the advanced level are purported to measure verbal reasoning.

3. Figural reasoning includes items developed to measure figure analogies, series completion, and pattern matrix. Nineteen percent of the items in the advanced level are purported to measure figural reasoning.

4. Quantitative reasoning consists of number series and arithmetic reasoning. Nineteen percent of the items in the advanced level are purported to measure quantitative reasoning (1969: 9-11).

The OLMAT can be administered to a group of students by the teacher or the counselor in 45 to 50 minutes with 40 minutes of working time for students. Responses can be made on the test booklet, IBM805 answer sheets, IBM1230 answer sheets, Digitek answer sheets or Norfolk Public Schools answer sheets. Harbor Answer Cards (special data processing cards developed by Harcourt Brace Jovanavich, Inc.) may be used also (1969: 9-11). The answer sheets can be scored by hand or machine (1967: 5). A single score is obtained which can be considered as an index or verbal-educational g (1969: 8).

National norms for the Otis-Lennon Mental Ability Test were based upon the testing of nearly 200,000 students in 117 school systems from all 50 states. A stratified random-cluster sampling procedure was used to yield a representative sample of the school population of the nation in grades K-12. One important variable used in the stratification was a composite socioeconomic index (1967: 5).

Reviews of the OLMAT indicated that the validity research was wide-ranging and abundant data was provided. Based on reported statistical data, the test can be expected to be a reliable measure of general mental ability (verbal-educational) (Buros, 1972: 689-693). A review by Grotelueschen reported that the sample was representative of the K-12 population in the United States and that the test was a direct measure of scholastic success (1969: 111-113).

The theoretical framework of OLMAT, found in Vernon's hierarchical theory of human abilities, was based on Spearman's g factor (Otis and Lennon, 1969: 7-9). This factor was derived by Charles Spearman, a British psychologist, who believed that man had a basic general mental factor (g). Vernon structured human mental abilities in a hierarchy with a broad general factor, Spearman's g, at the apex (Stanley and Hopkins, 1972: 333-335). Otis and Lennon used the top of Vernon's hierarchy with Spearman's g factor at the apex. Spearman's theory that a single common factor of intelligence is basic to the inter-correlations between psychological tests did not entirely satisfy the

designers of GATB. The technical information for GATB, published by the United States Department of Labor in its Manual for the General Aptitude Test Battery, Section III: Development, indicates that there is a relationship between Spearman's theory and the development of GATB (1967: 9).

In using the g factor of intelligence, Otis and Lennon used the two broad components of verbal-educational and practical-mechanical abilities. Minor group factors are found immediately below the two major components of verbal-educational and practical-mechanical. The Otis-Lennon series divides the verbal-educational section into verbal comprehension, verbal reasoning, figural reasoning, and quantitative reasoning (1967: 7-9).

SBTP. The State Board Test Pool Examination was a norm-reference test used to license practical/vocational nurses throughout the United States and Canada. Licensure examinations purport to measure minimum, safe, and effective practice for the beginning nurse (Hecht, 1973: 5).

In Becker's opinion, when society considers it important to its welfare that members of specific groups abide by rules or have certain knowledge, society imposes such rules. People consider it important for those who practice the healing arts to abide by certain rules. For this reason, the state licenses physicians, nurses, and others who engage in healing arts (1963: 16-17).

Shimberg, Esser, and Kruger found that the SBTP examination used for licensing practical nurses was one of the few tests used nationally for licensure purposes which was uniform in nature and prepared by specialists in test construction. Their study regarding the impact of licensing practices on the availability and mobility of nonprofessional manpower in occupations with skill shortages was initiated in 1967 by the Manpower Department of Labor (1972: 31).

Shimberg and associates summarized the procedure followed in the development of licensing examinations for nurses throughout the United States. A planning committee, composed of representatives who are selected on a rotating basis from all states, prepared a test plan based on previous design and current nursing practice. State boards of nursing, on a rotating basis, nominated qualified practical nursing educators to write items for possible inclusion in the licensing examination. Working in committees composed of approximately six members, the item writers, under the guidance of testing experts from the racially integrated staff of the National League for Nursing's Evaluation Services, developed questions in their nursing specialty. These questions were based on the Test Plan adopted by the Committee on Blueprint (See Appendix A). This process was an on-going one with new item writers coming in regularly. The items were assembled into test booklets for each state board of nursing to review. This review process was not a rubber-stamp procedure. Individual boards made comments regarding each item on the proposed test (1972: 31-33).

Shimberg further reported that all comments and suggestions by the state boards of nursing were analyzed by the N.L.N. staff. A preliminary form of the new test was assembled and administered to applicants writing the current licensing examination throughout the United States. An item analysis was done on the results to determine which items should be deleted. Only those items surviving this analysis were printed in the next standardized edition of the licensing examination for state boards of nursing to use (1972: 31-33). The length of time for a new series to be used for licensing purposes was influenced by security measures involving test administration throughout the United States.

The norms for each licensing examination were based on the results obtained from a large sample population of candidates writing the examination for the first time. This sample was taken from a representative cross section of the states. The raw scores were converted to standard scores with a national mean of 500 and a standard deviation of 100. Each state decided upon its minimum qualifying score. All except a few states selected 350 as the minimum (Shimberg, 1972: 31-33).

Licensing

Inadequacies in the written portion of the large number of other licensing tests studied by Shimberg and his associates were found to lack planning, over-reliance on essay tests, poor quality multiple-choice questions, and a failure to analyze results. The licensing examination for

nurses (SBTP) seemed relatively free of these inadequacies, according to Shimberg and associates (1972: 194-197).

A discussion of licensure and licensing examinations should give consideration to current related concerns. The original intent of licensing laws was protection of the public from incompetent practitioners. Forni believed that the same public interest was causing licensure practices to be the target of public dismay and controversy (1973: 17-23). Criticism of testing during the past decade, the civil rights movement, especially in regards to discriminatory practices of hiring and occupational access, and the rapid growth of jobs requiring licensure contributed to the current controversy, according to Hecht (1973: 7).

The possibility existed that occupational licensing examinations would be considered discriminatory in that they could exclude an individual completely from working in the occupational area for which he has been trained. The social and legal pressures which were previously focused on private employers to demonstrate use of fair employment practices may be expected to be directed to licensing boards in the future (Shimberg, et al., 1972: 202).

Although some controversy existed and could increase regarding licensing examinations, the decision was made to use the SBTP for L.P.N.'s and/or L.V.N.'s as the criterion of success as being the best measure available. The nature of the development and standardization procedure was a definite positive factor (Shimberg, et al., 1972: 106). Also, the fact

that an ongoing process of validation was conducted each time the examination was given influenced the researcher's decision (Sachs: 1973).

Recommendations to improve occupational licensing procedures to insure equal opportunities were excerpted from those made by Shimberg and associates. The purpose for including these was to strengthen the justification for using the licensing examination as the main criterion of success. Comparing these suggestions with the current practices of licensing boards responsible for licensure of practical/vocational nurses revealed that most of these suggestions were, in fact, already being done. Shimberg, et al., recommended that testing procedures for licensing various professions be improved by using professionals in the testing field for such services as job analysis, test specifications, item writing, directions for administration, scoring procedures, grading standards, item analysis, test analysis, and validity studies. Most of these recommendations have been a part of the licensing process of practical/vocational nurses since 1946 (Shimberg, 1972: 212-214).

In the opinion of this writer, two weak areas existed in the licensing procedure for L.P.N.'s/L.V.N.'s. One weak area pertained to job analysis. The last national job analysis for practical nurses was done in 1946 and should be updated. A second weak area involved validity studies to demonstrate a positive relationship between test results and job performance.

An adaptation of the Descriptive Rating Scale, used by the U. S. Department of Labor in connection with the GATB to evaluate workers, was used by Wrigley to compare scores of 107 L.P.N.'s on the licensing examination with their performance. The study revealed no significant relationship between the licensing examination and performance on the job (1968).

Basic Decision Theory. Decision theory served as a small portion of the conceptual theoretical framework of this study. Statistical decision theory, as developed by Abraham Wald in 1950, dealt mainly with quality control of industrial products. Special emphasis was placed on the decisions needed in the inspection and quality control of industrial products (Anastasi, 1968: 133-134). Cronbach and Gleser worked out the implications of decision theory for the construction and interrelation of psychological tests (1965: 1-6). Anastasi considered decision theory to be the conversion of the decision making process into mathematical form in order to use all available information to reach the most effective decision (1968: 134). Abdellah, et al., indicated that making a decision was one step in the problem solving process. Decision making regarding the selection of candidates for practical nursing involved the two minimal choices, acceptance or rejection. A third choice, based on the numerical outcome of psychological testing, was the recommended treatment of further schooling. Thus, decisions must be made regarding the disposition of

applications from prospective practical nursing students.

Cronbach and Gleser concluded that the two types of decisions in which tests were involved are institutional and individual. In an institutional decision, a large number of comparable decisions are made such as screening applicants and classifying military recruits. A relatively constant value system or philosophy serves as a basis for institutional decision making (1965: 7-9).

According to Cronbach and Gleser, a strategy was a rule for arriving at a decision. A strategy should state what the decision maker will do in a variety of contingencies. For example, one admissions committee might say, when given information that the individual was a high school graduate, that the terminal decision was to accept. If the individual were not a high school graduate, the terminal decision to reject was made. A strategy implies a conscious policy which guides the decision (1965: 19-21).

Kerlinger concluded that decision making often was associated with validity, especially criterion-related validity. Decisions regarding the selection of potentially successful candidates for business, industry, education, and other areas frequently involved the use of test scores for predictive purposes. Decisions regarding the admission of an applicant to college were made on the basis of academic aptitude. Such use of test scores placed them in an important category and made the predictive validity of test scores of prime importance (1973: 460-461).

Test Validity. The definition of validity was closely interwoven with the purpose or aim of the instrument (Ahmann and Glock, 1971: 266). Isaac and Michael indicated that the intended use of a test determined the kind of evidence required. The aim of a test dictated evidence. The nature and meaning of the involved variables were included also in the study of validity (1971: 85).

Kerlinger said that the most common definition of validity was embraced in answer to the question: Are we measuring what we purport to be measuring (1973: 457)? As an example, a teacher designed a practical nursing test to measure the student's ability to organize nursing care for a mother and newborn infant. The teacher developed a test containing items involving the knowledge of procedures for such care. The test was not valid since it did not measure the component under consideration which was organization of nursing care. However, if the teacher had intended to measure the student's knowledge of procedures basic to the organization of nursing care, she would probably have had a more valid instrument. Kerlinger wrote that a test or scale was valid when it was used for the scientific or practical purpose for which it was intended by the user (1973: 457).

Decisions made regarding the selection of potential practical nursing candidates included information relating to scores from academic aptitude tests. If the predictive validity of the tests being used was important for college candidates, then the predictive validity of tests used

to predict success in other educational programs was equally as important. The question of the validity of scores on GATB (G) and OLMAT as predictors of success on SBTP for practical nursing candidates was the topic of this study. Decisions regarding all candidates should be made by teachers, counselors, and administrators in practical nursing programs. Results obtained from measures of general mental ability form an integral part of the decision making process. Test results, when considered together with other pertinent information, increase the likelihood of making a wiser decision about the candidate's current academic ability.

Skills and Abilities Needed by Practical Nursing Candidates for Norfolk City Schools. As mentioned earlier in this study, some of the skills and abilities needed by potential practical nursing candidates were the ability to reason with or manipulate verbal, symbolic, and figural concepts in order to interpret technical literature, nursing care plans, and doctors' orders, communicate with patients and associates, and use arithmetic reasoning to perform basic skills such as calculating dosages for drugs and converting from one system of measurement to another.

A condition of health conducive to performing such physical activities as walking, standing for long periods of time, and lifting patients was required. A report of the physical condition of the applicant was obtained by the candidate from his/her physician. Evidence of high school graduation, as shown by an official secondary education transcript,

or successful scores on a high school equivalency test was required. A personal interview was conducted with each candidate for the purpose of obtaining relevant information about the individual and to provide information about the practical nursing program to the candidate. During the interview, the applicant's apparent ability to relate to another person in conversation was considered. Information about the need for financial assistance and possible sources of same were discussed. The daily requirements of the practical nursing program as well as the candidate's responsibilities in his/her home were discussed in order to facilitate arrangements for possible conflicts prior to entry. The age of the candidates could range from 17 to 55 years.

Basic Assumptions. Situation type multiple choice items on SBTP measured the practical nursing candidate's ability to reason with or manipulate verbal, symbolic, and figural concepts regarding nursing. If verbal comprehension, verbal reasoning, figural reasoning, and quantitative reasoning were necessary for the practical nursing candidate to be successful on the licensing examination prior to practicing as a L.P.N., then the relationship between OLMAT and SBTP scores should be significant. If ability with arithmetic reasoning, vocabulary, and three-dimensional space were necessary for the practical nursing candidate to be successful on the licensing examination prior to practicing as a L.P.N., then the relationship between GATB (G) and SBTP should be

significant. The interrelationship between OLMAT and GATB (G) also should be significant. If OLMAT and GATB (G) were relatively free of age and racial bias, the relationships between these variables and the criterion of SBTP should not be significant.

Past research indicated that increased age improved the likelihood of success in practical nursing. If age had this effect, then the mature practical nursing student would succeed to a greater extent than the young student.

Limitations of the Study. A number of limitations were recognized in this study. A major limitation was that the characteristics of the subject population limited generalization. Another limiting factor pertained to use of SBTP as the criterion of success. Ideally, performance of L.P.N.'s on the job would be a better criterion of success. The facts that (1) the practical nurse must pass the licensing examination before going on the job as a L.P.N. and (2) the methodology used to prepare, standardize, and revise the national licensing examination served to justify use of SBTP scores.

Prescreening of applicants for selection could be considered as a limiting factor. Only those candidates who met certain requirements were admitted to practical nursing programs. This selection procedure tended to classify the subjects.

Another important factor which could not be controlled was

personal motivation of the individual student. Coupled with the student's motivation was the teacher's ability to teach some students more effectively than others.

Socioeconomic factors pertaining to subjects were not included in this study.

Hypotheses. The problem will be written as three primary hypotheses. Secondary hypotheses pertaining to the demographic variables of race and age will be stated. The paradigm will serve as a guide for stating hypotheses.

Primary Hypothesis 1. (PH1) There is a positive relationship between scores of practical nursing students on OLMAT and SBTP.

Primary Hypothesis 2. (PH2) There is a positive relationship between scores of practical nursing students on GATB (G) and SBTP.

Primary Hypothesis 3. (PH3) The contribution by OLMAT is higher than GATB (G) as a predictor of success on SBTP for all subgroups.

Secondary Hypotheses

1. (SH1) There is a positive relationship between scores of Caucasian practical nursing students on OLMAT and SBTP.

1.A. (SH1.A) There is a positive relationship between scores of young, Caucasian practical nursing students on OLMAT and SBTP.

1.B. (SH1.B) There is a positive relationship between scores of mature, Caucasian practical nursing students on OLMAT and SBTP.

2. (SH2) There is a positive relationship between scores of non-Caucasian practical nursing students on OLMAT and SBTP.

2.A. (SH2.A) There is a positive relationship between scores of young, non-Caucasian practical nursing students on OLMAT and SBTP.

2.B. (SH2.B) There is a positive relationship between scores of mature, non-Caucasian practical nursing students on OLMAT and SBTP.

3. (SH3) There is a positive relationship between scores of Caucasian practical nursing students on GATB (G) and SBTP.

3.A. (SH3.A) There is a positive relationship between scores of young, Caucasian practical nursing students on GATB (G) and SBTP.

3.B. (SH3.B) There is a positive relationship between scores of mature, Caucasian practical nursing students on GATB (G) and SBTP.

4. (SH4) There is a positive relationship between scores of non-Caucasian practical nursing students on GATB (G) and SBTP.

4.A. (SH4.A) There is a positive relationship between scores of young, non-Caucasian practical nursing students on GATB (G) and SBTP.

4.B. (SH4.B) There is a positive relationship between scores of mature, non-Caucasian practical nursing students on GATB (G) and SBTP.

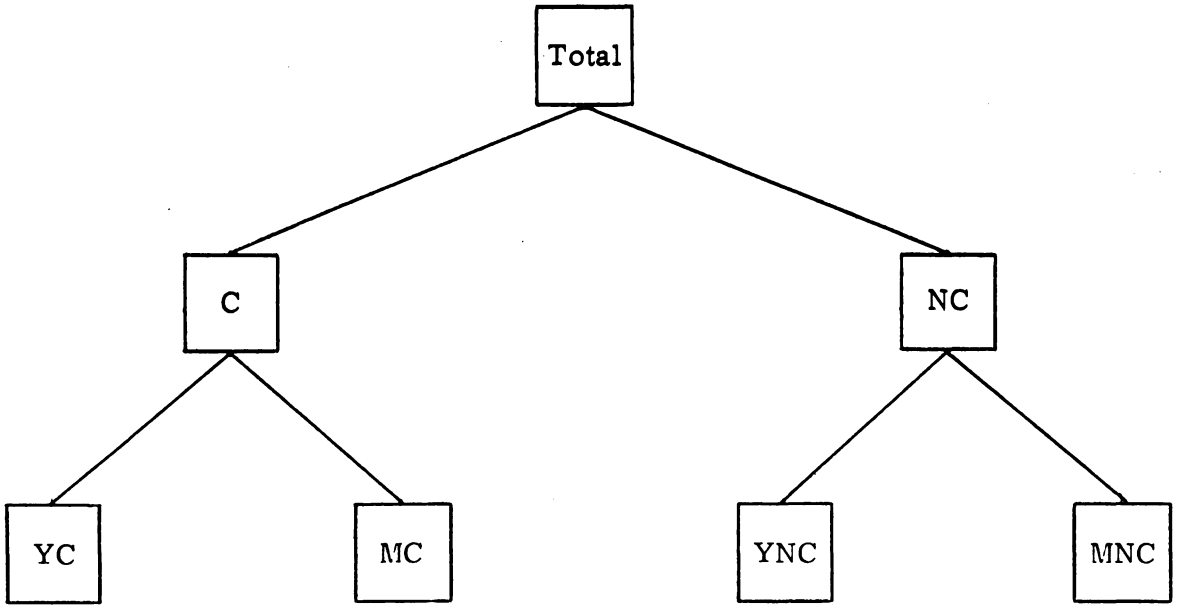

Figure 1

Illustration of Total Group and Breakdown into Sub-Groups

Legend:

NC	(Non-Caucasian)
C	(Caucasian)
YNC	(Young Non-Caucasian)
MNC	(Mature Non-Caucasian)
YC	(Young Caucasian)
MC	(Mature Caucasian)

In summary, the Otis-Lennon Mental Ability Test and General Aptitude Test Battery (G) were studied as predictors of success on SBTP for practical nursing candidates. The background of the problem, with emphasis on the need, was stated in this chapter. The theoretical framework, consisting of definition of terms, factors measured by the standardized instruments, basic decision theory, test validity, skills and abilities needed by practical nursing candidates, basic assumptions with interrelationships, and limitations, culminated in the primary and secondary hypotheses.

Chapter 2

REVIEW OF RELATED LITERATURE

A large portion of the review of literature was interdigitated in places which seemed more appropriate in other chapters. For example, Chapter 1 of this study was rich with references which appeared to be more relevant within that context than in a separate chapter. Pertinent research regarding professional nursing, practical nursing, as well as OLMAT and GATB was included in this chapter.

Professional Nursing

Studies relevant to this research effort were more numerous in professional nursing than in practical nursing. Many studies have been done using a variety of variables to predict success on the licensing examination for registered nurses. A recent example was seen in the work of Muhlenkamp, who used a combination of predictors at Marquette University School of Nursing. College Board Scholastic Aptitude Test (SAT) and English test scores, grades in specific nursing subjects and in a developmental psychology course, college grade point averages, and National League for Nursing Achievement Test scores were used as predictors. The most significant predictors were used to develop regression equations applicable to that university. The findings were

utilized as an aid in selection of nursing students at that university (1971: 57).

Exemplary studies involving other standardized tests used in professional nursing studies having significant relationship to OLMAT were discussed by Otis and Lennon. When the advanced level of OLMAT was compared with California Achievement Tests, correlation coefficients of 0.60 on spelling, 0.82 on reading comprehension, 0.75 on arithmetic, and 0.85 on total reading were obtained (1969: 29).

Studies investigating predictor variables, using the California Achievement Tests, were conducted at the Los Angeles County School of Nursing by Hayney, Michael, and Jones (1959: 641-643), Hayney, Michael, and Jones (1962: 389-392), Michael, Hayney, and Gershon (1963: 817-821), Michael, Hayney, and Brown (1965: 579-584), and Michael, Hayney, and Jones (1966: 1035-1040). The stated purpose for all of these studies was to develop a selection battery which would aid the admissions committee and faculty to reduce the 40 percent attrition rate. High school grade point average, scores on California Reading and Mathematics Achievement Tests, GATB, Survey of Space Relations Ability, Cattell's Sixteen Personality Factor Questionnaire, and Edward's Personal Preference Schedule were the predictor variables. The criteria for success were theory grades in nursing and related courses and ratings on clinical performance. Freshmen students in the three-year diploma program were the subjects. The number of students in each study varied from 82 to 118. The investigators cited

previously reported the highest degree of predictability for academic success was found in the California Reading and Mathematics Achievement Tests.

Practical Nursing

Three early predictive studies were conducted at the School of Practical Nursing, Indianapolis Public Schools. One study by Layton was designed to demonstrate that improved selection and counseling procedures would reduce attrition among practical nursing students. Age, mental aptitude, marital status, home responsibilities, and previous years of formal education were the predictor variables. A total of 895 students admitted between 1950 and 1957 was included. The number failing to complete the course was 248. The forerunner of OLMAT, the Otis Quick-Scoring Mental Ability Test, was used to determine mental aptitude. The median I.Q. for the continuing group was 92.8 and, for those who left the program, the median I.Q. was 85.6. The licensure score for Indiana was raised in 1953. As a result, the faculty increased the I.Q. cutoff score required for entrance. The subjects admitted before 1953 were placed in Group I and those enrolled after that date were placed in Group II. The report did not indicate the numbers in each group. The correlation between academic achievement in the practical nursing program and SBTP scores for Group I was a negative 0.17. A positive correlation of 0.62 was reported for Group II. No significant difference between the two groups was found in

relation to other variables. The purpose of the study to demonstrate that improved selection procedures would reduce the attrition rate was not accomplished (1959: 12-13).

The second study, conducted in the School of Practical Nursing in Indianapolis, was done by Rowan to study the impact of age and past formal education upon scholastic achievement. Rowan divided the students into two groups. Group A was composed of high school graduates ranging in age from 17 to 25 years. Group B consisted of those students between the ages of 30 and 59 years who had completed two years of high school or less. I.Q. scores and honor points achieved during the preclinical portion of the program were compared. The median I.Q. of Group B was three points higher than that of Group A. The honor point mean for Group B was 75.1 and, for Group A, the honor point mean was 61.2. The investigator concluded that older students with less formal education achieved beyond younger students with greater formal education (1959: 13-14).

Grubbs conducted the third study in Indianapolis to investigate the relationship between home responsibilities and class rank of 50 practical nursing students. The presence of dependent children, aged parents, and/or an ill spouse constituted home responsibilities. Students with home responsibilities achieved a mean course grade of 94.8 and those without such responsibilities attained a mean course grade of 81.6. These results suggested that other factors such as personal motivation and need

may have influenced the outcome. Grubbs did not discuss the findings (1960: 21-22).

In a study conducted by Meadow in 1961 in Detroit, the relationships between 27 predictor variables and seven criterion variables were investigated. The sample consisted of 236 practical nursing students enrolled between September 1957 and March 1959. GATB was one of four standardized tests used. Age, marital status, aptitude, and vocational interest were some of the predictor variables. Success criteria were final grades, achievement test scores, SBTP scores, clinical grades, and ratings by supervisors after employment. GATB was one of the three best predictors of academic success. The other two were the Psychological Corporation Entrance Examination (PCEE) and the National League for Nursing's Pre-Admission and Classification Examination (PACE). PACE was out of date, as mentioned earlier, and research regarding PCEE follows this review. Age and marital status were related significantly to academic success in that the older, married students excelled (1961).

Bailey compared practical nursing students' previous work experience, mental ability, and previous school achievement with achievement in the nursing program. The sample was composed of 405 students, selected from 34 practical nursing programs in Iowa and Illinois, who enrolled in practical nursing programs in 1965. High school rank, previous work experience, the Otis Quick-Scoring Mental Ability Test scores, and PACE scores were used as predictor variables. Classroom grades, clinical

achievement, and patient relationship were used to indicate achievement during the program. Clinical achievement and patient relationship were not defined nor was the method of measurement described. Correlation coefficients between the predictor and criterion variable indicated that high school rank had a low but significant correlation with classroom grades, clinical achievement, and SBTP scores. Otis and PACE test scores were significantly related to classroom grades and SBTP scores. The only predictor variable which had any significant relationship to patient relationship was high school rank, which had a coefficient of low magnitude (1968).

An unpublished dissertation most relevant to this study was done by Sister Rosalie M. Sitzmann on the validity of the Psychological Corporation's Entrance Examination (PCEE) as a predictor of success in academic work and on SBTP. The coefficient of correlation between verbal ability scores and SBTP scores was 0.58. Reading ability and success had a correlation coefficient of 0.47. Based on these findings, she concluded that use of PCEE should improve the selection of potentially successful applicants (1970).

The predictive validity of the California Test of Mental Maturity, the California Reading Test, the California Test of Personality, and age were investigated by Seither as indicators of success in the Hannah Harrison School of Practical Nursing in Washington, D. C. Success on SBTP and on the job were used as criteria of success. The reading test had a

significant positive relationship at the .01 level with achievement test scores, SBTP, and final theory grade. Age had a positive relationship with academic measures and the final clinical evaluation. An investigation of the predictor variables, using a pass-fail dichotomy in relation to selection measures, failed to predict success (1971).

A practical selection scheme for choosing practical nursing students in Virginia was developed by Weber, King, and Pitts, based on the PACE (1972: 48-52). Earlier research by King indicated that GATB subscores G and V were predictors of success in practical nursing (1969: 4).

One of the few studies in which race was identified was done by Atwood on 61 white women who took the Henmon-Nelson Test of Mental Ability. The correlation between the scores on this test and SBTP was 0.053 (1967: 70). The study did not include scores on non-Caucasians.

In a study of the relationships between cognitive and interest variables with practical nursing achievement, Johnson found that cognitive aptitude measures were probably more effective in predicting student success in practical nursing programs than interest or personality tests. Johnson joined Meadow (1964) in confirming the positive relationship between the PACE scores and achievement (1973: 148-153).

Related Areas

GATB. Review of related literature revealed numerous studies regarding the predictive validity of GATB. Selected studies most

pertinent to this investigation were cited as examples. Some studies and other information about GATB were discussed earlier in the first chapter and will not be repeated here.

Sullivan investigated the effectiveness of GATB as a screening device for vocational-technical programs in community colleges. Evidence collected led to the conclusion that GATB was an effective screening instrument. Prediction equations using three or four GATB scores indicated that they were practical and effective devices for screening and counseling students. Sullivan concluded that G and V subscores of GATB were the two best predictors of success (1968: 2502-3A).

Another study of the relationship between GATB scores and achievement of vocational students indicated a significant relationship between actual scores on GATB and course grades. The subjects in that study consisted of 810 eleventh grade students enrolled in six school districts in the first semester of 1964-1965 (Tate, 1966: 1672A).

One study done to determine the validity of GATB's predictive value in identifying students who would be successful in Oklahoma Area Vocational-Technical Centers concluded that the GATB was a valid predictive instrument (Sandmann, 1969: 1792A).

OLMAT. Predictive and concurrent validity data on OLMAT compared favorably with those for other instruments according to Thorndike and Hagen (1969: 668). In one validation study to determine

whether OLMAT was a valid measure of scholastic aptitude and to determine its suitability for a wide range of pupils, Burkhalter compared scores from this instrument with those of the Kuhlmann-Anderson Test of Academic Potential and Stanford Achievement Tests. A total of 632 third grade pupils in ten different elementary schools constituted the sample. The investigator concluded that OLMAT had no sex bias and was a valid measure of scholastic aptitude for third grade pupils (1969: 1812A).

Both male and female students entered practical nursing although the number of males was small. Students from varying backgrounds also enrolled. Research indicated that OLMAT had no sex bias and was effective for a wide range of third grade pupils. Recognition was made of the fact that this research was done on third grade pupils. Consideration was given to the variable of race of the adults in this study.

Proger, et al., reported that they had obtained evidence which indicated the Otis-Lennon series was as effective a predictor of verbal and numerical achievement as the Stanford Achievement Test. OLMAT appeared to be at least as effective as the Lorge-Thorndike Intelligence Test and the Metropolitan Readiness Test in predicting success with arithmetic. The investigators pointed out that more validity studies were needed (1971: 529-538). The need for further validation studies, especially for the advanced level, seemed evident.

DIQ's obtained on the Otis-Lennon Mental Ability Test were used in conjunction with teacher predictions, mathematics grades, and the

Orleans-Hanna Algebra Prognosis Test to predict algebra achievement by Hanna, et al. The sample consisted of 1,105 high school students in six states. DIQ's surpassed mathematics grades and teacher predictions in predicting algebra achievement test scores. The researchers concluded that use of mental ability test scores and teacher predictions may be less effective in predicting grades with tests when past student grades are included in the prediction (1969: 903-907).

Practical nursing students were required to use basic arithmetic and some algebra in calculating drug dosages. Research indicated that OLMAT scores (DIQ's) had a positive relationship to success in algebra. Some portion of the licensing examination for practical nurses generally was devoted to calculation of dosages. Therefore, one could assume that OLMAT scores would have a positive relationship to scores obtained on the licensing examination.

Breuer used the Attitude Scale of Gough, Harris, Martin, and Edwards to select one group of highly prejudiced and one group of minimally prejudiced white students. The two groups were pre-tested and post-tested with different forms of the Otis-Lennon Tests of Mental Ability. Each post-test examiner administered the Otis-Lennon Test of Mental Ability to a group composed of the two levels of racially prejudiced students. Results of the study indicated that examiner's race had no adverse effect on the group testing program (1970: 3259A).

Scores from the Otis-Lennon Test of Mental Ability were compared

with scores from the Torrance Tests of Creative Thinking and the California Test of Mental Maturity by Cox. Significant relationships of verbal ability and arithmetic reasoning were found between the mental ability tests (1970: 214A).

In summary, many studies in professional nursing were done to predict success on the licensing examination. California Achievement Tests were significant predictors of success in professional nursing. California Achievement Tests had a significant correlation with OLMAT. Studies in practical nurse education indicated older students with less formal education achieved beyond younger ones with more formal education. Practical nursing students with home responsibilities were more successful in theory than those with fewer responsibilities. Scores from GATB, PCEE, and PACE related significantly to academic success as did age and marital status. Otis and PACE test scores were significantly related to SBTP scores and theory grades. Academic failure was found to head the list as a cause of attrition in practical nursing programs.

Prediction equations using GATB subscores were found to be effective and practical in vocational-technical programs for selection and counseling. A significant relationship between GATB scores and achievement of vocational students was found.

OLMAT scores were found to compare favorably with the predictive and concurrent validity of other comparable instruments. OLMAT compared favorably with algebra achievement test scores.

Practical nursing students were required to use basic arithmetic and some algebra in addition to reading skills. Both OLMAT and GATB (G) measured reading and arithmetic.

Chapter 3

METHODOLOGY

This chapter contains a discussion of the sources of data needed to test the hypotheses and the procedure used to gather and analyze the data.

Sources of Data

Approval to conduct this investigation was obtained from the Director of Adult and Vocational Education and Department Chairmen of respective divisions of practical nursing in Norfolk Public Schools. Personal conferences were held with the Department Chairmen to explain the purpose of this investigation and to determine which student records contained scores from both OLMAT and GATB (G) tests.

Information regarding the sex, age, OLMAT scores, GATB (G) scores, and SBTP scores was obtained from individual records in the home office. Data regarding the racial background were secured by personal interviews with practical nursing educators who had taught each student during the one-year program. The format used to obtain data regarding race is in Appendix B. The teacher was provided the graduate's name, age, and graduation date. She was asked to place a check in either Column A or B to indicate the graduate's race according to the stated definition. Infor-

mation regarding race was not recorded in the student's final record during the period of time covered by this study.

Use of GATB was instituted in the practical nursing program of Norfolk City Schools in 1961. Thus, GATB (G) scores were available for all students in the sample.

Baseline data for the sample originated with the first adult practical nursing students entering the practical nursing programs sponsored by Norfolk City Schools after use of OLMAT was initiated. The first two adult classes entering the one-year practical nursing programs at Leigh Memorial Hospital and Norfolk General Hospital in March 1969 marked the beginning of the sample. All students entering the Leigh Memorial program from March 1969 to March 1971 were included in this study. In 1971, the Leigh Memorial program was merged with Norfolk Technical Vocational Center to become the Central School of Practical Nursing. During this period of time, 139 adults were enrolled and 111 graduated from the Leigh Memorial school. Practical nursing students enrolled in the Norfolk General division between March 1969 and March 1972 were included in the sample. GATB (G) scores were no longer made available to educational programs after January 24, 1972. From March 1969 to March 1972, 232 adults were enrolled and 136 graduated from the Norfolk General program. The first adult class from the Central School of Practical Nursing started in September 1971 and was included in the sample. The last class in that division for which GATB (G) scores were available was enrolled in March

1972. During this period of time, 70 adults were enrolled and 61 graduated from the Central School of Practical Nursing. The grand total of enrollees was 441 and the grand total of graduates in the sample was 308. Missing data for three of the graduates further reduced the final sample to 305 individuals. See composition of sample in Appendix C.

A majority of the practical nursing students lived in and around Norfolk, the largest city in Virginia. The city had a population of 307,951 in 1970, according to the federal census. Norfolk was composed of many transient families, being a seaport city. Racial composition, by families, was approximately 74.1% Caucasian and 25.9% non-Caucasian in 1973 (Division of State Planning and Community Affairs, Projections and Economic Base Analysis: 1971). The racial composition of the public schools was approximately 49.5% Negro, 1.0% American Indian, 0.4% Spanish surnamed, 0.8% Oriental, and 49.2% white in 1973 (ESEA, Title I Program Overview, Section C: 1973). Assuming the population of the practical nursing program to be representative of the general population of Norfolk, one would expect a variety of ethnic backgrounds. Therefore, Caucasians and non-Caucasians were identified in the sample.

Students in each of the practical nursing programs experienced the same basic curriculum or educational treatment. The curriculum was developed by the practical nursing educators in Norfolk and adopted by them in 1969. The same fundamental curriculum, with a few revisions to up-date behavioral objectives, content, and learning experiences, was

used for each class. A copy of the master curriculum is included in Appendix D.

Descriptions of the standardized tests, OLMAT and GATB, were included in Chapter 1. In addition to information already presented regarding SBTP examination in Chapter 1, a copy of the blueprint for developing licensing examinations for practical nurse licensure is included in Appendix C. This blueprint was used by the item writers and test designers of SBTP. The test plan was made available to schools of practical nursing during the time period of this study.

Methods of Procedure

Information regarding age, OLMAT scores, GATB (G) scores, and SBTP scores was obtained from the students' permanent record folders and data regarding racial background was obtained by personal interviews with previous teachers. These data were keypunched on data cards in the Computer Center of Norfolk Public Schools.

The total group, consisting of 305 subjects, was divided into six sub-groups based on age and race. Correlations, means, and standard deviations for the total group were obtained with a computer program for stepwise regression analysis. Critical values of the correlation coefficients were obtained from Glass and Stanley (1970: 536). In this analysis, correlation coefficients were obtained for each sub-group between OLMAT and SBTP and between GATB (G) and SBTP scores.

Regression Analysis was utilized because the title of this study, "The Otis-Lennon Mental Ability Test and General Aptitude Test Battery (G) as Predictors of Success on State Board Test Pool Examination for Practical Nursing Candidates," indicated the applicability of this method.

The first step in the analysis was to examine Primary Hypotheses 1 and 2. After determining that a significant positive relationship existed between OLMAT and SBTP scores, Primary Hypothesis 1, and between GATB (G) and SBTP scores, Primary Hypothesis 2, the researcher proceeded to test Primary Hypothesis 3.

Primary Hypothesis 3 called for a comparison of two correlation coefficients for the same sample.

Ferguson presented a formula to test the difference between r_{12} and r_{13} under these conditions. A t value was calculated for each sub-group using the formula (1971: 171).

Formula 1.

$$t = \frac{(r_{12} - r_{13}) \sqrt{(N-3)(1+r_{23})}}{\sqrt{2(1-r_{12}^2-r_{13}^2-r_{23}^2+r_{12}r_{13}r_{23})}}.$$

The obtained values and related degrees of freedom were used to enter Table D. Percentile Points of t - Distributions (Glass and Stanley, 1970: 521) to determine significance.

Further investigation of Primary Hypothesis 3 was performed by obtaining beta values. Kerlinger indicated that beta weights were regression weights used to predict with standard scores and called

standard partial regression coefficients. The effects of variables were held constant except for the one to which the weight applied (1973: 624-625). Beta weights were used to express the change in SBTP due to change in OLMAT and GATB (G) held constant and to express the change in SBTP due to change in GATB (G) with OLMAT held constant. Statistical significance of the beta values was interpreted with the F ratio by entering a table of percentile points of F-distribution (Glass and Stanley, 1970: 522-526).

Related questions such as whether there was a significant difference between the OLMAT and SBTP correlation coefficients for Caucasians and non-Caucasians prompted further study. This analysis necessitated the comparison of correlation coefficients from two groups. In this examination, the researcher transformed the correlation coefficients to Fisher's Z statistic using Table G (Downie and Heath, 1970: 319). In order to test difference between coefficient correlations, the investigator determined the differences between the Z's using the formula given below (Downie and Heath, 1970: 234).

Formula 2. $$Z = \frac{Z_1 - Z_2}{S_{DZ}}$$

In this formula, S_{DZ} was the standard error of the difference between the two Z's and was obtained using the following formula from Downie and Heath (1970: 233).

Formula 3. $$S_{DZ} = \sqrt{\frac{1}{N_1-3} + \frac{1}{N_2-3}}$$

An obtained Z value greater than 1.96 was required to indicate a significant difference at the .05 level. (A difference between the two Z statistics indicated a significant difference between the two sample correlation coefficients at the same level.)

Another related question explored was whether any significant difference existed between the scores obtained by Caucasians and non-Caucasians. Investigation of this question was pursued by use of a multivariate analysis of variance computer program.

Kerlinger considered multivariate analysis to be one of the most important statistical analysis, especially in the areas of education and bahavioral sciences. He described multivariate analysis as a general term referring to a family of analytic methods having the chief characteristic of analyzing simultaneously both dependent and independent variables (1973: 149).

In summary, the data were obtained from permanent records of students and interviews with previous teachers. The analysis consisted of calculating correlation coefficients, examining the significance of these correlation coefficients, and comparing those coefficients, using correlated and uncorrelated techniques, as the case required. The results of these analyses will be presented in Chapter 4.

Chapter 4

PRESENTATION AND ANALYSIS OF DATA

Introduction

This chapter contains a presentation of the descriptive and inferential statistics resulting from the analyses described in the previous chapter. These results are presented in three sections:

Section I presents univariate difference analysis to test significance differences between group means on OLMAT, GATB (G), and SBTP.

Section II deals with the use of multivariate analysis of variance (MANOVA) to test differences between group mean scores when all variables were considered simultaneously.

Section III contains the correlational analysis of scores for all groups on the three variables.

The presentation in this chapter related the findings to previously stated hypotheses and pertinent related questions. Overall conclusions and implications will be presented in Chapter 5.

Section I--Univariate Difference Analysis

Section I presents univariate difference analysis to test significance of differences between the means of Caucasians and non-Caucasians; young Caucasians and mature Caucasians; young non-Caucasians and mature

non-Caucasians; and mature individuals with young individuals.

The means and standard deviations for the total group and the sub-groups for OLMAT are presented in Table I. F ratios obtained when comparing groups are included also.

Table I

Means, Standard Deviations, and F Ratios for OLMAT

Groups	N	Mean	S.D.	df	F Ratio
1. Total	305	100.58	9.39		
2. Caucasian	251	102.08	9.11	1 and 303	40.95**
3. Non-Caucasian	54	93.36	7.30		
4. Young Caucasian	198	102.70	8.93	1 and 249	4.45**
5. Mature Caucasian	53	99.75	9.52		
6. Young Non-Caucasian	45	93.44	6.88	1 and 052	0.14
7. Mature Non-Caucasian	9	94.44	9.60		
8. Young	243	100.99	9.32	1 and 303	2.27
9. Mature	62	98.98	9.64		

*Significant at .05 level
**Significant at .01 level

The mean score of Caucasians on OLMAT was 102.08 and non-Caucasians had a lesser mean of 93.66. Comparison of scores for Caucasians with non-Caucasians for the total sample revealed an F ratio of 40.95 with 1 and 303 degrees of freedom which is significant at the .01 level.

Young Caucasians had a greater mean of 102.70 on OLMAT than mature Caucasians with a lesser mean of 99.75. Further analysis revealed an F ratio of 4.45 which was significant at the .01 level with 1 and 249 degrees of freedom.

The mean score for young non-Caucasians was 93.44 and for mature non-Caucasians was 94.44 on OLMAT. Further analysis of the scores produced an F ratio of 0.14. This ratio was not significant at the .05 level with 1 and 52 degrees of freedom.

The mean score obtained for the young group on OLMAT was 100.99 and 98.98 for the mature group. The F ratio of 2.27 with 1 and 303 degrees of freedom indicated no significance at the .05 level.

In summary, the F ratio obtained when comparing the means for Caucasian and non-Caucasian groups indicated that these two samples were significantly different from each other in regards to OLMAT scores. The obtained F ratios when the means of young Caucasians and mature Caucasians were compared indicated that these two groups were significantly different from each other based on OLMAT scores.

Young non-Caucasian and mature non-Caucasian groups were similar to each other when their means on OLMAT were compared with the F test. The young and mature sample populations were similar to each other when their means on OLMAT were compared with the F test.

Further inspection of Table I indicated that three groups obtained a mean on OLMAT which was greater than the mean for the entire subject population. These three groups were Caucasians, young Caucasians, and young practical nurse candidates. Groups achieving a mean less than the mean of 100.58 for the total sample were non-Caucasians, mature Caucasians, young non-Caucasians, mature non-Caucasians and mature students. This initial observation could lead to the tentative conclusion that Caucasians and young persons do better on OLMAT than non-Caucasians and mature individuals. This observation should not be construed to indicate that OLMAT was a better predictor than GATB (G) for Caucasians and young practical nursing students.

Table II contains the means and standard deviations obtained for each of the groups in the sample on GATB (G). F ratios obtained when comparing groups are included also.

Table II

Means, Standard Deviations, and F Ratios for GATB (G)

Groups	N	Mean	S.D.	df	F Ratio
1. Total	305	106.52	10.79		
2. Caucasian	251	107.83	10.71		
				1 and 303	22.29**
3. Non-Caucasian	54	100.44	8.98		
4. Young Caucasian	198	107.74	10.55		
				1 and 249	0.06
5. Mature Caucasian	53	108.15	11.37		
6. Young Non-Caucasian	45	100.62	9.08		
				1 and 052	0.10
7. Mature Non-Caucasian	9	99.56	8.93		
8. Young	243	106.42	10.65		
				1 and 303	0.10
9. Mature	62	106.90	11.40		

*Significant at .05 level
**Significant at .01 level

Caucasians had a mean score of 107.83 on GATB (G) as compared with 100.44 for non-Caucasians. Further analysis revealed an F ratio of 22.29 which is significant at the .01 level with 1 and 303 degrees of freedom.

The mean score for young Caucasians was 107.74 and for mature Caucasians was 108.15 on GATB (G). Further analysis of the scores produced an F ratio of 0.06. This ratio was not significant at the .05 level with 1 and 249 degrees of freedom.

The mean score for young non-Caucasians was 100.62 and for mature non-Caucasians it was 99.56 on GATB (G). The F ratio of 0.10 indicated no significance at the .05 level with 1 and 52 degrees of freedom.

The mean score obtained by the total young group on GATB (G) was 106.42 and 106.90 for the total mature group. The F ratio of 0.10 with 1 and 303 degrees of freedom was not significant at the .05 level.

In summary, the F ratio obtained when comparing the means for Caucasian and non-Caucasian groups indicated that these two sample populations were significantly different from each other based on GATB (G) scores.

Young Caucasian and mature Caucasian groups were similar to each other when their means on GATB (G) were compared by use of the F test. Young non-Caucasian and mature non-Caucasian groups were similar to each other when their GATB (G) means were compared. Young

and mature groups revealed a similarity when compared with each other on GATB (G).

Further analysis of Table II indicated that four groups obtained a mean on GATB (G) which was higher than the mean for the total subject population. Caucasians, young Caucasians, mature Caucasians, and mature subjects attained a mean higher than 106.52. Non-Caucasians, young non-Caucasians, mature non-Caucasians, and young subjects obtained means less than 106.52. The reader could have expected the means for non-Caucasians to be higher than for Caucasians since GATB was standardized on a group comprised predominantly of non-Caucasians.

The means and standard deviations for SBTP for the total group and each sub-group are presented in Table III. F ratios obtained when comparing groups were included also.

Table III

Means, Standard Deviations, and F Ratios for SBTP

Groups	N	Mean	S.D.	df	F Ratio
1. Total	305	567.19	73.68		
2. Caucasian	251	576.55	70.01	1 and 303	24.66**
3. Non-Caucasian	54	523.69	75.36		
4. Young Caucasian	198	567.20	70.72	1 and 249	17.86**
5. Mature Caucasian	58	611.47	55.13		
6. Young Non-Caucasian	45	519.06	77.58	1 and 052	1.01
7. Mature Non-Caucasian	9	546.78	61.63		
8. Young	243	558.28	74.28	1 and 303	18.46**
9. Mature	62	602.08	60.14		

*Significant at .05 level
**Significant at .01 level

The mean score of Caucasians on SBTP was 576.55 and non-Caucasians had a mean of 523.69. When comparing scores for the total sample, the researcher found an F ratio of 24.66 with 1 and 303 degrees of freedom. This F ratio was significant at the .01 level.

Mature Caucasians had a greater mean of 611.47 on SBTP than young Caucasians with a lesser mean of 567.20. Further analysis revealed an F ratio of 17.86 with 1 and 249 degrees of freedom which was significant at the .01 level.

The mean score for young non-Caucasians was 519.06 and for mature non-Caucasians the mean was 546.78. Further analysis of the scores produced an F ratio of 1.01. This ratio was not significant at the .05 level with 1 and 52 degrees of freedom.

The mean score obtained for the young group on SBTP was 558.28 and 602.08 for the mature group. The F ratio of 18.46 with 1 and 303 degrees of freedom indicated significance at the .01 level.

In summary, the F ratio obtained when comparing the means for Caucasian and non-Caucasian groups indicated that these two sample populations were significantly different from each other based on SBTP scores. Young Caucasian and mature Caucasian groups were significantly different from each other when compared on SBTP scores. The F ratio obtained when comparing the means of young and mature sample populations indicated that these two groups were significantly different from each other in regards to SBTP scores.

Young non-Caucasian and mature non-Caucasian groups were similar to each other when their means on SBTP were compared by use of the F test.

Comparison of means obtained by various sub-groups on SBTP revealed that four groups exceeded the mean for the total subject population. The means for Caucasians, young Caucasians, mature Caucasians, and mature subjects exceeded 567.19. Non-Caucasians, young non-Caucasians, mature non-Caucasians, and young subjects obtained means less than the mean for the total group. The same four groups achieved higher means on GATB (G) as on SBTP. The same four groups had lesser means on both GATB (G) and SBTP. This tentative observation should not be construed to indicate that GATB (G) is a better predictor for these four groups than OLMAT.

Table IV presents a summary of significant group means on the three standardized instruments. Two different sample groups were paired to test significant differences between group means.

Table IV

Summary Table of Significant Group Means

Groups	F Ratio, OLMAT	F Ratio, GATB (G)	F Ratio, SBTP
1. Caucasian and non-Caucasian	Significant **	Significant **	Significant**
2. Young Caucasian and mature Caucasian	Significant**	Not Significant	Significant**
3. Young non-Caucasian and mature non-Caucasian	Not Significant	Not Significant	Not Significant
4. Young and mature	Not Significant	Not Significant	Significant**

*Significant at .05 level
**Significant at .01 level

Comparison of means, as shown in Table IV, for the following groups produced F ratios which were significant at the .01 level for OLMAT:

1. Caucasian and non-Caucasian
2. Young Caucasian and mature Caucasian.

Comparison of means for GATB (G) resulted in a significant F ratio between Caucasian and non-Caucasian. F ratios significant at the .01 level were obtained on SBTP for the following groups:

1. Caucasian and non-Caucasian
2. Young Caucasian and mature Caucasian
3. Young practical nurses and mature practical nurses.

The F ratio pertaining to the means of Caucasians and non-Caucasians was significant at the .01 level on all three instruments. This consistency did not continue when age was introduced as a factor.

Further comparison of means for sub-groups revealed that Caucasians and young Caucasians obtained means on each instrument higher than the mean for the total group. Mature Caucasians had means greater than that for the total group on GATB (G) and SBTP. It was interesting to note that the highest mean for any group on SBTP was obtained by mature Caucasians. Non-Caucasians, young non-Caucasians and mature non-Caucasians had means lower than the mean obtained by total groups on OLMAT, GATB (G), and SBTP respectively.

In conclusion, this section has included a report of the univariate analysis of differences between the means of Caucasians and non-Caucasians and other sub-groups on OLMAT, GATB (G) and SBTP.

Section II--Multivariate Difference Analysis

Multivariate analysis of variance (MANOVA) was used to determine difference between group mean scores when all variables were considered simultaneously. The researcher wanted to ascertain if there were any significant differences between the mean scores of Caucasians and non-Caucasians on the same instruments. Also, was there any significant difference between the scores of mature and young subjects on the same measure? The three variables--OLMAT, GATB (G), and SBTP--were considered simultaneously to determine differences between groups previously divided according to age and race.

Taking these three variables together to compare Caucasians and non-Caucasians produced a multiple F of 16.91. Having 3 and 301 degrees of freedom, this F value indicated significance at the .01 level. The contribution of OLMAT to the multiple F was 0.90, GATB (G) was 0.66, and SBTP was 0.69. These component variable values indicate that OLMAT contributed the maximum amount toward separation of Caucasians and non-Caucasians in this sample.

Breakdown of the total sample into young Caucasians and mature Caucasians resulted in a multiple F of 11.40 with 3 and 247 degrees of

freedom. This value was significant at the .01 level. Contributions by OLMAT, GATB (G), and SBTP respectively were -0.36, 0.04, and 0.72. These values indicate that SBTP scores made the maximum contribution toward separating young and mature Caucasians.

An analysis of the scores of young non-Caucasians and mature non-Caucasians produced a multivariate F of 0.48 with 3 and 50 degrees of freedom. This value was not significant.

Comparison of scores of young and mature students in the sample produced a multiple F of 10.65. Having 3 and 301 degrees of freedom, this F value indicated significance at the .01 level. OLMAT's contribution was -0.27, GATB (G)'s was .06, and SBTP's was 0.76. These component variable values indicated that SBTP made the greatest contribution toward separation of the total number of young and mature persons.

A summary of MANOVA results for pairs based on race and age is presented in Table V.

Table V

Summary of MANOVA Results for Pairs of Groups
Based on Race and Age

Groups	Multiple F	df	OLMAT's Contribution	GATB (G)'s Contribution	SBTP's Contribution
1. Caucasian and non-Caucasian	16.91**	3 and 301	0.90	0.66	0.69
2. Young Caucasian and mature Caucasian	11.40**	3 and 247	0.36	0.04	0.72
3. Young non-Caucasian and mature non-Caucasian	0.48	3 and 50	0.30	-0.26	0.83
4. Young and mature	10.65**	3 and 301	-0.27	.06	0.76

**Significant at .01 level

In summary, the combined scores of OLMAT, GATB (G), and SBTP, as indicated in Table V, made a contribution which was significant at the .01 level toward separation of Caucasians and non-Caucasians; young Caucasians and mature Caucasians; and young students and mature students. The two groups not separated by the multiple scores were the young non-Caucasians and mature non-Caucasians.

Caucasians obtained significantly different combined scores on OLMAT, GATB (G), and SBTP from non-Caucasians. Young subjects obtained significantly different combined scores from mature subjects on OLMAT, GATB (G), and SBTP.

OLMAT contributed the greatest amount toward separation of Caucasians and non-Caucasians. SBTP contributed the maximum amount toward separating young and mature Caucasians as well as the combined total of young and mature students.

The contribution of GATB (G) separating paired groups was not significant.

Section III--Correlational Analysis

Correlational analysis was used to investigate primary and secondary hypotheses discussed in Chapter 3.

Correlation coefficients between scores for the OLMAT, the GATB (G), and the SBTP for the total group and sub-groups included in the hypotheses are presented in Table VI. Levels of significance as they relate to critical values necessary for significance at the .01 level were provided also.

Correlation coefficients obtained for each group in the sample when comparing OLMAT with SBTP and GATB (G) with SBTP are presented in Table VI. Hypotheses relating directly to these coefficients and the critical values necessary for significance at the .01 and .05 levels are included also. Table VI contains the correlation coefficients between OLMAT and GATB (G).

Table VI

Correlation Coefficients and Levels of Significance for All Groups as Related to Hypotheses

Groups		OLMAT with SBTP	GATB (G) with SBTP	OLMAT and GATB (G)	Critical Value Necessary for Significance		Hypotheses
					.01 Level	.05 Level	
1. Total	305	.369**	.363**	.678**	.254	.195	PH1, PH2 & PH3
2. Caucasian	251	.302**	.338**	.658**	.254	.195	SH1, SH3 & PH3
3. Non-Caucasian	54	.326*	.195	.584**	.354	.273	SH2, SH4 & PH3
4. Young Caucasian	198	.330**	.305**	.622**	.254	.195	SH1.A, SH3.A & PH3
5. Mature Caucasian	53	.461**	.548**	.814**	.354	.273	SH1.B, SH3.B & PH3
6. Young Non-Caucasian	45	.394**	.220	.571**	.372	.288	SH2.A, SH4.A & PH3
7. Mature Non-Caucasian	9	.013	.087	.684	.798	.666	SH2.B, SH4.B & PH3
8. Young	243	.399**	.336**	.648**	.254	.195	
9. Mature	62	.432**	.538**	.806**	.325	.211	

*Significant at .05 level
**Significant at .01 level

Primary Hypothesis 1. Primary hypothesis 1 stated that there was a positive relationship between scores of practical nursing students on OLMAT and SBTP.

Table VI showed that the correlation coefficient between OLMAT and SBTP scores for the total group was .369. A critical value of .254 was necessary for significance at the .01 level. Based on this information, the null hypothesis that there was no relationship between OLMAT and SBTP was rejected. Alternatively, primary hypothesis 1 was supported.

Acceptance of PH1 indicated that OLMAT scores and SBTP scores were correlated for the total group in this sample.

Secondary Hypothesis 1. Secondary hypothesis 1 stated that there was a positive relationship between scores of Caucasian practical nursing students on OLMAT and SBTP.

The correlation coefficient between OLMAT and SBTP for Caucasians was shown to be .302 in Table VI. This value exceeded the critical value of .254 needed for significance at the .01 level. The null hypothesis that there is no relationship between the two variables was rejected. Secondary hypothesis 1 was supported following rejection of the null hypothesis.

Acceptance of this hypothesis indicated that OLMAT scores predicted success on SBTP for Caucasians.

Secondary Hypothesis 1.A. Secondary hypothesis 1.A stated that there was a positive relationship between scores of young Caucasian practical

nursing students on OLMAT and SBTP.

The correlation coefficient, as shown in Table VI for young Caucasians, was .330. This value exceeded the required critical value for significance at the .01 level of .254. The null hypothesis, indicating no relationship between OLMAT and SBTP scores for young Caucasian practical nursing students, was rejected. Rejection of the null hypothesis resulted in confirmation of secondary hypothesis 1.A.

Acceptance of hypothesis 1.A indicated that OLMAT scores and SBTP scores were correlated for young Caucasians in the sample.

Secondary Hypothesis 1.B. According to secondary hypothesis 1.B, there was a positive relationship between scores of mature Caucasian practical nursing students on OLMAT and SBTP.

Table VI showed that the correlation coefficient between OLMAT and SBTP for mature Caucasians was .461. The critical value necessary for significance at the .01 level was .354. Finding an observed correlation coefficient greater than the table value resulted in rejection of the null hypothesis. Alternatively, secondary hypothesis 1.B was accepted.

Acceptance of this hypothesis indicated that OLMAT scores and SBTP scores were correlated for mature Caucasians in this sample.

Secondary Hypothesis 2. Secondary hypothesis 2 stated that there was a positive relationship between scores of non-Caucasian practical nursing students on OLMAT and SBTP.

The correlation coefficient for non-Caucasian practical nursing students was .326. The critical value necessary for significance at the .01 level of .354 was not reached. The critical value for significance at the .05 level of .273 was exceeded. Based on this information, the null hypothesis that there was no relationship between scores of OLMAT and SBTP for non-Caucasians was rejected. Consequently, secondary hypothesis 2 was supported at the .05 level of significance.

Accepting secondary hypothesis 2 indicated that there was a positive correlation between scores of non-Caucasian practical nursing students on OLMAT and SBTP at the .05 significance level.

Secondary Hypothesis 2.A. Secondary hypothesis 2.A stated that there was a positive relationship between scores of young non-Caucasian practical nursing students on OLMAT and SBTP.

The observed correlation coefficient for young non-Caucasians was .394. The critical value necessary for significance at the .01 level was .372. The null hypothesis was rejected since the observed coefficient was greater than the table value. Alternatively, secondary hypothesis 2.A was substantiated.

Acceptance of hypothesis 2.A indicated that there was a positive correlation between scores of young non-Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 2.B. Secondary hypothesis 2.B stated that there was a positive relationship between scores of mature non-Caucasian practical nursing students on OLMAT and SBTP.

According to Table VI, the correlation coefficient for this group was .013. The critical value necessary for significance at the .01 level was .798 and .666 at the .05 level. The null hypothesis that there was no relationship between scores of mature non-Caucasian practical nursing students on OLMAT and SBTP was retained. Hence, secondary hypothesis 2.B was not supported.

Rejection of secondary hypothesis 2.B suggested that there was no significant relationship between scores of mature non-Caucasian practical nursing students in this sample on OLMAT and SBTP.

The small number of observations in the sub-group makes it unwise to generalize this finding to a larger population.

In summary, there was a significant positive relationship between scores of OLMAT and SBTP for Caucasians, young Caucasians, mature Caucasians, non-Caucasians, and young non-Caucasians as summarized in Table VI. The relationship was not significant for mature non-Caucasians.

Primary Hypothesis 2. According to primary hypothesis 2, there was a positive relationship between scores of practical nursing students on GATB (G) and SBTP.

Table VI showed that the correlation between GATB (G) and SBTP

for the total group was .363. The critical value necessary for significance at the .01 level was .254. Based on this information, the null hypothesis that there was no relationship between GATB (G) and SBTP was rejected. Alternatively, primary hypothesis 2 was confirmed.

These findings indicated that GATB (G) scores and SBTP scores were correlated for the total group in this sample.

Secondary Hypothesis 3. Secondary hypothesis 3 stated that there was a positive relationship between scores of Caucasian practical nursing students on GATB (G) and SBTP.

Table VI showed that the correlation coefficient between GATB (G) and SBTP for Caucasians was .338. A critical value of .254 was necessary for significance at the .01 level. The null hypothesis that there was no relationship between GATB (G) and SBTP for Caucasians in this sample was rejected. Alternatively, secondary hypothesis 3 was accepted.

Acceptance of this hypothesis indicated that GATB (G) scores and SBTP scores were correlated for Caucasians in this sample.

Secondary Hypothesis 3.A. According to secondary hypothesis 3.A, there was a positive relationship between scores of young Caucasian practical nursing students on GATB (G) and SBTP.

The obtained correlation coefficient, as indicated in Table VI, was .305. The critical value needed for significance at the .01 level was .254.

Based on this information, the null hypothesis that there was no relationship between scores of young Caucasians in this sample on GATB (G) and SBTP was rejected. The alternate secondary hypothesis 3.A was confirmed.

Accepting this hypothesis indicated that GATB (G) scores and SBTP scores were correlated for young Caucasians in this group.

Secondary Hypothesis 3.B. Secondary hypothesis 3.B stated that there was a positive relationship between scores of mature Caucasian practical nursing students on GATB (G) and SBTP.

Table VI showed the obtained correlation coefficient between these two variables was .548. A critical value of .354 was needed to indicate significance at the .01 level. Using this information, the decision was made to reject the null hypothesis that there was no relationship between GATB (G) and SBTP for mature Caucasians in this sample. Alternatively, secondary hypothesis 3.B was accepted.

Acceptance of this hypothesis indicated that GATB (G) scores and SBTP scores were correlated for those mature Caucasians included in this sample.

Secondary Hypothesis 4. Secondary hypothesis 4 stated that there was a positive relationship between scores of non-Caucasian practical nursing students on GATB (G) and SBTP.

According to Table VI, the correlation coefficient between GATB (G) and SBTP for this group was .195. The critical value necessary for signifi-

cance at the .01 level was .354 and .273 at the .05 level. Thus, the obtained coefficient was not greater than the table value for either level of significance. Based on this information, the null hypothesis that there was no relationship between scores of non-Caucasians in this group on GATB (G) and SBTP was not rejected. Secondary hypothesis 4 was not supported.

Finding no evidence to support this hypothesis indicated that GATB (G) scores did not correlate with SBTP scores for non-Caucasian practical nursing students.

Secondary Hypothesis 4.A. According to secondary hypothesis 4.A, there was a positive relationship between scores of young non-Caucasian practical nursing students on GATB (G) and SBTP.

Table VI showed that the correlation coefficient between these two variables was .220. The critical value needed for significance at the .01 level was .372 and .288 at the .05 level. Based on this information, the decision was made to reject the null hypothesis that there was no relationship between scores of young non-Caucasians in this group on GATB (G) and SBTP. Evidence was not obtained to support secondary hypothesis 4.A.

Finding no evidence to support this hypothesis indicated that GATB (G) scores did not correlate with SBTP scores for young non-Caucasian practical nursing students in this sample.

Secondary Hypothesis 4.B. Secondary hypothesis 4.B stated that there was a positive relationship between scores of mature non-Caucasian

practical nursing students on GATB (G) and SBTP.

As shown in Table VI, the correlation coefficient between these two variables was .087. The critical value necessary for significance at the .01 level was .798 and .666 at the .05 level. The null hypothesis that there was no relationship between scores of mature non-Caucasian practical nursing students on GATB (G) and SBTP was not rejected. Secondary hypothesis 4.B was not supported.

Finding no evidence to support this hypothesis indicated that GATB (G) scores did not correlate with SBTP scores for this group of mature non-Caucasian practical nursing students.

The correlation between scores of mature non-Caucasian practical nursing students on GATB (G) and SBTP was not significantly different from 0 at the .05 level. The small number in this group was again emphasized.

In summary, there was a significant positive relationship between scores of GATB (G) and SBTP as shown in Table VI for Caucasians, young Caucasians and mature Caucasians. The correlation between scores of GATB (G) and SBTP for non-Caucasians, young non-Caucasians and mature non-Caucasians was not significant. One could conclude that there was no statistical relationship between GATB (G) scores and SBTP scores for this total group of non-Caucasians and sub-groups of non-Caucasians.

A summary of the findings indicating the groups for which OLMAT and GATB (G) had a significant relationship with SBTP scores is presented in Table VII. OLMAT scores had a significant relationship with success on SBTP for all groups except the mature non-Caucasians. Attention was again called to the small number of nine in this group. GATB (G) scores had a significant relationship with SBTP scores for the total group and all sub-groups of Caucasians. GATB (G) scores did not have a significant relationship with SBTP scores for any of the non-Caucasian groups in this sample.

Table VII

Summary of Findings Regarding Significant Relationships
of OLMAT and GATB (G) Scores with SBTP Scores

Groups	OLMAT	GATB (G)
1. Total	Significant at .01 level	Significant at .01 level
2. Caucasian	Significant at .01 level	Significant at .01 level
3. Non-Caucasian	Significant at .05 level	Non-Significant
4. Young Caucasian	Significant at .01 level	Significant at .01 level
5. Mature Caucasian	Significant at .01 level	Significant at .01 level
6. Young Non-Caucasian	Significant at .01 level	Non-Significant
7. Mature Non-Caucasian	Non-Significant	Non-Significant
8. Young	Significant at .01 level	Significant at .01 level
9. Mature	Significant at .01 level	Significant at .01 level

Primary Hypothesis 3. Primary hypothesis 3 stated that a contribution by OLMAT was higher than GATB (G) as a predictor of success on SBTP for all sub-groups. The difference between the correlation coefficients of SBTP and OLMAT, SBTP and GATB (G), and OLMAT and GATB (G) was compared with a t test presented in Formula 1 in Chapter 3. The t values are presented in Table VIII.

Regression coefficients of OLMAT and GATB (G) on SBTP were computed. The beta values and standardized beta values are given in Table IX.

Table VIII

Values of t Obtained When Comparing Correlation Coefficients of OLMAT and SBTP with GATB (G) and SBTP

Groups	t Value
1. Total	.142
2. Caucasian	-.733
3. Non-Caucasian	1.080
4. Young Caucasian	.430
5. Mature Caucasian	1.210
6. Young Non-Caucasian	1.320
7. Mature Non-Caucasian	0.350
8. Young	1.848
9. Mature	-1.553

The t test, according to Ferguson (1971: 171), was used to test the difference in the amount of contribution by OLMAT and GATB (G) on the SBTP measure. The t values of various groups were given in Table VIII. The t value of .142 for the total group was not significant, indicating that the null hypothesis of the same amount of contribution should not be rejected. The obtained value of t for the total group of Caucasians was -.733, .430 for young Caucasians, and 1.210 for mature Caucasians. The t value for the entire group of non-Caucasians was 1.080, young non-Caucasians had a value of 1.320, and mature non-Caucasians had a t value of .350. The obtained t values of all sub-groups did not reach the level of 1.99 and were not significant.

In summary, the t test indicated that the difference between the correlation coefficients for OLMAT and GATB (G) for each group was not significant.

Further investigation was performed by obtaining the beta values as described in Chapter 3. The beta values and standardized beta values are given in Table IX.

Table IX

Beta Values and Standardized Beta Values of OLMAT and GATB (G) on SBTP with Related F Values

Groups	N	B OLMAT	B GATB (G)	Beta (B*) OLMAT	Beta (B*) GATB (G)	F OLMAT	F GATB (G)
1. Total	305	1.784	1.428	0.2273	0.2090	10.028**	8.483**
2. Caucasian	251	1.0741	1.6108	0.1399	.2464	3.143*	9.754**
3. Non-Caucasian	54	3.3311	.0498	0.323	.0059	3.922*	0.001
4. Young Caucasian	1.98	1.8179	1.0876	0.2294	0.1623	7.201**	3.602*
5. Mature Caucasian	53	0.2565	2.4813	0.0443	0.5116	0.0472	6.302**
6. Young Non-Caucasian	45	4.4925	-.0648	0.3984	-0.0076	5.321**	0.002
7. Mature Non-Caucasian	9	-.5697	1.0228	-0.0888	0.1482	0.0255	0.0709
8. Young	243	2.4993	.9267	0.3129	0.1328	16.4110**	2.957*
9. Mature	62	-.0326	2.8625	-0.0052	0.5426	0.0008	8.558**

*Significant at .05 level
**Significant at .01 level

The contributions of OLMAT and GATB (G) on SBTP were compared for each sub-group. Standard partial regression coefficients and beta values were obtained. F tests were calculated to determine significance. The beta value on OLMAT for the total group was 0.2090 and the F ratio was 10.028, indicating significance at the .01 level. OLMAT was a significant predictor of success on SBTP.

The beta value of GATB (G) was 0.2090 when OLMAT was held constant for the total group. The F ratio of 8.483 was significant at the .01 level indicating that GATB (G) was a significant predictor of success on SBTP.

OLMAT's standard partial regression coefficient of 0.1399 for the Caucasian sample had an F value of 3.143 which was significant at the .05 level. The contribution of OLMAT as a predictor of success on SBTP was significant for the Caucasian sub-group.

The beta value for Caucasians on GATB (G) was 0.2464 with an F ratio of 9.754 which was significant at the .01 level. This value indicated that GATB (G) made a significant contribution toward predicting success on SBTP.

OLMAT's beta value for non-Caucasians was 0.323 with an F ratio of 3.922 which was significant at the .05 level. The contribution of OLMAT as a predictor of success on SBTP for this subject population was significant.

The standard partial regression coefficient of .0059 for the non-Caucasian sample on GATB (G) had an F value of 0.001 which was not

significant. This indicated that GATB (G) did not make a significant contribution toward predicting success on SBTP for non-Caucasians.

The beta value for young Caucasians on OLMAT was 0.2294 with an F ratio of 7.201 which was significant at the .01 level. This value indicated that OLMAT was a significant predictor of success on SBTP for this subject population.

GATB (G)'s beta value for the young Caucasian group was 0.1623 with an F ratio of 3.602 which was significant at the .01 level. This indicated that GATB (G) made a significant contribution toward predicting success on SBTP.

The standard partial regression coefficient of 0.0443 for the mature Caucasian sample on OLMAT had an F value of 0.0472 which was not significant. This indicated that OLMAT made no significant contribution toward predicting success on SBTP for this group.

The beta value for mature Caucasians on GATB (G) was 0.5116 with an F ratio of 6.302 which was significant at the .01 level. The contribution of GATB (G) as a predictor of success on SBTP was significant for this group.

The beta value for young non-Caucasians on OLMAT was 0.3984 with an F ratio of 5.321 which was significant at the .01 level. This value indicated that OLMAT was a significant predictor of success on SBTP for non-Caucasians in this study.

The standard partial regression coefficient of -0.0076 for the young non-Caucasian group on GATB (G) had an F ratio of 0.002 which was not significant. GATB (G) made no appreciable contribution toward predicting success on SBTP for this group.

OLMAT's beta value of -0.0888 for mature non-Caucasians had an insignificant F ratio of 0.0255. OLMAT was not a significant predictor of success on SBTP for mature non-Caucasians. The beta value of GATB (G) of 0.1482 for mature non-Caucasians had a non-significant F value of 0.0709. GATB (G) was not a significant predictor of success on SBTP for this group. Attention was called again to the small number of nine in this group.

The young group had a beta value of 0.3129 on OLMAT with an F ratio of 16.4110 which was significant at the .01 level. This value indicated that OLMAT was a significant predictor of success on SBTP for this subject population.

The young group had a beta value of 0.1328 on GATB (G) with an F ratio of 2.957 which was significant at the .01 level. This value indicated that GATB (G) was a significant predictor of success on SBTP for the young sample.

OLMAT's beta value for the mature sample was -0.0052 with a non-significant F ratio of 0.0008. OLMAT was not a significant predictor of success on SBTP for the mature subject population.

GATB (G)'s beta value for the mature sample was 0.5426 with an F value of 8.558 which was significant at the .01 level. This ratio indicated that GATB (G) was a significant predictor of success on SBTP for the mature sample.

In summary, an interpretation of the F values relative to the beta values presented in Table IX indicated that OLMAT made a significant contribution toward success on SBTP for the total group, Caucasians, non-Caucasians, young Caucasians, young non-Caucasians, and the young subject population. GATB (G) made a significant contribution toward success on SBTP for the total group, Caucasians, young Caucasians, mature Caucasians, young students and mature subjects.

GATB (G) did not make a significant contribution toward predicting success on SBTP for any of the non-Caucasian groups. OLMAT made a significant contribution toward predicting success on SBTP for non-Caucasians and young non-Caucasians.

Based on information obtained from Table IX, F tests were significant for non-Caucasians on OLMAT and non-significant for GATB (G) for the same group. This tended to show that OLMAT was a better predictor for SBTP than GATB (G) for this subject population.

The F values reported in Table IX indicated that GATB (G) was a better predictor of success on SBTP than OLMAT for mature Caucasians and the entire mature sample.

Based on information reported in Table IX, F tests were significant for Caucasians, young Caucasians, and young students on OLMAT and GATB (G). This tended to show that both instruments were good predictors of success on SBTP for these groups.

Based on information obtained from the t test, the null hypothesis that OLMAT and GATB (G) made similar amounts of contribution as predictors of success on SBTP for all sub-groups was retained. Primary hypothesis 3 was not supported.

Although primary hypothesis 3, stating that the contribution by OLMAT was higher than GATB (G) as a predictor of success on SBTP for all groups, was not supported in its entirety, significant variations based on beta values and F ratios were observed as previously discussed in the summary.

As stated earlier, additional selected pertinent questions were investigated. Was there a significant difference between the correlation coefficients of Caucasians and non-Caucasians? Young Caucasians and young non-Caucasians? Mature Caucasians and mature non-Caucasians? Young and mature practical nurse candidates?

The Z values obtained with Formulas 2 and 3, given in Chapter 3 to compare correlation coefficients of different groups, are summarized in Table X.

Table X

Z Values Between (1) OLMAT and SBTP
and (2) GATB (G) and SBTP

Groups	(1) OLMAT and SBTP	(2) GATB (G) and SBTP
1. Caucasian and Non-Caucasian	.1948	1.006
2. Young Caucasian and Young Non-Caucasian	-.411	.535
3. Mature Caucasian and Mature Non-Caucasian	-1.13	1.05
4. Young and Mature	-.005	-1.74

*Significant at .05 level
**Significant at .01 level

The value of Z, obtained when comparing the correlation coefficients for Caucasians and non-Caucasians between OLMAT and SBTP, was .1948, as summarized in Table X. The value of Z, obtained on the same groups for GATB (G) and SBTP, was 1.006. The value of Z, obtained for young Caucasians and young non-Caucasians utilizing the OLMAT and SBTP correlation coefficient, was -.411. The value of Z, obtained on the same groups for GATB (G) and SBTP, was .535. The Z value for mature Caucasians and mature non-Caucasians for OLMAT and SBTP was 1.113, and for GATB (G) and SBTP the Z value was 1.05. The value of Z, obtained for young practical nurse candidates and mature candidates for OLMAT and SBTP, was -.005 and for GATB (G) and SBTP the Z value was -1.74.

A level of 1.96 was required for significance at the .05 level. None of the Z values reached the required level of significance. Finding no significant Z values indicated no statistical difference between sub-groups separated according to race and age when correlation coefficients were compared.

In summary, findings of the Z tests indicated no significant difference between correlation coefficients for OLMAT with SBTP and GATB (G) with SBTP for the following four pairs:

1. Caucasians and non-Caucasians
2. Young Caucasians and young non-Caucasians
3. Mature Caucasians and mature non-Caucasians
4. Young and mature.

The correlation coefficients for the paired groups did not differ significantly.

The purpose of this chapter was to present the descriptive and inferential statistics derived from the analyses outlined in Chapter 3. The data presented was analyzed and interpreted in relation to the previously stated hypotheses. Additional pertinent questions were investigated. A summary, conclusions and implications follow in Chapter 5.

Chapter 5

SUMMARY, CONCLUSIONS AND IMPLICATIONS

Introduction

This study focused on the relationship between success of practical nurse candidates on the state licensing examination, State Board Test Pool Examination (SBTP), pre-entrance test scores, as determined by Otis-Lennon Mental Ability Test (OLMAT), and General Aptitude Test Battery (G). OLMAT scores and GATB (G) scores were examined as predictors of success on SBTP for practical nursing candidates. Scores were analyzed further in relation to race and age.

This chapter contains a summary, conclusions about the findings, and implications for further consideration.

Summary of Problem and Methodology

The purpose of this study was to compare the success of practical nursing students on SBTP in relation to pre-entrance test scores on OLMAT and GATB (G). The analysis was made in regards to race and age. The scores of both young and mature Caucasians on OLMAT and GATB (G) were correlated with SBTP scores. After finding a significant positive relationship of scores obtained by practical nursing candidates between OLMAT and SBTP and between GATB (G) and SBTP, the present study determined

whether the difference between OLMAT and GATB (G) as predictors of success on SBTP was significant.

The sample consisted of 305 adult practical nurse students enrolled in the practical nursing program of the Norfolk City Schools. All students enrolled between March 1969 and March 1972 were included in the original sample of 441. Scores on OLMAT, GATB (G), and SBTP were obtained for 305 cases which comprised the final working sample. This total sample was separated into 54 non-Caucasians (17.7%) and 251 Caucasians (82.3%). After the sample had been divided according to race, it was further separated into 45 young non-Caucasians, 9 mature non-Caucasians, 198 young Caucasians, and 36 mature Caucasians.

The level of confidence decided upon for the study was the .05 or 5 percent level of significance.

The limiting confines of this study were:

1. The characteristics of the sample limited generalization.

2. A more ideal criterion of success might be the performance of L.P.N.'s/L.V.N.'s on the job. Use of SBTP scores as the criterion of success was justified by the fact that an individual must pass the licensing examination before going on the job as a L.P.N. Another factor influencing selection of SBTP as the success criterion was the sound methodology used to prepare, standardize, and revise the national licensing examination.

3. Prescreening of the applicants to practical nursing tended to classify the subjects.

4. Personal motivation of individual students was an important but uncontrollable factor.

5. The teacher's ability to guide the learning process for some students was more effective than for others.

6. The small number of mature non-Caucasians in sample.

7. Socioeconomic backgrounds of the subjects were not considered in this study.

Summary of the Study

Univariate analysis, multivariate analysis, and correlational analysis were used to test the following hypotheses:

Primary Hypothesis 1. There is a positive relationship between scores of practical nursing students on OLMAT and SBTP.

Primary Hypothesis 2. There is a positive relationship between scores of practical nursing students on GATB (G) and SBTP.

Primary Hypothesis 3. The contribution by OLMAT is higher than GATB (G) as a predictor of success on SBTP for all sub-groups.

Secondary Hypothesis 1. There is a positive relationship between scores of Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 1.A. There is a positive relationship between scores of young Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 1.B. There is a positive relationship between scores of mature, Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 2. There is a positive relationship between scores of non-Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 2.A. There is a positive relationship between scores of young, non-Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 2.B. There is a positive relationship between scores of mature, non-Caucasian practical nursing students on OLMAT and SBTP.

Secondary Hypothesis 3. There is a positive relationship between scores of Caucasian practical nursing students on GATB (G) and SBTP.

Secondary Hypothesis 3.A. There is a positive relationship between scores of young, Caucasian practical nursing students on GATB (G) and SBTP.

Secondary Hypothesis 3.B. There is a positive relationship between scores of mature, Caucasian practical nursing students on GATB (G) and SBTP.

Secondary Hypothesis 4. There is a positive relationship between scores of non-Caucasian practical nursing students on GATB (G) and SBTP.

Secondary Hypothesis 4.A. There is a positive relationship between scores of young, non-Caucasian practical nursing students on GATB (G) and SBTP.

Secondary Hypothesis 4.B. There is a positive relationship between scores of mature, non-Caucasian practical nursing students on GATB (G) and SBTP.

Summary of the Findings Related to Section I

Univariate difference analysis to test significance differences between group means on OLMAT, GATB (G), and SBTP indicated that the three groups which obtained higher means than other sub-groups on all three instruments were Caucasians, young Caucasians, and mature Caucasians. Mature students achieved relatively high means on GATB (G) and SBTP. This group of mature students included both Caucasians and non-Caucasians.

The average score on SBTP for mature Caucasians exceeded the means for other groups.

Summary of the Findings Related to Section II

Multivariate difference analysis was used to determine differences between group mean scores on OLMAT, GATB (G) and SBTP.

Caucasian and non-Caucasian practical nursing students obtained significantly different scores on OLMAT, GATB (G), and SBTP when these three instruments were considered simultaneously. OLMAT scores made the

biggest contribution toward this difference.

Young Caucasian and mature Caucasian practical nursing students obtained significantly different scores when OLMAT, GATB (G), and SBTP were considered collectively.

Young non-Caucasian and mature non-Caucasian practical nursing students obtained similar scores on OLMAT, GATB (G), and SBTP. Non-Caucasians were not separated by these three instruments. One could conclude that both young and mature non-Caucasians did equally as well on the three tests.

Young and mature practical nursing students obtained significantly different scores on OLMAT, GATB (G), and SBTP when these three instruments were considered simultaneously without the race variable.

SBTP scores made the greatest contribution toward separating young Caucasian and mature Caucasian practical nurse candidates. SBTP scores also made the greatest contribution toward separating young and mature practical nurse candidates.

In conclusion, there was a significant difference between the collective mean scores obtained by the following pairs of groups in this sample:

1. Caucasian and non-Caucasian
2. Young Caucasian and mature Caucasian
3. Young and mature candidates.

Summary of the Findings Related to Section III

Correlational analysis used to investigate primary and secondary hypotheses indicated a significant positive relationship between scores of OLMAT and SBTP for all groups except mature non-Caucasians. The groups for which OLMAT was a significant predictor of success on SBTP were Caucasian, non-Caucasian, young Caucasian, mature Caucasian, young non-Caucasian, young subjects, and mature subjects in addition to the total group.

A significant positive relationship between scores of GATB (G) and SBTP was obtained for the total sample and sub-groups of Caucasian, young Caucasian, mature Caucasian, young and mature subjects. GATB (G) scores did not have a significant relationship with SBTP scores for any of the non-Caucasian groups in the sample.

Statistical analysis with the t test to determine whether OLMAT's contribution was higher than GATB (G)'s as a predictor of success on SBTP for all sub-groups revealed no significant difference. This finding was stressed in light of the preliminary finding of varying significance between OLMAT and SBTP scores as well as GATB (G) and SBTP scores for various sub-groups. OLMAT and GATB (G) scores as predictors of success on SBTP were found to be comparable in their significance.

Further statistical analysis utilizing beta values and F ratios indicated that both OLMAT and GATB (G) were good predictors of success on SBTP for these groups. The previous finding that OLMAT and

GATB (G) scores were significant predictors of success on SBTP for the total group was sustained.

Examination of beta values and F ratios for sub-groups indicated that OLMAT made a significant contribution toward predicting success on SBTP for Caucasian, non-Caucasian, young Caucasian, young non-Caucasian, and young subjects. OLMAT was not a significant predictor of success on SBTP for mature Caucasian, mature non-Caucasian, and mature subjects. GATB (G) made a significant contribution toward predicting success for Caucasian, young Caucasian, mature Caucasian, young and mature subjects. GATB (G) was not a significant predictor of success on SBTP for non-Caucasian, young non-Caucasian, and mature non-Caucasian groups. GATB (G) did not predict success for non-Caucasian groups at a significant level of .05.

Although significant variations based on beta values and F ratios were observed for certain groups, similar variations were not found when the correlation coefficients were compared for the same instrument on two paired sub-groups with the Z test. The correlation coefficients for OLMAT with SBTP and GATB (G) with SBTP were not significantly different for the following four pairs of sub-groups:

1. Caucasians and non-Caucasians
2. Young Caucasians and young non-Caucasians
3. Mature Caucasians and mature non-Caucasians
4. Young and mature.

Conclusions of the Study

Major conclusions of the study were as follows:

1. Both OLMAT and GATB (G) were significant predictors of success on SBTP for the total group.

2. Although OLMAT and GATB (G) were significant predictors of success on SBTP for this total subject population, they were not consistent for all sub-groups. One such exception appeared with the mature, non-Caucasian group which had a small number.

3. OLMAT was a significant predictor of success on SBTP for all groups in this subject population except for the mature non-Caucasians.

4. GATB (G) was a significant predictor of success on SBTP for all Caucasian groups in the sample.

5. GATB (G) was not a significant predictor of success on SBTP for non-Caucasian groups in this study.

6. There was no significant difference in coefficient correlations between sub-groups separated by race and age.

7. Mature practical nursing students performed better than young subjects on OLMAT, GATB (G), and SBTP.

8. Caucasians performed better than non-Caucasians on OLMAT, GATB (G), and SBTP as evidenced by an analysis of their combined scores on these three instruments.

Relationship of This Study to Related Research

Meadow and King indicated that GATB's subscore, G, was a significant predictor of success on SBTP for practical nurses. Further support to the significant relationships of GATB (G) and SBTP scores was provided by this study.

Norms for L.P.N.'s on the GATB were established in 1964 on a sample of 94 L.P.N.'s. As pointed out in Chapter 1, a breakdown of the sample revealed twelve (12) non-minority and 82 minority members. This proportion was contrary to the criteria established by the United States Department of Labor indicating that national test norms are established on final samples of at least 30 persons from the minority group and 30 non-minority individuals. Although the minimum total exceeded the required number of 60, the distribution of minority and non-minority persons did not meet the requirements established for its test construction by the United States Department of Labor. One could have expected non-Caucasians in this sample to have achieved a significant relationship between GATB (G) and SBTP. As reported on page 81, none of the non-Caucasian groups in this sample had a significant relationship between GATB (G) and SBTP scores. Attention is called to the finding that when non-Caucasians and Caucasians were considered together, the entire group had a significant relationship between GATB (G) and SBTP scores. These findings could be considered as supportive of Weiss's review in 1972 indicating that GATB's norms were badly in need of revision.

Guidelines from the Office of Federal Contract Compliance, U. S. Department of Labor, indicated that the relationship between a selection test and at least one relevant criterion must be statistically significant. SBTP scores were the relevant criterion in this study. Significant relationships of OLMAT and GATB (G) scores with SBTP scores were found for the total group in this sample. This finding indicated that both OLMAT and GATB (G) met the above guideline for the total subject population. However, when the entire sample was categorized, investigation revealed that neither selection test provided a significant relationship for mature non-Caucasians having only a total of nine in the group. Attention is called to the finding that GATB (G) scores for non-Caucasian practical nurse students did not have a significant relationship with SBTP scores.

Findings of this study concurred with those of Rowan, Meadow and Seither in that mature, practical nursing candidates obtained higher scores on SBTP than younger ones.

Reports of findings by Sullivan, Tate and Sandmann, presented in Chapter 2 regarding the relationship of GATB subscores and success of students in vocational-technical programs, indicated a significant relationship between the two. Practical nurse education is considered to be a vocational program. Results of this study indicated a significant relationship between GATB (G) scores and success in the vocation of practical nursing as measured by SBTP scores. Findings of Sullivan, Tate and Sandmann were sustained when applied to the specific area of practical

nursing.

Certain nursing measures such as calculating dosages of medications and reconciling parenteral fluid intake to the patient's output require certain skills in arithmetic and some basic algebra. Research reported by Hanna and others indicated that OLMAT scores had a positive relationship to student success in algebra. SBTP contains certain basic uses of algebra. A significant positive relationship between OLMAT scores and SBTP scores for L.P.N.'s in this subject population was consistent with the findings of Hanna and others.

Sitzmann found reading and verbal ability to be significant factors in the success of practical nurse candidates on SBTP.

The description of OLMAT on pages 18-19 indicated that a large portion of the test was designed to measure verbal and reading ability. A significant relationship was found between OLMAT scores and SBTP scores for all groups in the subject population except mature non-Caucasians, the group which had a small sample size.

Bailey's study indicated that Otis and PACE test scores were related significantly to classroom and SBTP scores for practical nursing students. Otis was a forerunner of OLMAT used in this study. Evidence that the revised Otis, OLMAT, has a significant relationship to SBTP scores for this subject population was presented.

GENERAL IMPLICATIONS

Implications of Section I

Univariate difference analysis was used to test differences between group means on OLMAT, GATB (G), and SBTP for the total group and all sub-groups. Observing that the three groups which obtained higher means on all three instruments than other sub-groups were all Caucasians has possible implications for investigation not included in this study. For example, are the Caucasians more test-wise than non-Caucasians?

The conclusion that mature practical nurse students obtained the highest mean on SBTP could have implications for curriculum change for the young practical nursing student population. Further study should be conducted to determine if enriching supplemental learning experiences should be planned for young practical nurse students. This could become increasingly important with the growing number of practical nursing programs for secondary students.

Implications of Section II

Differences between group mean scores on OLMAT, GATB (G), and SBTP were investigated with multivariate difference analysis. The conclusion that there was a significant difference between the collective mean scores when groups were divided according to age and race could serve as a basis for further research. For example, are some of the items,

especially on SBTP, based on the experience of living as opposed to the practical nursing curriculum?

One of the most important implications within the context of this study is that individuals responsible for making selections of practical nursing candidates make those selections on the basis of criteria other than test scores alone. As indicated in this study, age and race or ethnic background were factors which could be considered. For example, a mature non-Caucasian's score on OLMAT and/or GATB (G) should be considered in connection with that person's age and race. This suggestion should in no way be construed as implying selection or non-selection on the basis of age and race or ethnic background.

Implications of Section III

Correlational analysis indicated a significant relationship between OLMAT scores and SBTP for all groups except mature non-Caucasians. A significant relationship between GATB (G) scores and SBTP scores was obtained for all groups in the sample except non-Caucasians. The reported differences could be a result of socioeconomic factors not related to race or age.

OLMAT can be used with greater confidence than before this study as one aid in selecting future practical nursing students for Norfolk Public Schools.

GATB (G) can be used with more confidence than before this study as an aid in selecting future practical nursing students for Norfolk Public Schools. Inability of local schools to obtain a breakdown of GATB scores for potential practical nursing students, especially subscore G, negates the usefulness of that instrument for comparable samples to be selected by Norfolk Public Schools of Practical Nursing.

Further Research

Generalization of these findings to other sample populations will require further study and research replication. Such research would add validity to this study and its methodology.

Efforts to identify the areas in which the mature practical nursing student excells over the younger one should be made as a basis for curriculum revision.

A longitudinal study of the L.P.N.'s scores on SBTP with performance on the job should be conducted to determine the validity of SBTP to measure minimal, safe performance.

OLMAT scores reflected a composite score of verbal comprehension, verbal reasoning, figural reasoning and quantitative reasoning. An instrument which diagnosis both verbal and mathematical performance is needed to aid in guiding prospective candidates into educational courses such as basic mathematics and basic reading for health occupations. After having the opportunity to improve one or two of their basic communication

skills, reading and mathematics, the prospective applicant should then be encouraged to re-apply. Research should be conducted to compare OLMAT scores with the reading and mathematics scores before and after appropriate treatments of either basic course.

Studies in which practical nurse educators have learned to teach students to read in the content area should be conducted for those students with relatively low scores on OLMAT. Diagnostic reading tests should be given before and after the experiences designed to improve reading. An analysis of the socioeconomic background of practical nursing students should be undertaken to examine demographic variables other than age and race.

Practical Implications

One guideline from the Office of Federal Contract Compliance, U. S. Department of Labor, stating that the relationship between a selection test and at least one relevant criterion must be statistically significant, can be considered as having been met in this study. Both OLMAT and GATB (G) scores had a significant relationship with the relevant criterion, SBTP.

Difficulty in obtaining GATB (G) subscores on potential practical nursing students at times deprived selection committees of one important guide in making decisions regarding the applicant. Findings of this study could be used in concert with other findings regarding GATB (G) subscore as a predictor of success on SBTP to encourage the U. S. Department of

Labor to reconsider its present practice regarding release of G subscores to selection committees.

Search of the literature regarding the standardization procedure and date of standardization of GATB as reported in this study could be used in connection with reviews and other studies to motivate current standardization of this instrument which has already been studied extensively.

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APPENDIX A

TEST PLAN FOR STATE BOARD TEST POOL EXAMINATION FOR PRACTICAL NURSE LICENSURE ADOPTED BY THE COMMITTEE ON BLUEPRINT FOR LICENSING EXAMINATIONS OF THE ANA COUNCIL OF STATE BOARDS OF NURSING

April, 1974

The measurable abilities are not mutually exclusive. A single test time may test subabilities under two or more of the major abilities. The range of percentage of items in each major ability is included in parentheses.

Measurable Abilities	Limitations
I. (5-8%) Understands what the licensed practical nurse's responsibilities are as a member of a vocation, an individual, and as a member of a health team.	
A. Scope of functions of licensed practical nurses	
1. Range and limitations of functions	Will not be tested on leadership role.
2. Administrative lines	Will not be tested on administrative lines other than those which a licensed practical nurse uses directly.
3. Problems which should be referred to the physician or registered nurse	Will not be tested on details of differentiation of functions of professional workers in the health field.
B. Ethical responsibilities	
C. Legal responsibilities	
D. Basic principles of communication and cooperative action	Will not be tested on principles of group leadership.

APPENDIX A (continued)

Measurable Abilities	Limitations
E. Vocational growth	
1. Trends in nursing	Will not be tested on history other than general trends.
2. Authoritative sources of information in nursing	Will not be tested relative to fine distinctions among sources.
3. Roles and characteristics of nursing organizations	Will not be tested on details of structure or function of organization other than aspects affecting practical nursing or licensed practical nurses.
II. (8-10%) Understands elementary facts and principles of the natural and biological sciences and related terminology.	
III. (6-8%) Knows the signs of physical health and normal physical growth and development throughout the life cycle.	Will not be tested relative to subtle variations.
A. Gross signs of physical health and development	
B. Optimum and normal health as differentiated from abnormal states	
C. General physical needs	
D. General nutritional needs	Will not be tested on evaluation of diets in terms of measurements other than average servings.
E. General environmental needs	

APPENDIX A (continued)

Measurable Abilities	Limitations
IV. (1-3%) Knows elementary psychosocial facts and principles, which are basic to individual adjustment and to nursing practice.	Will not be tested on psychotherapeutic concepts.
V. (4-7%) Knows the gross signs of emotional and mental health and development in all age groups, recognizes states of faulty adjustment, and understands general emotional needs and their possible effects on behavior.	Will not be tested on subtle signs of variation in mental or emotional health, or on theories of psychological development.
VI. (9-10%) Understands basic principles of human relations and knows what measures are likely to be helpful to persons under stress.	Will not be tested on formal nondirective techniques, or on subtle judgements relative to patients' readiness to learn.
VII. (5-7%) Knows the general causes, modes of transfer, and relative incidence of common diseases and abnormal conditions and understands methods for their prevention and control.	Will not be tested on uncommon diseases or conditions, on the theory of immunity, or on details of preventive programs.
A. Important causes of, and factors predisposing to, diseases and abnormal conditions	
B. Transmission of disease	
C. Conditions which constitute major health problems	

APPENDIX A (continued)

Measurable Abilities	Limitations
D. Prevention and control of communicable diseases	
E. Prevention and control of noncommunicable diseases and conditions	
F. Roles of major organizations and agencies concerned with prevention and control of disease and maintenance and improvement of physical and mental health.	Will not be tested on details of structure or functions of the organizations.
VIII. (6-10%) Knows gross manifestations of common diseases and abnormal conditions.	Will not be tested on uncommon conditions or on any but the most important manifestations.
A. Symptoms and course	
B. Gross effects on the tissues	
C. Prognosis and complications	
IX. (18-20%) Knows purposes, effects, dangers of common measures used: preventive, diagnostic, therapeutic, supportive, and rehabilitative.	Will not be tested on other than gross physiologic effects of treatments and medications.
X. (22-32%) Understands common nursing measures and knows how to carry out or assist with commonly used procedures (exclusive of VI).	
A. Selection of specific nursing measures in accordance with patient needs	Will not be tested on selection of complex nursing measures.

APPENDIX A (continued)

Measurable Abilities	Limitations
B. Differentiation between safe and unsafe modifications of nursing measures	Will not be tested on evaluation of procedures in terms of scientific principles.
C. Preparation for, implementation of, or assistance with measures used in care of patients	Will not be tested on calculated dosage problems and conversion between metric and apothecary systems. Will not be tested on evaluation of equipment in terms of scientific principles.
D. Reporting and recording	
E. Evaluation of priority of assigned patients' needs based upon possible choices of nursing care	Will not be tested on ability to establish priorities of nursing care of patients with complex needs except in emergencies when neither a registered nurse nor a doctor is present.

APPENDIX B

FORMAT USED TO OBTAIN DATA REGARDING RACE OF PRACTICAL NURSING GRADUATES

Name of Graduate	Date of Graduation	*Caucasian	**Non-Caucasian
1.			
2.			
3.			
4.			
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30.			

*Caucasian--Pertaining to the white race of mankind.
**Non-Caucasian--Pertaining to the non-white race of mankind.

APPENDIX C

COMPOSITION OF SAMPLE

Name of Division	Group Number	Entrance Date	Graduation Date	Number Enrolled	Number Graduated
Leigh Memorial	1	March 1969	March 1970	22	14
	2	Sept. 1969	Sept. 1970	36	28
	3	March 1970	Sept. 1971	15	11
	4	Sept. 1970	Sept. 1971	33	29
	5	March 1971	March 1972	33	29
				(139)	(111)
Norfolk General	6	March 1969	March 1970	25	14
	7	Sept. 1969	Sept. 1970	29	21
	8	March 1970	March 1971	38	14
	9	Sept. 1970	Sept. 1971	33	22
	10	March 1971	March 1972	34	20
	11	Sept. 1971	Sept. 1972	40	25
	12	March 1972	March 1973	33	20
				(232)	(136)
Central	13	Sept. 1971	Sept. 1972	37	30
	14	March 1972	March 1973	33	31
				(70)	(61)
			GRAND TOTAL	441	308

APPENDIX D

CURRICULUM
NORFOLK CITY SCHOOLS
PRACTICAL NURSING

INTRODUCTION

On April 26, 1967, the faculties of Norfolk City Schools and Leigh Memorial Hospital School of Practical Nursing and Norfolk City Schools and Norfolk General Hospital School of Practical Nursing embarked upon a major curriculum revision for the practical nursing programs in Norfolk. The primary purpose for the revision was to improve the instructional programs by correlating theory and clinical practice more closely. A committee was formed consisting of Mrs. Corinne Dorsey, Mrs. Willie Kitts, Mrs. Catherine Giles and Mrs. Marjorie Shaw with Mildred Mason as Chairman. Mrs. Mary Frances King became a member of this committee in July 1968.

After discussing the advantages and disadvantages of a block rotation curriculum, the members of the committee agreed in the spring of 1967 that block rotation was practical and advantageous. They further agreed that the steps to be pursued in accomplishing this improvement were as follows:

1. Identify broad areas of learning
2. Develop behavioral outcomes expected of students
3. Study course content as a basis for placing it in the appropriate context

APPENDIX D (continued)

4. Develop course outlines which include expected behaviors, content, methods of teaching, and methods of evaluation
5. Trial
6. Revision

After identifying the broad areas of learning, the Block Rotation Committee attempted to find a local person experienced in developing behavioral objectives. Being unable to do so, the committee planned a self-study program. Copies of the programmed book on developing behavioral objectives written by Robert F. Mager were obtained. A study guide to accompany the book, Preparing Objectives for Programmed Instruction, was developed. All faculty members studied this book and answered the questions on the study guide before a group meeting of all instructional personnel in Health Occupations was held. Each faculty member wrote sample behavioral objectives to be studied by the entire group with Mager's principles serving as guidelines.

Miss Margaret Gray, R.N., Educational Director for the Virginia State Board of Examiners of Nurses was invited to serve as a consultant to the faculty members for two days in February 1967. Miss Gray's experience in helping faculties develop behavioral objectives was invaluable in this undertaking.

Sub-committees to study course content and place it in its appropriate context were appointed. A member of the main committee served as chairman

APPENDIX D (continued)

of the smaller group. The instructor teaching that course in each of the two programs was appointed to the sub-committee. Teachers involved in closely related courses were assigned to help also. The services of consultants from the Department of Nursing Service of Leigh Memorial Hospital and Norfolk General Hospital were made available to us. The assistance of Mrs. Jean Miller, R.N., Director of Nursing, Leigh Memorial Hospital, and Miss Jeanne Riddle, R.N., Director of Nursing Service, Norfolk General Hospital, was invaluable in this major revision.

The problem of overall planning for block rotation in a school admitting two classes each year was still unsolved in June 1968. The question of whether to continue with plans for block rotation or to continue with plans for improving the existing master plan needed to be resolved. The services of Sister Mary Walsh, Consultant, National League for Nursing, were obtained early in July 1968. Sister Mary Walsh did not think we could do block rotation. Miss Grace Ricks, R.N., Assistant Secretary, Virginia State Board of Nurse Examiners, who had originally recommended a block rotation, was called in as a consultant the latter part of July 1968. In helping to answer the question, "What is the best method of correlating theory and clinical practice?", Miss Ricks used sample rotation plans developed previously by faculty members in showing how block rotation could be worked in our programs. The main Curriculum Revision Committee did further work together on the master rotation plan and met again in August 1968. The decision was

APPENDIX D (continued)

made by the staff members in cooperation with hospital representatives to proceed with the block rotation.

Course outlines, including expected behavioral outcomes, content, methods of instruction, and methods of evaluation continued to be developed. The teachers from each program worked together with their respective chairman to develop the outlines.

The exchange of ideas between faculty members in the development of outlines and other aspects of curriculum revision was productive. The same committees met together to discuss progress being made and the problems encountered. The sub-committees also will serve an important role in evaluating course outlines and making suggestions for change.

Each faculty currently is in the process of studying its philosophy and making the changes indicated.

A special note of appreciation is made to each instructor who has given unselfishly of her time and talents in the current curriculum revision. In addition to carrying a regular teaching load, each teacher has done work individually and in small groups at night, after school hours, and on weekends. Non-typists have become typists, new recruits to teaching have become experienced in curriculum revision, daytime jobs have become night ones, and we trust that applicants to practical nursing will give better patient care as a result of these efforts.

Mildred A. Mason. R.N.
Supervisor, Health Occupations

January 1969

APPENDIX D (continued)

NORFOLK CITY SCHOOLS OF PRACTICAL NURSING

OBJECTIVES

The graduate of this program shall be expected to:

1. **Function effectively and safely as a beginning practitioner of practical nursing.**
2. **Demonstrate technical knowledge in the performance of practical nursing.**
3. **Communicate effectively as a practical nurse.**
4. Display desirable attitudes toward patients, families and associates.
5. Establish rapport with patients, families and associates.
6. Demonstrate knowledge of the responsibilities of the L.P.N. in the community.

Approved and adopted 4/18/69

APPENDIX D (continued)

NORFOLK CITY SCHOOLS OF PRACTICAL NURSING

AREAS OF LEARNING

Preclinical Period--18 Weeks

I. Basic Practical Nursing

a.	Vocational Relationships	40 hours
b.	Structure and Function	50 hours
c.	Fundamentals of Practical Nursing (includes Clinical Practice)	249 hours
d.	Normal Nutrition	35 hours
e.	Normal Life Span	40 hours
f.	Drug Therapy	50 hours
g.	Introduction to Medical-Surgical Nursing	40 hours
	TOTAL HOURS	504 hours

Clinical Period*--30 Weeks

II. Advanced Practical Nursing*

a.	Medical-Surgical Nursing II	12 weeks
b.	Obstetrical Nursing	4 weeks
c.	Pediatric Nursing	4 weeks
d.	Psychiatric Nursing	4 weeks
e.	Medical-Surgical Nursing III	6 weeks
	TOTAL WEEKS	30 weeks

* Theory and clinical practice given concurrently in all areas.

Revised January 1969
Revised January 1971
Revised September 1971

APPENDIX E

Raw Data Regarding Students in Sample

Student	SBTP	OLMAT	Age	Race	GATB (G)
001	449	087	25	1	090
002	460	093	19	2	100
003	549	105	19	2	110
004	471	105	18	2	111
005	541	102	20	2	100
006	630	094	38	2	111
007	552	092	18	2	113
008	545	100	19	2	092
009	652	102	47	2	112
010	601	111	19	2	112
011	468	089	26	1	094
012	350	093	18	1	090
013	600	097	21	2	117
014	434	101	19	2	112
015	350	085	24	1	090
016	604	092	36	1	096
017	549	115	22	2	123
018	523	091	26	1	090
019	482	091	18	2	103
020	464	086	51	1	090
021	501	097	18	2	102
022	604	092	31	1	092
023	475	108	20	2	114
024	453	091	18	2	105
025	508	086	24	1	105
026	545	090	37	1	102
027	626	094	21	1	104
028	626	101	41	2	109
029	571	085	29	2	101
030	364	090	18	2	084
031	626	098	43	2	108
032	460	082	36	1	101
033	479	086	23	1	104
034	504	093	36	1	094
035	350	090	22	1	110
036	611	097	42	2	113
037	534	097	25	1	116

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
038	645	104	37	1	098
039	449	088	18	2	094
040	648	120	23	1	125
041	549	100	24	1	112
042	479	107	37	1	108
043	541	113	20	2	115
044	427	093	25	1	110
045	623	102	35	2	126
046	623	108	26	2	132
047	423	091	36	1	097
048	538	096	18	2	105
049	504	098	25	1	098
050	600	122	34	2	132
051	471	112	20	2	117
052	431	102	28	1	105
053	464	092	28	2	094
054	606	084	49	2	093
055	564	085	49	2	100
056	504	092	22	2	113
057	508	086	25	1	105
058	493	090	19	1	090
059	527	102	19	2	107
060	431	087	32	1	092
061	530	097	19	2	105
062	673	099	35	2	107
063	543	107	19	2	113
064	524	100	18	2	095
065	623	103	21	2	113
066	597	094	33	2	107
067	646	103	24	2	104
068	627	097	19	2	098
069	730	110	37	2	120
070	612	104	19	2	111
071	593	087	26	2	095
072	593	096	19	2	098
073	566	102	23	2	108
074	627	093	28	2	090

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
075	486	093	21	1	096
076	623	094	39	2	106
077	510	103	18	2	103
078	647	102	37	2	108
079	432	095	18	2	096
080	647	113	40	2	119
081	580	105	20	2	110
082	525	107	18	2	090
083	443	092	18	2	091
084	658	114	19	2	118
085	588	102	27	2	111
086	506	098	28	1	111
087	565	094	18	2	096
088	494	111	18	2	106
089	475	085	41	2	095
090	443	106	17	2	110
091	568	093	39	2	097
092	576	103	18	2	110
093	506	095	18	2	091
094	522	102	19	2	104
095	537	104	32	2	104
096	482	109	19	2	110
097	370	096	18	2	094
098	518	106	18	2	108
099	568	102	19	2	100
100	518	109	18	2	109
101	635	107	26	2	109
102	424	104	19	2	097
103	506	092	18	2	097
104	600	095	19	2	096
105	592	103	19	2	110
106	600	118	20	2	111
107	647	106	20	2	101
108	572	091	18	2	096
109	580	105	19	2	106
110	541	090	39	1	100
111	494	093	20	2	093
112	651	123	18	2	116

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
113	588	108	19	2	112
114	584	092	22	2	109
115	592	106	19	2	101
116	654	092	39	2	088
117	612	119	19	2	119
118	433	090	19	2	092
119	609	102	18	2	104
120	606	114	17	2	119
121	612	105	40	2	107
122	536	096	20	2	112
123	540	102	17	2	108
124	505	098	18	2	096
125	523	101	18	2	082
126	536	097	18	2	110
127	408	092	18	2	100
128	612	105	19	2	116
129	619	097	26	2	090
130	512	110	20	2	109
131	543	097	18	2	110
132	588	097	18	2	113
133	567	109	18	2	096
134	550	106	19	2	106
135	640	090	43	2	115
136	484	102	18	2	094
137	547	103	18	2	096
138	498	093	35	2	108
139	588	102	19	2	099
140	682	105	40	2	111
141	519	099	19	2	102
142	457	097	22	2	109
143	512	104	18	2	093
144	567	092	49	2	101
145	540	096	19	2	110
146	502	102	18	2	111
147	664	116	23	2	110
148	433	092	22	1	096
149	540	092	20	2	098
150	509	089	44	2	084

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
151	519	097	21	2	099
152	602	097	21	2	093
153	585	106	18	2	103
154	623	106	33	2	132
155	471	100	18	2	107
156	578	094	19	1	094
157	581	114	21	2	121
158	682	110	32	2	118
159	588	099	19	2	112
160	471	085	31	1	098
161	543	109	19	2	112
162	567	115	20	2	119
163	630	093	37	2	115
164	446	092	20	2	113
165	519	101	19	2	112
166	474	093	18	2	098
167	616	097	23	1	117
168	637	106	48	2	117
169	536	103	19	2	122
170	616	098	37	2	097
171	460	090	39	2	090
172	646	112	19	2	115
173	502	112	20	2	111
174	680	110	21	2	110
175	616	102	23	2	110
176	547	100	34	1	111
177	536	100	40	2	105
178	623	099	37	2	102
179	490	099	26	1	107
180	593	097	24	2	109
181	559	097	24	2	103
182	597	091	27	2	090
183	608	090	43	2	105
184	600	087	25	1	092
185	572	086	33	1	093
186	600	090	45	2	104
187	604	097	21	1	092
188	490	086	24	1	095

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
189	510	099	48	2	106
190	475	102	22	2	105
191	608	102	41	2	111
192	568	095	45	2	100
193	498	100	23	1	111
194	525	077	36	2	097
195	615	084	41	1	102
196	572	095	18	1	101
197	572	098	34	2	104
198	592	093	36	1	090
199	568	097	27	2	096
200	709	108	29	2	113
201	678	098	38	2	114
202	565	093	19	2	111
203	608	089	26	1	093
204	674	102	24	2	114
205	584	087	46	1	088
206	494	101	18	2	118
207	596	090	37	2	096
208	623	097	38	2	102
209	522	097	21	1	089
210	561	106	18	2	113
211	627	090	28	1	112
212	627	102	36	2	108
213	654	103	31	2	098
214	615	102	35	2	100
215	717	099	31	2	104
216	701	129	25	2	121
217	682	125	38	2	131
218	694	105	26	2	089
219	592	104	23	1	110
220	602	101	28	1	098
221	657	107	20	2	125
222	664	106	45	2	112
223	606	113	17	2	102
224	599	115	22	2	120
225	619	090	27	2	100
226	661	104	34	2	093

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
227	715	123	19	2	138
228	557	109	42	1	116
229	606	099	37	2	100
230	592	098	40	2	097
231	609	100	26	2	111
232	651	108	38	2	116
233	578	104	31	2	117
234	640	105	23	2	114
235	609	097	30	2	115
236	516	086	33	2	087
237	561	096	38	2	095
238	630	101	19	2	112
239	671	100	20	2	106
240	481	097	17	2	105
241	637	098	21	2	120
242	443	115	20	2	120
243	682	110	26	2	118
244	543	094	21	1	103
245	585	120	19	2	122
246	630	102	42	2	108
247	557	108	45	2	120
248	491	093	51	1	092
249	661	097	43	2	114
250	623	097	41	2	102
251	692	110	23	2	122
252	682	111	19	2	115
253	657	125	20	2	123
254	682	099	46	2	103
255	602	087	29	2	099
256	585	104	32	2	116
257	574	103	18	2	103
258	550	094	25	2	102
259	671	101	26	2	097
260	571	131	19	2	121
261	671	100	22	2	106
262	516	094	18	2	100
263	589	108	20	2	123
264	575	110	23	2	117

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
265	667	110	42	2	127
266	527	093	41	2	101
267	652	103	40	2	119
268	567	102	45	2	122
269	597	108	17	2	109
270	704	095	27	2	096
271	619	118	42	2	126
272	552	108	18	2	123
273	608	094	22	2	106
274	552	102	19	2	111
275	556	123	18	2	132
276	656	092	37	2	103
277	523	104	24	2	123
278	586	104	31	1	109
279	508	091	35	2	088
280	685	107	36	2	096
281	534	112	18	2	116
282	593	094	35	2	096
283	589	100	33	2	100
284	682	125	40	2	142
285	541	106	37	2	106
286	530	087	17	2	103
287	564	108	17	2	099
288	545	103	20	2	111
289	619	110	29	2	120
290	641	119	20	2	142
291	597	111	23	2	115
292	560	097	36	2	106
293	567	114	20	2	107
294	663	123	20	2	128
295	663	101	35	2	108
296	527	100	22	2	102
297	619	102	33	2	124
298	719	115	20	2	120
299	552	115	19	2	106
300	575	091	18	2	112
301	460	118	21	2	116
302	615	092	23	2	111

APPENDIX E (continued)

Student	SBTP	OLMAT	Age	Race	GATB (G)
303	516	111	20	2	111
304	527	103	18	2	122
305	626	125	39	2	127

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THE OTIS-LENNON MENTAL ABILITY TEST AND GENERAL APTITUDE TEST BATTERY (G) AS PREDICTORS OF SUCCESS ON STATE BOARD TEST POOL EXAMINATION FOR PRACTICAL NURSING CANDIDATES

by

Mildred Alfy Mason

(ABSTRACT)

The purpose of this investigative study was to determine whether scores on the Otis-Lennon Mental Ability Test (OLMAT) and General Aptitude Test Battery (G) (GATB (G)) were related to success on the practical nurse licensing examination (SBTP) using race and age as demographic variables. A second purpose was to determine if OLMAT and GATB (G) scores varied in their ability to predict success on SBTP.

Related problems of the study were to determine whether significant differences between group mean scores of Caucasians and non-Caucasians existed when the same instrument was used. Scores of mature and young subjects in the sample population were analyzed for significant differences on the same instrument also. The coefficient correlations between OLMAT and SBTP and between GATB (G) and SBTP were examined to determine if they differed for Caucasians and non-Caucasians as well as young and mature sub-groups.

Two primary hypotheses pertained to a positive relationship between (1) OLMAT and SBTP scores and (2) GATB (G) and SBTP scores. The third primary hypothesis indicated that OLMAT was a higher predictor than GATB (G) on SBTP for all sub-groups.

Secondary hypotheses pertained to positive relationships between scores of the six sub-groups on OLMAT and SBTP scores as well as GATB (G) and SBTP scores.

The sample consisted of 305 adult students enrolled in practical nursing in Norfolk City Schools during a three-year period. The subject population was first divided into Caucasians and non-Caucasians. These two groups were separated into young and mature subjects. Socioeconomic factors were not considered in this study.

Statistical procedures used to test the hypotheses were univariate difference analysis, multivariate difference analysis, and correlational analysis. All hypotheses were tested at the .05 level.

Major conclusions were as follows:

1. Both OLMAT and GATB (G) were significant predictors of success on SBTP for the total group.

2. Although OLMAT and GATB (G) were significant predictors of success on SBTP for this total subject population, they were not consistent for all sub-groups. One such exception appeared with the mature, non-Caucasian group which had a small number.

3. OLMAT was a significant predictor of success on SBTP for all groups in this subject population except for the mature non-Caucasians.

4. GATB (G) was a significant predictor of success on SBTP for all Caucasian groups in the sample.

5. GATB (G) was not a significant predictor of success on SBTP for non-Caucasian groups in this study.

6. There was no significant difference in coefficient correlations between sub-groups separated by race and age.

7. Mature practical nursing students performed better than young subjects on OLMAT, GATB (G), and SBTP.

8. Caucasians performed better than non-Caucasians on OLMAT, GATB (G), and SBTP as evidenced by an analysis of their combined scores on these three instruments.