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Relationship of Admission Variables to Success for Licensed Practical Nurses in Associate Degree in Nursing Ladder Program

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RELATIONSHIP OF ADMISSION VARIABLES TO SUCCESS FOR LICENSED PRACTICAL NURSES IN ASSOCIATE DEGREE IN NURSING LADDER PROGRAM

by

Sally Kathryn Johnson

A Dissertation Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Doctor of Education Department of Educational Leadership

Western Michigan University Kalamazoo, Michigan August 1986

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Sally Kathryn Johnson
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CHAPTER I

INTRODUCTION

Background

Nursing education is experiencing an opportunity and a challenge in the rush by the Licensed Practical Nurse (LPN) populace to reenter school to become Registered Nurses (RNs). Associate Degree in Nursing (ADN) programs which offer this option to LPNs have many more applicants than they can admit. The opportunity presented to these programs is one of selectivity—programs may establish criteria for the purpose of selecting the most promising applicants. This opportunity to be selective, however, creates the challenge—upon what legally acceptable and valid criteria can this selectivity be based? As Perez (1977) so succinctly summarizes, valid selection criteria are needed in order to make the best use of limited faculty, clinical facilities and financial resources. Perez, reiterating the statements of Wittmeyer, Camiscioni, and Purdy (1971) and Mueller and Lyman (1969), observes that if variables which predict success in nursing education could be identified, applicants could be provided more meaningful
guidance and counseling.

Currently there are four levels of preparation for entry into nursing practice. These levels are Practical (Vocational) Nursing (PN or VN), Associate Degree in Nursing (ADN), Diploma in Nursing (DN), and Bachelor of Science in Nursing (BSN). Practical Nursing is a distinct level of nursing with its own licensure examination (LE) which qualifies successful candidates as Licensed Practical Nurses (LPN). In contrast, ADN, DN, and BSN graduates qualify to practice as Registered Nurses by succeeding on the RN licensure examination—the National Council Licensure Examination for Registered Nursing (NCLEX-RN).

The trend toward career mobility in nursing education has been given impetus by two events—one within the nursing profession and one from outside the profession. In 1965, and reaffirmed in 1978, the American Nurses Association resolved that "the minimum preparation for entry into professional nursing practice is the baccalaureate degree in nursing" and that there be one lower level of nursing called technical nursing ("Entry into practice resolutions," 1978, p. 505). The National League for Nursing (NLN) resolved in 1985 to support this posture. This position, if implemented, would eliminate LPNs and DNs since ADNs would be considered the technical nurses and BSNs the professional nurses.
The target date for this change was set for 1985 and while it has not materialized the threat has influenced LPNs across the nation to reenter school to become RNs. The outside factor influencing the career mobility trend is the national concern over rising health care costs which has resulted in the implementation of strong cost-containment measures in hospitals. Nursing has received particular attention since nursing care comprises approximately 30% of the typical hospital budget (Hamilton, 1984). In efforts to control budgets, hospitals have reduced nursing staffs (Coleman & Smith, 1984; Mitchell, 1984) with LPNs included in the reduction. Lee (1984) cites the opinions of Richard Keenan, Vice President for Finance at Valley Hospital in New Jersey and Carolyne Davis, Administrator of Health Care Financing Administration, that the rise in the number of home care and out-patient clinics will help provide employment for displaced RNs. However, this does not hold true for LPNs. These changes in the nursing employment picture severely reduce the LPN's opportunities for continued employment.

An effect of these two factors has been the rush by LPNs to return to school. Not only do they want to return, they desire to avoid repeating material learned previously and expending additional money and time in becoming an RN. Hence, the primary focus for these
individuals is on specific ADN schools which grant credit for or in a substantial way acknowledge previous learning and allow LPNs to move forward as quickly as possible. These schools have similar programs which may be variously called ADN ladder, one-plus-one, step-up, advanced standing, or ADN completion programs. (The term ADN ladder will be used in this paper when speaking of this type of program). The specific processes of admission and completion in these programs differ widely but, in general, LPNs meet certain testing, prerequisite course work, and/or experience requirements and are then admitted to complete approximately one year to earn an Associate Degree in Nursing.

Schools of nursing accommodating these returning LPNs are finding it necessary to screen and select individuals due to the high volume of applicants and the limited availability of spaces in the programs (Nash, 1977). A review of admission criteria used by Michigan ADN ladder programs reported in Nursing Education Programs in Michigan 1983-1985 (Michigan League for Nursing, 1983) suggests that there is little consensus regarding criteria which effectively screen or select these applicants. Nash found this same variation in the selection and screening processes in a nationwide study of nursing programs. Admission criteria range from simply being a graduate of a practical nursing program
to combinations of reading and math proficiency requirements, grade point specifications, specific course requirements in high school and/or college, and nursing competency testing (Michigan League for Nursing, Nash, 1977). These requirements may take as long as a year to complete in addition to the PN education. And yet, a review of the literature reveals a dearth of studies which attempt to relate these admission criteria for returning LPNs to success in the ADN ladder curriculum or performance on the NCLEX-RN.

Nursing has experienced a dramatic change in its data base in the last few years. The LE for both the PN and the RN are new and the focus and format of each has been changed ("Developing, Constructing ... I," 1983). In addition, the score reporting is now in terms of one score in contrast to the previous practice of reporting five scores. Further, the NLN has developed new tests designed to assist in identifying potentially successful students in programs and on the LEs ("Validity," 1981). Froman and Owen (1984) propose that these changes point to a need to examine the relationships among these changed variables as the validity of certain predictive measures may have changed since the focus of the LE has changed. The validity and predictability of the new NLN tests has yet to be satisfactorily determined, as well.

The primary goal of each nursing education program
is to prepare nurses with adequate skills to enter the practice of nursing. The stated purpose of the LEs is to identify those graduates who possess basic entry level nursing skills and who can perform nursing functions adequately and safely ("Developing, Constructing ... I," 1983). The problem and challenge for nurse educators in ADN ladder programs is to identify admission criteria for LPN applicants which are most likely to indicate success in the program and on the NCLEX-RN.

Problem Statement

This study is based on the conceptual hypothesis that success of an individual in an educational endeavor can be suggested by certain past performance indicators. The questions posed here focus on examining the extent to which specific admission criteria available for the LPN applicant to an ADN ladder program relate to measures of success in that program. More specifically, to what extent are GPAs in ADN nursing theory and clinical courses in the ADN ladder program and the NCLEX-RN score related to:

1. Number of years since graduation from Practical Nursing school?
2. Scores on the National League for Nursing Pre-Admission Assessment for Practical Nursing--math,
verbal, science, and composite?

3. Grade point average in Practical Nursing courses--theory, practice, and overall?

4. Number of non-nursing courses included in the ADN curriculum completed prior to starting nursing courses?

Limitations of the Study

The student population was limited to one community college ADN program which is designed to admit LPNs for approximately one year to earn an Associate Degree in Nursing and, ultimately, to become registered nurses. Thirty LPNs were admitted into the ADN program each Fall and the 79 students with complete data who were admitted from 1981 to 1984 constitute the study population. The small population, the single school, and the single program type present limitations. Generalizations from this study may be limited due to these factors as well as the predominantly rural and small urban area study population. Many factors not tested in this study, such as age, marital status, number of children, and motivation, are additional variables which may warrant study as related to this group.

Significance of the Problem

The significance of identifying indicators of
success for LPNs admitted to an ADN ladder program is three-fold. The more effectively nursing education programs can select applicants, the more efficiently scarce nursing education resources can be used. Preadmission counseling and guidance would be improved for the prospective student and this could save disappointment, time and money (Perez, 1977). Finally, the nursing profession would have the opportunity to add the best qualified personnel to the professional ranks.

Plan of Presentation

Chapter Two of the dissertation reviews the literature related to the problems of this study and analyzes past research. Chapter Three is devoted to a description of the design of the study and the data gathering process. Chapter Four consists of analysis of the data and Chapter Five includes an analysis of the findings, conclusions and recommendations. The Appendices include a listing of acronyms and a glossary of terms used within the study.
CHAPTER II

REVIEW OF SELECTED LITERATURE

This chapter reviews selected literature in two categories related to the study. These two categories are indicators of success in higher education and indicators of success in nursing education. The purpose of this review was to identify possible variables which could be studied as admission criteria for LPNs entering an ADN ladder program.

Predictors of Success in Higher Education

In reviewing the literature concerning indicators of success in higher education, it quickly becomes evident that "success" is defined in two different ways. Some researchers define success in higher education as a high level of achievement in academic endeavors. Other researchers define success in higher education as the level of achievement in the work world which follows the educational experience. For both definitions of success, test scores, grades, subjective evaluations, aptitude and attitude measures, and demographic data have been evaluated for their level of relationship or...
predictive value.

Prediction of success in educational endeavors has received considerable attention in the literature and it is generally accepted that past academic performance is the best predictor of future academic performance. Terman and Ogden (1947), in their classic study, found that intellectually gifted individuals completed higher levels of education and earned more scholastic honors than those who were less gifted. Likewise, Jensen (1973) identified a high degree of predictability between IQ and higher status occupations defined as those requiring attainment of the higher educational levels. Hoyt (1966) while indicting the use of college grades as predictors of adult success, acknowledges that in one study a "significant correlation was found between GPA and amount of additional higher education" (p. 72).

Further, regarding the predictive ability of GPA, Dallam and Dawes (1981) reported that "first semester GPA [in college] was the most potent predictor of graduation (correlation .68)" (p. 159). Chase (1981), Schwartz and Wilbur (1981), Trusheim and Crouse (1982), and Weitzman (1982) all agree that high school rank (HSR) is the most important predictor of first semester GPA in college. These studies provide evidence that academic performance levels tend to remain consistent
throughout an individual's educational career and may, therefore, be useful as predictors of future academic performance.

Academic aptitude tests, tests specifically designed to predict future academic performance, have also been widely researched in trying to identify actual predictive capability. Of such aptitude tests, McClelland (1973) states that "aptitude test scores are correlated highly with grades in school" (p. 1). He believes this to be the case primarily because aptitude tests were originally developed from exercises teachers used in school and the continued similarity should logically contribute to high levels of correlation. Two of the most commonly used academic aptitude tests are the American College Test (ACT) and the Scholastic Aptitude Test (SAT) each of which has several components. The ACT test scores appear to have consistent and reasonably good validity when used alone or with other predictors according to Crooks (1980) and Dallam and Dawes (1981), researchers who have reviewed numerous studies involving ACT.

The SAT, while still widely used, has been the subject of considerable controversy in the past few years. Trusheim and Crouse (1982) observed that adding SAT scores to multiple regression equations for predicting
first year college GPA typically increases the multiple correlation by only .04 to .07. Trusheim added further that when "selection strategies with and without the SAT are compared, the SAT appears to add virtually no additional information that would help the typical college to maximize the percentage of correct admissions decisions" (p. 61). In contrast, Weitzman (1982) developed a special correlation formula for use with SAT scores and states unequivocably that they are valid predictors of first year college GPA. A further concern about SAT, according to Weitzman, is its apparent tendency to favor upper versus lower socio-economic groups to a greater degree than does high school rank. In a study by Chase (1981), SAT scores and HSR were both used in the prediction of first semester GPA and the HSR proved meaningful while SAT scores did not—a finding corroborated by Schwartz and Wilbur (1981). It appears, then, that the ACT has been found to be the more useful predictor of success in higher education than the SAT when success is defined as academic performance.

Specialized assessment for specific skills or characteristics as they relate to proficiency in specific occupational programs are additional potential predictors of educational success. For example, Ghiselli (1966) found that motor ability test scores were related
to proficiency as a vehicle operator. McClelland (1973) expands this concept further in finding that specialized test scores show significant positive correlations with certain job skills, that is, "perceptual speed with clerical proficiency" (p. 6).

Additional support for specialized testing comes from Berg (1970) who described several studies by Brockaw, Humphrey, Anderson, and others (pp. 148-155) which were done in the armed services and strongly support skill aptitude testing and the matching of skill aptitudes to specific jobs. The search for occupation-specific predictors is also being conducted at professional educational levels as evidenced in a study completed by Arnold, Calkins, and Willoughby (1983). In this study a wide range of variables including specialized aptitude tests, interview results, and reference ratings were explored for value in predicting success in medical school and beyond. An interesting aspect of the Arnold et al. (1983) study was the unexpectedly high level of predictive capability of high school teacher references and interview results for level of residency clinical performance in medical school.

Crooks (1980) attempted grade prediction with context-specific predictors and reached some interesting conclusions. He compared the predictive ability of
general college admission variables—ACT scores, School and College Ability Test (SCAT), and high school percentile rank (HSPR)—to the predictive ability of course-specific measures. In this case the course was physics and the course-specific predictors were specific physics related mathematics skills, physics knowledge and previous study of mathematics and physics. Crooks found both types of testing scores to have a positive relationship with physics grades but the course-specific predictors were stronger. Crooks suggested that the limited success of predictive studies is due to the general nature of predictors such as ACT and SAT scores and HSPR and that this type of testing may not be well suited for differential prediction.

Research in the area of predicting success in the world of work has been less rewarding than that exploring predictors of academic success. Some researchers espouse a relationship between academic success and occupational success, others suggest that there is no relationship, and still others believe that when a relationship is identified, it is an artifact.

Hoyt (1966) conducted a review of research involving college grades as related to adult accomplishment in the work world. Based on his review, Hoyt strongly asserted that "college grades have no more than a very
moderate correlation with adult success, no matter how it is defined" (p. 72). Berg (1970) in his book suggestively entitled Education and Jobs: The Great Training Robbery, stated that there is strong "evidence to support the proposition that educational credentials as such have relatively little bearing on [job] performance" (p. 175).

More specifically, McClelland (1973) presented a convincing case against using general aptitude or intelligence tests for predicting job success. He found support for this contention in the research of Thorndike and Hagen (1959) who studied 10,000 respondents and found no correlation between aptitude test scores and various measures of occupational success. Several researchers (Hudson, 1960; Taylor, Smith, & Ghiselin, 1963; Thorndike & Hagen, 1959; Wing & Wallach, 1971) attempted to relate college grades, attitude tests, and amount of education with occupational success in specific areas and consistently found that no relationship existed.

In contrast, the Terman and Ogden 1947 study, cited earlier, indicated that "giftedness" is positively related to life success. Ghiselli (1966) reported that general intelligence test scores were meaningfully related to trainability and proficiency across all types of jobs. However, he reports that general intelligence
test scores correlate at 0.42 with trainability and at 0.23 with proficiency scores which does not seem to support his contention. Jensen (1973) has provided more recent support for the intelligence/life success relationship. With regard to the relationship of high IQ or "giftedness" to life success, however, McClelland (1973) contended that the relationships of opportunity, motivation, socioeconomic status, and language ability to "giftedness" and to success have not been adequately studied and that those factors could as well explain the success of "gifted" individuals.

In summary, the literature provides strong evidence that in higher education past academic performance remains the strongest predictor of future academic success. Academic aptitude tests, especially ACT, also appear to be useful in predicting academic performance. However, the search continues for new and more valid predictors and some researchers are finding predictive capabilities in specialized testing and assessment for specific skills and for professional education. This includes performance of those skills in practice components of educational programs such as medical school. In contrast, neither past academic performance nor intelligence test scores have been found to be clearly related to practice components of educational programs or work success.
These concepts will now be explored more specifically as they relate to nursing education.

Predictors of Success in Nursing Education

The search for predictors of success in nursing education, on the LE, and in nursing practice has been lengthy and varied. The largest portion of the studies conducted have involved BSN and ADN programs. Fewer studies are available dealing with DN programs and still fewer with PN programs. This difference presumably occurs since DN and PN programs have not traditionally been established in the collegiate setting and the majority of instructors and administrators have been Diploma graduates who often have not had a research orientation.

As in higher education, success in nursing education is subject to various definitions in the literature. It may be defined as GPA in the first year of the program, completion versus non-completion, GPA in nursing courses in theory, practice, and/or overall, LE scores, and job performance after graduation. These various definitions of success contribute to wide variations in the studies done.

There is an interesting variety of admission criteria used by schools of nursing to screen and select program applicants. In an extensive nation-wide study
conducted by Schwirian (1978), 150 schools of nursing were selected in a stratified random sample which was representative of the United States by geographic regions, public and private institutions, and by program types—including BSN, DN and ADN programs. One aspect of this study involved identification of admission criteria used by schools of nursing. For all three types of programs, no less than 63 admission criteria were identified. When Schwirian (p. 177) asked respondents to rank the "four most critical criteria," the following criteria emerged in descending order of frequency—high school GPA, ACT scores, HSR, interview, health data, college GPA, SAT scores, personal references, NLN test scores, biographical data, ethnic and racial background, autobiographical essay, and Minnesota Multiphasic Personality Inventory (MMPI) scores.

Schwirian (1978) also requested schools to identify program measures used as "predictors of subsequent performance of their nursing students" (p. 159). The variety of admission criteria identified above notwithstanding, only three criteria were consistently identified as predictors—NLN, ACT, and SAT scores. "Fewer than 3 percent of the respondents used any other cognitive, personality, attitudinal, or vocational assessment tools," according to Schwirian (p. 159). While these
three criteria—NLN, ACT, and SAT scores—appear frequently in nursing student performance prediction research, many others of the aforementioned "critical criteria" also appear in studies.

Schwirian (1978) ascertained that in those schools studying the predictive capability of admission criteria the NLN, ACT and SAT scores were valued moderately as predictors of academic performance and achievement on the LE. However, these same scores were considered of little to moderate value in predicting program completion and of little significance in predicting performance in nursing practice courses. No assessment was sought by Schwirian as to how these predictive capabilities were identified or their value in predicting success in graduate nursing practice. Subscales on the various tests were not examined for predictive or correlational relationships with academic and demographic variables.

The difficulty created by the several definitions of success in nursing and the variety of admission criteria is that there are numerous studies yet little replication since each study involves a different combination of criteria. The remainder of the literature review will examine studies as they relate to the various definitions of success in nursing education—first
year nursing program GPA, completion versus noncompletion, GPA in nursing courses in theory, practice, and/or overall, LE scores, and job performance after graduation. Further differentiation of the studies as they relate to the identified criteria of success will be on the basis of types of predictors—academic, personal characteristics, and demographic data—when possible. For example, for beginning year nursing program GPA, academic predictors will be reviewed first, then personal characteristics, and finally demographic data. In many cases, the type of program being studied will be identified since there are implications for interpretation of results and application of findings.

Prior to reviewing studies related to prediction of first year nursing program GPA, the general structure of the four types of nursing programs will be described since the structure of the programs may influence interpretation of study results. (These descriptions are also included in the Appendix B.)

1. Practical Nursing program—most of the content in the one year program is specific to nursing. There are few if any general education courses.

2. Associate Degree in Nursing program—half or more of content in the first year of the two year RN program is usually nursing. General education
requirements are usually limited to English, social and biological sciences.

3. Diploma Nursing Program—most commonly the first year of the two to three year hospital based RN program is predominantly general education and includes few nursing specific courses. The second year and third year (if offered) are predominantly nursing courses.

4. Baccalaureate in Nursing program—the four year RN program tends to have two years of general education including social and biological sciences followed by two years primarily devoted to nursing specific courses.

**First Year Nursing Program GPA**

There are numerous studies involving prediction of first year nursing program GPA. Early researchers, Munday and Hoyt (1965), studied seven nursing programs including two DN programs, and five BSN programs. Using ACT scores and local academic predictors (those criteria specific to each program such as NLN tests, reading scores, HSR, and high school GPA), the ACT scores in both types of schools correlated more strongly than the local predictors with first year nursing program GPA. Alichnie and Bellucci (1981), in a cross validated study involving BSN students, found that both the Aptitude Test for Nursing and SAT scores correlated positively
but the Aptitude Test for Nursing had the higher correlation with first year GPA in both the criterion and cross-validation groups. Oliver (1985) found that high school biology and English grades and HSR correlated with the beginning GPA for the ADN student. Since the first year of an ADN program usually includes English and biological science, this finding seems appropriate.

In the studies cited above, traditional cognitive predictors, such as ACT, SAT, and high school GPA, designed to reflect academic potential in the collegiate setting appear to do just that even though there is inconsistency in which academic predictors are best. These results are consistent with the findings for higher education in general especially since DN and BSN programs include primarily general education courses in the first year. However, the stronger correlation of the nursing specific test used by Alichnie and Belluci (1981) over the SAT is consistent with Crooks' (1980) findings that course-specific indicators tend to show stronger correlations than general indicators.

Completion Versus Noncompletion

Various studies have been completed using academic predictors in attempting to identify program completers. Costello (1974) studied ACT scores, HSR, and age in
relation to completion in three ADN programs. In this study ACT Natural Science scores, ACT Social Science scores, HSR and age were each significant in at least one school but in regression equations explained only 5 to 9% of the variance between groups. Stankovich (1977), also studying ADN programs, found high school GPA and the college Anatomy and Physiology grade to be positively related to program completion. Oliver (1985), reviewing an ADN program, also found HSR, biology and English grades to be useful predictors of completion. The findings relative to ADN programs seem to suggest that overall high school performance, level of science ability (ACT Natural Science score, college Anatomy and Physiology grade, and high school biology grade), and possibly social science grades are positively related to nursing program completion.

In studies involving BSN programs, Clemence and Brink (1978) found that the Anatomy and Physiology grade did not relate to program completion but that college social science and liberal arts GPA were positively related to program completion. Richards (1977) found IQ and SAT Verbal and Mathematics scores were significantly higher for completers than for noncompleters. Further, Alichnie and Belluci (1981) found higher intellectual factors to be positively correlated with completion in
BSN programs, specifically nursing and science GPA. The evidence from studies of prediction of BSN program completion, as in ADN programs, suggests that a variety of academic performance indicators may predict program completion—GPA in several areas, IQ, ACT and SAT scores.

Zagar, Arbit, and Wengel (1982) found, in DN programs, ACT scores to be better predictors than the MMPI or the Edwards Personal Preference Survey (EPPS) but the ACT only identified 12% of the variance. Here again, even though the relationship is not strong, the positive nature of the relationship of academic performance to program completion is evident.

Summarizing the studies related to prediction of nursing program completion, regardless of the type of program, high academic performance seems to be a useful predictor of nursing program completion. These relationships are not strong but they do seem to be consistent.

Numerous personality and demographic variables have also been studied attempting to predict completion versus noncompletion of nursing programs. Baker (1975), studying students in five ADN programs, found certain personal and psychological factors related to program completion—namely, the older, married student who displayed a higher achievement orientation, a higher sense
of responsibility, more self-control, and greater acceptance of the values of others. In another study involving nonacademic predictors in an ADN program, Oliver (1985) found that the older ADN student with previous college experience was more likely to complete the program. Stankovich (1977) noted that the older student was more likely to complete the program but this was true only through age 35. Beyond that point, the likelihood of completion decreased. Stankovich also found that, while prior academic performance was a better predictor of ADN program completion, the married student was significantly more likely to complete than the unmarried student but no explanation for this was offered.

In BSN programs, however, these demographic variables seem less meaningful. Clemence and Brink (1978) found no relationship between age, prior non-nursing work, and nursing experience and BSN program completion. However, leadership potential and critical thinking were found to be related to BSN program completion by Richards (1977).

In comparing completers with noncompleters of a DN program, Mowbray and Taylor (1967) used the Kuder Preference Test (KPT) and the Strong Vocational Interest Blank (SVIB). They found that the score on the KPT
differentiated at a significant level while the score on the SVIB did not. Nonpredictive capability of personality and preference measures is reported by Zagar et al. (1982). They studied the MMPI and the EPPS and found these variables unrelated to DN program completion.

To summarize, the results of studies attempting to identify nonacademic predictors of program completion are generally inconclusive or contradictory. While certain personality or demographic factors have been identified as stronger predictors of program completion than others, intellectual measures appear to be consistently stronger than other factors when compared in the same study. At the same time personal and demographic factors seem to be emerging as more capable predictors in ADN programs than in DN and BSN programs. This finding suggests that it may be helpful to further examine various personal and demographic factors such as age and marital status for LPNs entering an ADN ladder program.

GPA in Nursing Courses

The search for predictors of GPA in nursing theory courses, nursing practice courses, and/or overall nursing program has been extensive. Nursing theory courses are those courses included in the nursing curriculum.
which are taught in the classroom format, deal specifically with the practice of nursing and are open only to nursing students (see Appendix B). Nursing theory GPA is computed on all nursing theory course grades combined. Nursing practice courses are open only to nursing students and are conducted in a health care agency in which student nurses perform nursing functions under the supervision of a nurse instructor. GPA in nursing practice courses is computed on all nursing practice course grades combined. Overall nursing GPA is computed on all the grades in these two types of nursing courses.

In the search for predictors of success in nursing courses as measured by GPA, researchers again have relied on academic, personal and demographic variables in various combinations.

Jones (1977), studying ADN students and Zagar et al. (1982), studying DN students, found that ACT scores were significantly related to success as measured by overall nursing GPA. Conversely, Aldag and Rose (1983), Costello (1974) and Kochey (1973) all found that ACT scores were unrelated to overall nursing GPA for ADN students.

Ledbutter (1968) examined the relationship between ACT scores and both nursing theory and nursing practice course GPA for BSN students. A positive relationship
between ACT scores and nursing theory course grades was found but no relationship between ACT scores and nursing practice grades was evident. For BSN students, ACT scores combined with prenursing GPA was found to be a strong predictor of overall nursing GPA by Wittmeyer et al. (1971) who also found that personality and value factors did not increase the predictive ability of ACT scores and prenursing GPA.

Aldag and Rose (1983) identified a negative age bias on the ACT test as reported by the American College Testing program (1973). Since ADN students tend to be older than BSN or DN students (Vaughn, 1981), this may be a significant factor in attempting to predict ADN student success using ACT scores. In relation to this factor, it is interesting to note that Ledbetter (1968) and Wittmeyer et al. (1971) were studying BSN programs and found positive relationships between nursing GPA and ACT scores while Aldag and Rose (1983), Costello (1974), and Kochey (1973) were all studying ADN students and found no relationship.

Another academic predictor of overall nursing GPA, college prenursing GPA, was studied by Burgess, Duffey, and Temple (1972), Donsky and Judge (1981), Seither (1980), and Wittmeyer et al. (1971). In each case prenursing GPA was a strong predictor of overall nursing GPA.
GPA especially if combined with ACT (Wittmeyer et al.), SCAT (Burgess et al., 1972), high school biological and behavioral science GPA (Seither) or age (Donsky & Judge, 1981). A noteworthy finding of the Donsky and Judge study was that age and prenursing GPA were the strongest predictors with age being stronger—again ADN students.

Backman and Steindler (1971), Capoor (1982), Donsky and Judge (1981), Jones (1977), Seither (1980), Stankovich (1977), and Tillinghast and Norris (1968) explored a variety of preadmission criteria available from high school records as they related to overall nursing GPA. All of these researchers were studying ADN students except Seither who used a BSN population. High school GPA was identified as a useful predictor by Capoor, Donsky and Judge, Stankovich, and Tillinghast and Norris. High school biology grades were found to be useful predictors, as well, by Stankovich and Seither. Jones found HSPR to be of no value but Seither found a strong relationship and Backman and Steindler found a low to moderate relationship between HSPR and overall nursing GPA. Seither also found that class size and the SVIB had no predictive value. Donsky and Judge found ACT scores added little to the predictive capability of age and high school GPA while Backman and Steindler found SAT verbal scores to be moderately predictive of overall
nursing GPA. Capoor found high school GPA, scores on the Aptitude Test for Allied Health Programs, and scores on the Interest and Background survey to be most valuable as predictors from among pre-admission variables studied. Overall, these studies seem to suggest that the best predictors of overall nursing GPA from high school data would be high school GPA and biology grades.

Tests have been developed for the specific purpose of identifying students capable of attaining satisfactory grades in a nursing program. Capoor (1982), Goodwin and Arbuckle (1975), and Kormorita (1971) each studied scores from a different type of such an examination in relation to nursing GPA. The Comparative Guidance and Placement Battery forecast was determined by Goodwin and Arbuckle to have a strong correlation with overall nursing GPA and Capoor found the Aptitude Test for the Allied Health Programs to be a very useful predictor, also. However, the entrance examination score studied by Koromorita was found to be a poor predictor of nursing practice GPA. Noteworthy here is that an academic predictor was seemingly ineffective for predicting nursing practice GPA.

Another area of predictors of nursing theory and practice GPA, the personality characteristics of students, has been examined by various researchers.
Kormorita (1971) explored the relationship between self-concept/other-concept and nursing theory and practice grades. The relationship between self-concept/other-concept was positive with theory and practice grades but was consistently higher with practice grades. Self-concept measures were also found to be stronger predictors of practice grades than prenursing GPA. In contrast, Richards (1977), studying only attitude, values, and personal variables, found significant correlation of these variables with both nursing theory and practice GPA but less strong for practice. Zagar et al. (1982), using ACT composite score, MMPI and EPPS found ACT scores to be the best predictor of overall GPA with little improvement noted by adding MMPI and EPPS. In general, personality characteristics do not seem particularly useful in predicting nursing theory GPA but personality characteristics may be more useful than academic performance for predicting clinical practice GPA.

To summarize the research relating to prediction of nursing theory, practice and overall GPA, it would appear that the best predictors of overall nursing GPA and nursing theory GPA are ACT scores (except possibly in the case of ADN students), prenursing GPA, and high school grades—all academic measures. To be considered here is the factor that generally nursing theory credits
constitute a higher proportion of nursing course credits than nursing practice course credits. When nursing theory and practice grades are separated and the relationships are explored, academic predictors seem less useful and certain personal and value factors seem to be more meaningful in predicting practice grades. This is consistent with the research mentioned earlier concerning physician's practice courses yet the evidence is limited and inconsistent.

Performance on Licensure Examination

A crucial measure of success in nursing education, licensure examination (LE) performance, has received considerable attention in the literature. As with other academic measures of success, academic predictor variables appear to have the strongest predictive capabilities. Ledbetter (1968) found ACT scores to be significant predictors of LE scores and this was supported by Aldag and Rose (1983), Froman and Owen (1984), Jones (1977), Stankovich (1977), and Wittmeyer et al. (1971). In the Jones, Ledbetter and Wittmeyer et al. studies, ACT scores were stronger predictors of success on the LE than prenursing or nursing GPA. In the more recent studies of Froman et al. and Stankovich, nursing course grades and ACT scores were both predictors of LE scores.
but nursing course grades were stronger predictors of LE scores than ACT scores. In these studies, three ADN and three BSN programs are represented with the findings divided nearly evenly between the two types of programs.

The predictive ability of SAT scores as related to LE scores was compared with nursing and nursing related course grades by Muhlenkamp (1971) and Reed and Feldhusen (1972). In the Muhlenkamp study, the SAT scores were not significant and in the Reed et al. study the SAT Verbal score alone was more significant than nursing GPA in predicting LE performance. In a study by Krupa (1983, p. 65) it was noted that as students' SAT Mathematics and Verbal scores rose the rate of failure on the LE decreased. SAT Mathematics correlated at .36 with LE score while SAT Verbal correlated at .52. Backman and Steindler (1971) and Tillinghast and Norris (1968) also found SAT verbal scores to be consistently more strongly related to LE scores than SAT mathematics scores. The stronger and more consistent predictive ability of ACT scores over SAT scores seems evident here as in the general education area yet the consistent relationship of SAT verbal scores to LE scores suggests the need for further study.

The NLN has developed several objective tests which are specifically designed to identify the level of
knowledge in various areas of nursing education. In several studies in which these NLN test scores were used to predict performance on the LE, these scores showed useful predictive capabilities. Krupa (1983, p. 65) found six different NLN achievement test scores to correlate with LE scores in a range of .42 to .74. Brandt, Hastie, and Schumann (1966) found nursing theory grades to be stronger predictors than NLN test scores for LE scores but both were significant. Similarly, Muhlenkamp (1971) found that seventh semester nursing GPA was stronger than NLN test scores in predicting LE score but found NLN scores significant as well. Baldwin, Howbry, and Taylor (1968), Capoor (1982), Ledbetter (1968) and Melcolm, Venn, and Bausell (1981) all found NLN scores to have a higher predictive value for LE scores than nursing theory grades. These studies included ADN, DN and BSN programs and it appears that the academic measures, NLN test scores, have consistently been predictive of successful performance in ADN, DN, and BSN education as measured by the LE score—also an academic measure.

Breyer (1984) reports that the NLN Comprehensive Nursing Achievement Test, which is designed to measure terminal RN student competency, correlates at .712 with the NCLEX-RN score. There are also NLN knowledge level PN tests and an NLN comprehensive nursing achievement
test for graduating PN students as well as the PN pre-admission test discussed in this study. There is a lack of data dealing with the PN pre-admission, the PN knowledge level, or the PN comprehensive achievement tests.

Several studies have involved nursing theory and nursing practice grades as predictors of success on the LE. Nursing theory grades were found in all studies but one in a DN program (Baldwin et al., 1968) to be positively related to LE scores. Brandt et al. (1966), Dubs (1975), Froman and Owen (1984), Melcolm et al. (1981), and Yocum and Scherubel (1985) all agree that in BSN programs nursing theory GPA but not nursing practice GPA is related to success on the LE. Krupa's (1983, p. 66) study found the greatest difference in nursing theory GPA between students who passed and failed the LE and the least difference in GPA of practice course grades of those who passed and failed. Pearson r correlations in the Krupa study showed that grades in six nursing theory courses correlated between .41 and .47 while each nursing practice grade correlation was below .20.

Jones (1977), Larkin (1977), Ledbetter (1968) and Muhlenkamp (1971) combined nursing theory and practice grades in studies of ADN and BSN students attempting to predict LE scores. These grades were also strongly predictive of success but this positive relationship may
be due primarily to the theory component which usually constitutes a higher proportion of the overall GPA.

As a predictor of LE scores, prenursing GPA, defined as high school or college GPA prior to entry into nursing courses, was studied by Froman and Owen (1984), Krupa (1983), Reekie (1970), Stankovich (1977), Wittmeyer et al. (1971) and Yocum and Scherubel (1985). Reekie and Wittmeyer et al. found prenursing GPA for BSN students to be a stronger predictor than personality factors for LE scores. Stankovich compared prenursing GPA for ADN students and demographic data and also found GPA to be the stronger predictor and noted that demographic data did not contribute to predictive capability. The descriptive study of Krupa (1983) illustrates also that the higher prenursing college GPA is related to higher success rates on the LE. Froman and Owen and Yocum and Scherubel, consistent with previous findings regarding BSN students, noted the strong correlations between prenursing GPA and LE scores. Summarizing, it appears that prenursing GPA can be a valuable predictor of LE performance and that personality and demographic variables are less meaningful.

Backman and Steindler (1971), Jones (1977) and Reed and Feldhusen (1972) all included HSR is attempting to predict success on the LE for ADN students. ADN
students tend to be older than other nursing students and the number of intervening variables from the time of high school graduation may render the HSR less meaningful than for the younger student. This may serve to at least partially explain the lack of relationship between HSR and LE success for ADN students.

Mueller and Lyman (1969) completed an extensive cross validation study of 38 factors as predictors of success on the LE. There were academic and aptitude factors—NLN test scores, pre-nursing aptitude test battery scores, HSR and nursing course grades; personality factors—ego strength, practical-imaginative tendencies, affective traits, and dominance-submissiveness traits; and demographic factors—parents' years of schooling, birth order, and size of graduating class. This study is unique in the combination of factors studied and the findings present a strong case for ranking predictor variables for the LE from highest to lowest in the general categories of academic, personal and demographic factors. The academic variables in Mueller's study were generally highly related to LE success, the personality factors were less strongly related and the demographic factors showed no relationship at all.

One demographic variable—age—appears to have some
relationship to LE scores. This occurred primarily in studies of ADN programs and a recent BSN study. In the Aldag and Rose (1983) study, the ages were grouped in spans of 10 up to 39 years of age and those over 40 years of age were grouped together. The 30 to 39 year olds exhibited the highest LE success rate and those over 40 years old exhibited a lower success rate. In the Capoor (1982) study, the highest pass rate occurred in the 31 to 50 age group and the success rate decreased in the over 50 age group. Donsky and Judge (1981) identified age to be a strong predictor of LE success with a median age of 25 in that study population. Reed and Feldhusen (1972), studying five ADN programs, found that the student's age in months was significantly related to LE scores. Jones (1977), in a cross validated ADN study, found that age was equal to academic measures in predicting success and Froman and Owen (1984), the only BSN study, found that older students performed significantly better on the LE. The Donsky and Judge, Reed and Feldhusen, Jones, and Froman and Owen studies did not identify students by age group.

Regarding predictors of success in nursing education when success is defined in terms of the LE score, it appears that academic performance on standardized nursing tests, in prenursing courses and in nursing
theory courses are the strongest predictors. Emerging in more recent studies involving primarily ADN programs, age seems to contribute positively to predictions of the LE score. Nursing practice course grades alone show low or no correlation with the LE score in the few studies which look at them as a separate entity. Other personal and demographic data appear to contribute very little to predicting successful LE performance.

Relative to the change in focus, format and score reporting of the LE for RNs, only Breyer (1984), Froman and Owen (1984) and Krupa (1983) based their studies on performance on the new examination. As mentioned, nursing theory GPA, NLN Comprehensive Nursing Achievement Test, and age were found to be related to LE score but little new evidence came to light from these studies.

**Success in Job Performance**

The studies designed to identify predictors of success in job performance as a licensed nurse have been generally unsuccessful. In 1966, Blaylock reported that no factors about the school, the program, the faculty, nor the curriculum were related to job performance. Bohan (1967) studied graduates from 40 programs and found no relationship between course grades and work performance evaluations. Brandt and Metheny (1968) and
Dubs (1975) found a moderate correlation between nursing practice course GPA and graduate performance on the job. Richards (1977) found that nursing practice and theory grades along with the NLN score in Public Health were useful predictors of work performance while Girona (1970) and Seither (1980) found a positive correlation between self-concept and graduate performance but the return rate in these studies was very low. Reekie (1970) found that sophomore GPA was the best single predictor of graduate performance when compared with personality and demographic data. Wilson, Lange, and Pockwood (1974) studied a range of academic achievement variables along with age and experience and found no relationships to graduate performance.

It appears that some of the difficulty in predicting graduate performance lies in the lack of an acceptable tool for measurement. In the studies reviewed, performance was measured with unique instruments such as the Alice Price Efficiency Scale (Blaylock, 1966), instructor evaluation of success (Girona, 1970), Clinical Nurse Rating Scale (Reekie, 1970) and a study specific questionnaire (Dubs, 1975; Wilson et al., 1974). In the Dubs study, which identified a positive relationship between clinical practice grades and performance in practice, this difficulty became
particularly evident. The performance rating scale was developed by instructors from their school's terminal objectives and used by the same instructors who were evaluators in the study. It comes as no surprise, then, that practice ratings correlate with clinical grades. In the Seither (1980) study, self-evaluation and supervisor ratings were used but the return was so low that very little validity can be attributed to the findings. Clinical practice grades would appear to bear some relationship to graduate performance but much work remains to be done in this area.

**Practical Nursing Students**

With regard to practical nursing students, Bledsoe (1981) studied the graduates of several PN schools in an effort to identify predictors of success with success defined by LE scores and job performance. At this educational level, the nursing practice grades were the best predictors of the LE score. Also there was a strong relationship between LE score and job performance as measured by the Minnesota Satisfactoriness Scale. These findings, while unsubstantiated by other studies, suggests a much different relationship between practice course grades, LE scores, and graduate performance for the PN than is seen in ADN, DN, and BSN—Registered
Nursing—education and practice.

Conclusions

The review of literature is based on the conceptual hypothesis of this study—success of an individual in an educational endeavor can be suggested by certain past performance indicators. More specifically, in nursing education, which admission criteria available for the LPN applicant to an ADN program may be useful for predicting success in that program?

In the literature review process, studies of predictors of success in general education, professional education, and all types of nursing education were used to gain a broad perspective. In all areas, success was found to be defined in two different ways—success in the educational setting and success in the work world following graduation. When success is defined in terms of the level of performance in the educational setting, the literature reveals that previous academic performance is the best predictor of future academic performance in all three educational areas. In nursing education, the strongest academic predictors of program success appear to be the ACT, SAT, various NLN test scores, and nursing theory GPA. The less useful predictors appear to be nursing practice course GPA, personality
factors, and demographic data. The one exception concerning demographic data may be in ADN programs where age emerges in some studies as a useful predictor of program completion, nursing theory GPA, and LE score.

A conspicuous gap in the literature exists concerning predictors of success for LPNs who enter an ADN ladder program. There are studies dealing with a variety of predictors for students as they enter into, progress through, and graduate from ADN, DN, and BSN programs. Only one study of PN students was found and that study focused on practical nursing at a termination level rather than as a beginning of another educational level.

A further consideration, not mentioned in any of the literature reviewed, is the heavy credit hour load carried by nursing students. The option exists for students to complete certain required non-nursing courses prior to entering the nursing curriculum or to complete all the nursing and non-nursing courses in the curriculum within one year. By completing general course work prior to entry into nursing courses, the credit hour load is reduced. This researcher, based on personal observation and a desire to advise students wisely, believes that research in this area is needed. A further area to be explored in this study, then, is whether the number of courses completed prior to
enrolling in nursing courses relates to success in the nursing program.

These findings suggest certain hypotheses to be studied and these lie primarily in the academic area. The choices of factors to study are limited since LPNs frequently have only one year of post-secondary education and that is almost entirely nursing course work. Further, areas subject to study will be limited to information which can, by law, be available to the admitting college. This limitation precludes the use of age and PN licensure examination score. As a means of approaching the age question indirectly, the number of years since graduation from PN school will be studied. The use of years since PN graduation will give an indication of age but it is also recognized that this variable may also be reflective of background experience as well as maturity and other factors.

Considering the above findings and limitations, success of LPNs in an ADN ladder program as indicated by nursing theory and clinical course GPA and LE score will be studied as related to years since PN graduation, PAAPN scores, GPA in PN courses, and number of courses completed prior to enrolling in nursing curriculum.

In the following Chapter, the methodology of the study will be described.
CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

The methodology of the study to identify possible predictors of success for LPNs entering an ADN ladder program is described in the following pages. Attention will be focused on the population and sample, operational definitions and hypotheses along with data collection and analysis procedures.

Population and Sample

This study was conducted in a small public community college which offers a PN/ADN ladder program and serves a rural and small town area in west central Michigan. The college converted its PN program to a PN/ADN ladder program in 1981. Graduates of the PN program desirous of continuing into the ADN program could do so by meeting required nursing GPA and course work requirements.

The criteria for admission into the PN program include the composite score on the PAAPN and high school GPA, GPA in 12 credit hours of college work relevant to nursing, or General Educational Development (GED) test scores. Individuals are ranked based on a combination
of these two criteria and admission is by rank from highest to lowest. The admission and progression processes in effect at this college permit study of the PAAPN scores as they relate to ADN performance.

PN graduates from any nursing program were admitted into the second year of the program. However, PAAPN scores were not available for these individuals and often the performance of these students in clinical course work was not indicated by a grade. In some schools pass/fail evaluation was used and in others clinical grades were combined with theory grades. This lack of data necessitated omitting these individuals from the study.

The subjects under study are PN graduates of this college who also graduated from the second year of this PN/ADN program but not necessarily in successive years. These persons began the nursing courses in the ADN curriculum between September 1981 and September 1984. Students who continued directly into the ADN program and LPNs who returned to the ADN program met similar but somewhat different criteria.

For the continuing student, the criteria were completion of English Composition I and General Psychology, evidence of proficiency in mathematics and biology, and completion of all nursing courses with a GPA of 2.5 or
higher. However, these applicants were ranked by first semester nursing course GPA since the admission process was completed prior to their completion of the PN program. Admission was granted according to GPA by ranking from highest to lowest. Despite the possibility of excluding certain students in each year, all students who desired to progress and who met the criteria were able to do so.

For the returning LPN, the criteria also included completion of English Composition I and General Psychology, evidence of proficiency in mathematics and biology, and PN GPA of 2.5. In addition, verification of one year of nursing experience was required if PN graduation was in excess of five years previous to admission. Applicants who did not meet the requirement of PN GPA of 2.5 could be considered for admission by completing 12 credit hours of nursing related course work at the college level with a GPA of 2.0. Applicants who met the criteria by the application deadline were admitted by date of application. There were many applicants among this group who were not admitted due to the lack of space.

The two processes just described reflect a selective admission process but at the same time allow applicants with PN GPAs in the lower ranges to be admitted.
The benefit of these processes in conducting this study is that the range of academic ability of this population is not limited to those students who achieved the highest PN academic levels.

From 1981 to 1984, a total of 116 PN graduates and LPNs were admitted to the ADN program. Of these students, one is still enrolled, six withdrew or failed, and data is incomplete for 30 graduates (primarily graduates of other PN programs). A total of 79 students are included in this study and all students successfully completed the ADN curriculum by June of 1985. All 79 of the students completed the ADN courses within three years but most did so within one year. The non-nursing courses which were required of students in the ADN curriculum were completed prior to or concurrently with nursing theory and practice courses. There was no time limitation in effect for the non-nursing courses.

The low cost and open admissions policy of community colleges attract large numbers of non-traditional students including minorities, single parents and older adults (Allen & Hoddick, 1983; Daniel & Cozart, 1980). Statistical information gathered by the NLN on the marital status of newly licensed nurses in 1982 is reported in the NLN Nursing Data Book 1983-84 (1984, p. 122). As shown in Table 1, the study population parallels the
national population very closely when compared by marital status. In both populations, married students comprise a majority of the newly licensed AD RNs.

Table 1
Comparison by Marital Status of Study Population With National Population of Newly Licensed Associate Degree Nurses in 1982

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Group</th>
<th>%</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never Married</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982 AD RNs</td>
<td>32</td>
<td>8,598</td>
<td>54</td>
<td>14,564</td>
<td>12</td>
<td>3,439</td>
<td>1</td>
<td>269</td>
<td></td>
</tr>
<tr>
<td>Study Group</td>
<td>28</td>
<td>22</td>
<td>51</td>
<td>40</td>
<td>20</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

n = 79

A similar correspondence with national trends is in evidence when comparison is done by sex. Nationally in 1982, 93.6% (24,701) newly licensed AD RNs were female and 6.4% (1,684) were male (NLN Nursing Data Book 1983-1984, p. 122). In the study population, 97.5% (77) were female and 2.5% (2) were male. The study population was
100% Caucasian while nationally 7.8% (6,514) of students enrolled in ADN programs were Black, 2.7% (1,950) were Hispanic, and 1.8% (1,244) were American Indian or Oriental in 1981 (NLN Nursing Data Book 1983-1984, p. 66).

While age is not a variable used in this study, comparison of the study population with the national

Table 2

Comparison by Age of Study Population and Newly Licensed Associate Degree Nurse Graduates in 1982

<table>
<thead>
<tr>
<th>Age</th>
<th>1982 AD RNs</th>
<th>Study Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>19 and under</td>
<td>0.2</td>
<td>54</td>
</tr>
<tr>
<td>20 to 24</td>
<td>34.1</td>
<td>9,166</td>
</tr>
<tr>
<td>25 to 29</td>
<td>25.4</td>
<td>6,828</td>
</tr>
<tr>
<td>30 to 34</td>
<td>17.4</td>
<td>4,677</td>
</tr>
<tr>
<td>35 to 39</td>
<td>11.2</td>
<td>3,011</td>
</tr>
<tr>
<td>40 to 49</td>
<td>9.5</td>
<td>2,554</td>
</tr>
<tr>
<td>50 and over</td>
<td>2.2</td>
<td>591</td>
</tr>
</tbody>
</table>

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population may enhance the usefulness of the data. Study population ages were determined from birth dates reported with LE results. The range in age of the study group was 20 to 61 with a median of 32. The national median age of newly licensed AD RNs in 1982 was 27.89 years (NLN Nursing Data Book 1983-1984, p. 121). Table 2 provides age comparison by ranges.

Holtzclaw (1983) predicted that college educated non-nursing majors would be entering nursing programs and that men would be common in this group. Of the 392 nursing students included in a study by Krupa (1983), 2% (8) of the students were pursuing a second degree. In this study population, 5% (4) of the students had a previous non-nursing profession and had entered nursing but none of these students were men.

Of the 79 students included in this study 40 (50.6%) continued directly through the two years of the PN/ADN program while 39 (49.4%) stopped for one or more years between graduating from the PN year and starting the ADN year. The number of full years between PN and ADN educational experiences ranged from 1 to 17 with the median being 4 years and the average being 7.4 years. Eighteen students (46%) of the 39 students who did not continue straight through had 1, 2 or 3 years between the PN and ADN educational experiences.
There were six non-nursing courses included in the ADN program. Students had the option of completing any number of them prior to or concurrently with the nursing courses. None of these courses was required for admission but, as Table 3 indicates, all but 11 of the 79 students had completed at least one of the six courses.

Table 3
Number of Non-nursing General Education Courses Completed Prior to Enrolling in Nursing Courses

<table>
<thead>
<tr>
<th>No. of Courses Completed</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>n</td>
<td>11</td>
</tr>
<tr>
<td>%</td>
<td>14</td>
</tr>
</tbody>
</table>

n = 79

One student of the 79 included in the population was unsuccessful on the LE. This equates to a 98.7% pass rate compared with 90% to 91.7% national pass rate range from 1982 to 1984 for all RN candidates and a 92% to 94% Michigan pass rate range for the same time period. ADN pass rate range in Michigan from 1982 to 1984 was 92.6 to 94.9%.
In the ADN curriculum being studied, there have been, throughout the time of the study, the same non-nursing courses included in the curriculum with one exception. The students starting in 1981 were required to complete Sociology and in subsequent years that course was replaced by State and Local Governments or National Government. All three courses are one semester, three credit courses in the social sciences area. The other non-nursing courses which were required were English Composition II, Anatomy and Physiology II, Elementary Microbiology, Chemistry for Health Sciences, and Moral Problems in Life Sciences. These courses, too, are all one semester courses of three or four credits. In a few instances, certain of these courses were taken at other colleges and transfer credit was granted.

From 1981 through 1985, no substantive changes were implemented in the nursing curriculum other than the aforementioned Sociology/Government change. One new nursing faculty member replaced a regular faculty member for one year and only one change in non-nursing course faculty occurred within that time frame. The sites for clinical courses in nursing remained unchanged and few supervisory nursing personnel changed in those sites. All students in the ADN program were assigned on a rotating basis to the same three hospitals and
comparable experiences were provided for all students in three similar Medical Care Facilities. Grading and evaluation practices have also remained relatively stable. This span of four years of relative stability in the nursing curriculum provides a unique opportunity for study since it covers the time immediately following the implementation of the new LE.

Operational Definitions

The following operational definitions have been developed for use in this study (also included in Appendix B).

1. Years since graduation from PN school—The number of full years from completion of PN program until start of nursing courses in ADN program.

2. ADN Student—Individual who is eligible to write the NCLEX-PN or who has successfully completed the NCLEX-PN and is enrolled in an Associate Degree in Nursing program.

3. NCLEX-PN score—standardized score earned by a Practical Nursing school graduate on the National Council Licensure Examination for Practical Nursing.

4. NCLEX-RN score—standardized score earned by a graduate of a registered nursing program on the National Council Licensure Examination for Registered Nursing.
5. ADN curriculum—All courses required in the second year of the PN/ADN ladder program and includes nursing theory and practice and non-nursing courses.

6. PN curriculum—All courses required in PN program and includes nursing theory and practice and non-nursing courses.

7. Nursing theory courses—classroom courses in the nursing program which are taught by nursing faculty and relate directly to the practice of nursing. May be PN or ADN as specified. Includes courses such as Foundations of Nursing, Medical-Surgical Nursing, Pediatric Nursing, Obstetrical Nursing, Nutrition, Concepts of Nursing, Perspectives in Nursing, Leadership, and Pharmacology.

8. Nursing theory GPA—GPA computed over all nursing theory courses. May be PN or ADN as specified.

9. Nursing practice courses—skill application courses in the nursing program which include basic skills, medical-surgical nursing, medication administration, leadership, obstetrics, pediatrics, and mental health. Instruction is given by nursing faculty in the laboratory or health care agency. May be PN or ADN as specified.

10. Nursing practice GPA—GPA computed over all nursing practice courses. May be PN or ADN as
specified.

11. Non-nursing courses—Courses which are required for program completion and include content which relates to nursing but are taught by non-nursing faculty. These courses include communications, biological sciences, humanities, and social science courses and may be completed prior to or concurrently with required nursing courses. May be PN or ADN as specified.

12. Overall nursing GPA—GPA for all courses included in the nursing curriculum. Includes nursing theory and practice and non-nursing courses required for completion of the curriculum. May be PN or ADN as specified.

Operational Hypotheses

The research questions posed, indications in the literature, and researcher experience suggest twenty-seven hypotheses for investigation. To avoid a lengthy list of hypotheses, the twenty-seven hypotheses have been collected into categories according to types of independent variables.

1. The number of years since graduation from Practical Nursing school is related to GPA in ADN theory and practice courses and NCLEX-RN scores.

2. The score on each portion of the Pre-Admission Assessment for Practical Nursing—mathematics, verbal,
science, and composite—is related to GPA in ADN theory and practice courses and NCLEX-RN scores.

3. GPAs in PN courses—theory, practice, and overall—are related to GPA in ADN theory and practice courses and NCLEX-RN scores.

4. The number of non-nursing courses included in the ADN curriculum which is completed prior to starting nursing theory and practice courses is related to GPA in ADN theory and practice courses and NCLEX-RN scores.

Data Collection

All data were collected during September and October, 1985, by examination of graduate ADN files for PN graduation date, PAAPN and NCLEX-RN scores, PN and ADN GPAs, and courses completed prior to entry into the nursing curriculum. Anonymity of the students was maintained by assigning a number to each student at the close of the data collection process and all names were omitted from the data.

Overall GPA was computed by multiplying each numerical grade expressed in whole grade points by the number of credits given for the course, summing across all courses, and dividing by the total number of academic credits. This process was completed for each grouping of courses for each student included in the
study. No grades below 2.0 appear in the study since a 2.0 was required in each course for continuation in the program.

The PAAPN was developed by the NLN Test Service "to assist schools of practical nursing in the guidance and placement of applicants who want to become practical nurses" ("NLN Pre-Admission Examination-PN," 1984, p. 1). NLN does not establish a passing or failing score on the examination and an individual may not take the examination more frequently than once per year, according to NLN policy. College policy allowed the score to be valid for a period of three years. An applicant not admitted to the PN program within three years of completing the test had to retake it and the most recent score was used.

The PAAPN examination has three sections. The verbal ability portion of the test assesses word knowledge by asking the examinee to select the correct word to complete a sentence. The other portion of the verbal test consists of answering questions about selected readings which indicates level of comprehension. The test items in the mathematics section require arithmetic, basic algebraic and geometric skills to solve the problems and consist of both computational and reading problems (Test Services for Schools of Nursing 1984-85, Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
1985, p. 27). The science section includes questions pertaining to general science, biology, chemistry, physics, and health. All test items require the selection of the correct or best response from four options. Calculators, books, notes or other aids are not permitted in the test situation.

Test scores are reported as raw scores and percentiles for each area and on the total performance (composite) as well ("Guide for Interpretation of NLN Test Reports," 1985, p. 1; "NLN Pre-Admission Examination-PN," 1984, p. 2). "Forms of the test will be equated so that scores of examinees taking different forms of the test can be compared" (Test Services for Schools of Nursing 1984-85, 1985, p. 32). Therefore, even though the PAAPN test was taken in different years with different forms being used, it is reasonable to expect that the scores can be compared. The raw scores will be used for purposes of completing this study.

Applicants to the PN program were ranked by composite PAAPN percentile score and high school or college GPA or GED scores. The highest ranking applicants were admitted first. This practice limited the range of composite PAAPN scores to be identified for ADN graduates. However, since the scores on the three portions of the test were not considered individually for
admission purposes, scores on the individual tests fell into a wider range.

In July 1982, the National Council of State Boards of Nursing, Incorporated, instituted the NCLEX-RN ("Developing, Constructing, ... I," 1983). This examination, which allows successful candidates to practice legally as Registered Nurses, replaced the State Board Test Pool Examination for Registered Nurses (SBTPE-RN). The NCLEX-RN is based on a study of current nursing practice at the entry level. The SBTPE-RN, in use through February 1982, was constructed on the basis of a test plan developed and put into effect in 1952 ("Developing, Constructing, ... I"). The new licensure examination, different on the basis of current nursing practice, also differs in the method of reporting scores. The SBTPE-RN reported five separate scores—medical, surgical, ob-stetric, pediatric, and psychiatric nursing—and to be successful, candidates were required to score at a specified level in each area. In the current examination—NCLEX-RN—the content of each of the above five areas is integrated with the addition of decision-making factors in nursing ("Developing, Constructing, ... I,"). Success on this examination is identified by the attainment of a single minimum standardized score of 1600.
The number of years since PN graduation was determined from the PN transcript. Each full year since graduation was counted and any part of a year was dropped.

Data Analysis

Data analysis included completion of frequency distribution, mean and standard deviation on PN theory, practice, and overall GPA; ADN theory and practice GPA; each category of PAAPN scores; NCLEX-RN scores; and years since graduation from PN school.

The second process was completed to determine whether a significant relationship existed between the dependent variables and each of the independent variables. The Pearson product-moment correlation coefficient (Pearson r) will indicate the extent of the linear relationships between these variables. In using Pearson r for examining the relationships between these variables, it is recognized that the calculations are being computed on restricted scores. The restriction of scores occurs through the selective admission process and the grade requirements for continuation in the nursing program. The resultant correlations can be considered to be underestimates of the true value of the relationships (Borg & Gall, 1983; Givner & Hynes, 1979).
The research design, the data collection methods, and the analysis selected take into account certain assumptions about the nature of the sample.

1. The classes and individuals from the four years will not differ substantially from each other in general characteristics.

2. The intervening variables will not differ substantially among the classes being studied—namely the instruction process, the instructors, the experiential setting, and the grading practices.

3. Student records provide reliable data sources.

All data will be considered as interval data. GPA will be carried to the first decimal place, raw scores and years since graduation will be whole numbers.
CHAPTER IV

ANALYSIS OF THE DATA

The focus of this chapter is to present the results of the data analysis concerning the relationship of specific admission criteria to success in the second year of a PN/ADN ladder program. Each admission criterion and each measure of educational success was examined using range, mean and standard deviation. The relationships between each admission criterion and each success measure were tested using the Pearson product moment correlation (r) at alpha .05 for committing a Type I error. This level of probability was selected since the desire is to avoid rejecting possible hypotheses which may prove fruitful with further study but also begin to eliminate areas which seem to have little relevance for further exploration.

Table 4 presents the range, mean and standard deviation for each admission criteria. Regarding the years since PN graduation, with a range of 0-17 years, it is important to recall that 40 of the 79 students continued directly into the ADN year of the program after graduation from the PN program and were not out of school for even one year. This causes the data to be
skewed positively on this variable.

Table 4

Range, Mean and Standard Deviation of Admission Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years since PN graduation</td>
<td>0-17</td>
<td>2.7</td>
<td>3.9</td>
</tr>
<tr>
<td>PN theory GPA</td>
<td>2.2-4.0</td>
<td>3.1</td>
<td>0.5</td>
</tr>
<tr>
<td>PN practice GPA</td>
<td>2.0-4.0</td>
<td>3.5</td>
<td>0.4</td>
</tr>
<tr>
<td>PN overall GPA</td>
<td>2.4-4.0</td>
<td>3.3</td>
<td>0.4</td>
</tr>
<tr>
<td>PAAPN verbal score</td>
<td>28-68</td>
<td>48.2</td>
<td>8.3</td>
</tr>
<tr>
<td>PAAPN mathematics score</td>
<td>10-48</td>
<td>30.1</td>
<td>5.9</td>
</tr>
<tr>
<td>PAAPN science score</td>
<td>29-63</td>
<td>43.1</td>
<td>5.8</td>
</tr>
<tr>
<td>PAAPN composite score</td>
<td>96-154</td>
<td>129.7</td>
<td>11.7</td>
</tr>
<tr>
<td>No. of non-nursing courses completed</td>
<td>0-6</td>
<td>2.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>

n = 79

All data relative to GPA will have a potential range from 2.0 to 4.0 on a 4 point scale. Since 2.0 is required for a student to remain in the nursing program, this will be the lower GPA limit. The result is a narrowed range of scores and an increase in the homogeneity of the group.
One of the admission criteria for the PN program is earning a 65 percentile on the PAAPN composite. Even though percentiles are not used in the correlations there would be a resultant restriction of the composite raw score range. This restriction would be less apparent in the separate areas of the PAAPN raw scores since there is no required level of achievement in each area.

The upper range for the number of non-nursing courses completed is six which was the maximum number of courses possible to have completed prior to enrolling in the nursing courses. The range and mean of this variable reflect that students were relatively normally distributed over the range of possible courses. No assessment was computed on which courses were completed most frequently.

Table 5 presents the range, mean and standard deviation for each measure of success. Again, GPA minimum is restricted to 2.0. In the study population, only one student had an NCLEX-RN score below 1600, the minimum passing score. The mean reveals that the students generally earned scores well above the minimum passing rate.
Table 5

Range, Mean and Standard Deviation of Success Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADN theory GPA</td>
<td>2.2-3.8</td>
<td>2.8</td>
<td>0.4</td>
</tr>
<tr>
<td>ADN practice GPA</td>
<td>2.6-4.0</td>
<td>3.6</td>
<td>0.4</td>
</tr>
<tr>
<td>NCLEX-RN score</td>
<td>1317-2766</td>
<td>2155.5</td>
<td>301.5</td>
</tr>
</tbody>
</table>

\[ n = 79 \]

Data in these tables provide an overview of variables and serves as a basis for subsequent discussion.

Associate Degree Nursing Theory GPA

The examination of the relationships between the nine admission criteria variables and the ADN theory GPA was completed to test the following hypotheses.

1. ADN theory GPA is related to the number of years since graduation from PN school.
2. ADN theory GPA is related to the PAAPN mathematics raw score.
3. ADN theory GPA is related to the PAAPN verbal raw score.
4. ADN theory GPA is related to the PAAPN science raw score.
5. ADN theory GPA is related to the PAAPN composite raw score.

6. ADN theory GPA is related to PN theory GPA.

7. ADN theory GPA is related to PN practice GPA.

8. ADN theory GPA is related to PN overall GPA.

9. ADN theory GPA is related to the number of non-nursing ADN curriculum courses completed prior to entry into the nursing curriculum.

Table 6 reveals the results of the Pearson r correlations for hypotheses 1 through 9. Analysis of these relationships reveals that PN theory and overall GPAs exhibited the strongest positive relationships to ADN theory GPA. In addition, three of the four PAAPN scores—verbal, science and composite—displayed positive correlations ranging from .248 to .362. Finally, a positive relationship was seen between the number of non-nursing courses completed prior to enrollment in nursing courses and the ADN theory GPA.

Three of the admission criteria—the number of years since PN graduation until enrollment in nursing curriculum, the PAAPN mathematics raw score and the PN practice GPA—exhibited no relationship with ADN theory GPA at the .05 alpha level.

Based on the findings regarding the relationships of the nine admission criteria to the ADN theory GPA,
hypotheses 3, 4, 5, 6, 8 and 9 will be retained at the .05 alpha level of significance while no support was found for hypotheses 1, 2 and 7 at the .05 alpha level.

Table 6
Pearson r Correlations of Nine Admission Variables to Associate Degree Nursing Theory GPA

<table>
<thead>
<tr>
<th>Admission Variable</th>
<th>r with ADN theory GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years since PN graduation</td>
<td>.039</td>
</tr>
<tr>
<td>PAAPN mathematics raw score</td>
<td>.197</td>
</tr>
<tr>
<td>PAAPN verbal raw score</td>
<td>.248*</td>
</tr>
<tr>
<td>PAAPN science raw score</td>
<td>.313*</td>
</tr>
<tr>
<td>PAAPN composite raw score</td>
<td>.362*</td>
</tr>
<tr>
<td>PN theory GPA</td>
<td>.646*</td>
</tr>
<tr>
<td>PN practice GPA</td>
<td>.216</td>
</tr>
<tr>
<td>PN overall GPA</td>
<td>.576*</td>
</tr>
<tr>
<td>Non-nursing courses completed</td>
<td>.324*</td>
</tr>
</tbody>
</table>

n = 79

*p < .05

Associate Degree Nursing Practice GPA

Examination of the relationships between the nine admission criteria variables and the ADN practice GPA
was completed to test the following hypotheses.

10. ADN practice GPA is related to the number of years since graduation from PN school.

11. ADN practice GPA is related to the PAAPN mathematics raw score.

12. ADN practice GPA is related to the PAAPN verbal raw score.

13. ADN practice GPA is related to the PAAPN science raw score.

14. ADN practice GPA is related to the PAAPN composite raw score.

15. ADN practice GPA is related to the PN theory GPA.

16. ADN practice GPA is related to the PN practice GPA.

17. ADN practice GPA is related to the PN overall GPA.

18. ADN practice GPA is related to the number of non-nursing courses completed prior to entry into the nursing curriculum.

The correlations between the nine admission criteria and the ADN practice GPA (shown in Table 7) exhibit fewer and weaker relationships than those with ADN theory GPA.

The nine admission variables, when correlated with
the ADN practice GPA, reveal only four positive relationships occurring at the .05 alpha level. The highest relationships occurred with the three PN GPA variables. The highest was the PN overall GPA, the second highest was PN theory GPA and the third was PN practice GPA. The final admission variable which demonstrated a positive relationship was the PAAPN science raw score but the correlation was at a low .243.

Table 7

Pearson r Correlations of Nine Admission Variables to Associate Degree Nursing Practice GPA

<table>
<thead>
<tr>
<th>Admission Variable</th>
<th>r with ADN Practice GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years since PN graduation</td>
<td>.088</td>
</tr>
<tr>
<td>PAAPN mathematics raw score</td>
<td>.115</td>
</tr>
<tr>
<td>PAAPN verbal raw score</td>
<td>.029</td>
</tr>
<tr>
<td>PAAPN science raw score</td>
<td>.243*</td>
</tr>
<tr>
<td>PAAPN composite raw score</td>
<td>.182</td>
</tr>
<tr>
<td>PN theory GPA</td>
<td>.490*</td>
</tr>
<tr>
<td>PN practice GPA</td>
<td>.451*</td>
</tr>
<tr>
<td>PN overall GPA</td>
<td>.516*</td>
</tr>
<tr>
<td>Non-nursing courses completed</td>
<td>.148</td>
</tr>
</tbody>
</table>

n = 79
*p < .05
The remaining five variables show no relationship to ADN practice GPA. These variables include the PAAPN composite, mathematics, and verbal raw scores; the number of courses completed prior to enrolling in nursing courses; and the number of years since PN graduation.

The identified correlations between the nine admission criteria and ADN practice GPA support the retention of hypotheses 13, 15, 16, and 17, however, support was not found for hypotheses 10, 11, 12, 14, and 18.

NCLEX-RN

Examination of the relationships between the nine admission variables and the NCLEX-RN score was completed to test the following hypotheses.

19. NCLEX-RN score is related to the number of years since graduation from PN school.
20. NCLEX-RN score is related to the PAAPN mathematics raw score.
21. NCLEX-RN score is related to the PAAPN verbal raw score.
22. NCLEX-RN score is related to the PAAPN science raw score.
23. NCLEX-RN score is related to the PAAPN composite raw score.
24. NCLEX-RN score is related to the PN theory GPA.

25. NCLEX-RN score is related to the PN practice GPA.

26. NCLEX-RN score is related to the PN overall GPA.

27. NCLEX-RN score is related to the number of non-nursing courses completed prior to entry into the nursing curriculum.

The correlations between the nine admission variables and the NCLEX-RN score (shown in Table 8) revealed the most numerous and the highest levels of relationships examined in this study.

There were strong relationships noted between the NCLEX-RN score and PN theory and overall GPAs, and both of these admission criteria have a greater than 50% covariance with the ADN success measure. The lower level of the PN practice GPA relationships is consistent with information reported by Hecht (1974) that while theory grades were good predictors of LE scores, practice course grades were not. Additionally, the PAAPN raw scores, except for mathematics, displayed a moderately strong relationship with the NCLEX-RN score.

The PAAPN mathematics raw score displayed a lower level of relationship than the other three PAAPN
Table 8

Pearson r Correlations of Nine Admission Variables to National Council Licensure Examination for Registered Nursing Scores

<table>
<thead>
<tr>
<th>Admission Variables</th>
<th>r with NCLEX-RN Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years since PN graduation</td>
<td>-.104</td>
</tr>
<tr>
<td>PAAPN mathematics raw score</td>
<td>.250*</td>
</tr>
<tr>
<td>PAAPN verbal raw score</td>
<td>.429*</td>
</tr>
<tr>
<td>PAAPN science raw score</td>
<td>.475*</td>
</tr>
<tr>
<td>PAAPN composite raw score</td>
<td>.448*</td>
</tr>
<tr>
<td>PN theory GPA</td>
<td>.756*</td>
</tr>
<tr>
<td>PN practice GPA</td>
<td>.491*</td>
</tr>
<tr>
<td>PN overall GPA</td>
<td>.725*</td>
</tr>
<tr>
<td>Non-nursing courses completed</td>
<td>.228*</td>
</tr>
</tbody>
</table>

n = 79

*p < .05

measures. The number of non-nursing courses completed prior to ADN enrollment also displayed a correlation with NCLEX-RN at .05 alpha level, but, again the level of correlation was low.

The only admission criteria which was not related to the NCLEX-RN score was the number of years since PN graduation.
The correlations identified between the nine admission variables and NCLEX-RN scores support the retention of hypotheses 20, 21, 22, 23, 24, 25, 26, and 27 but no support is found for hypothesis 19.

To summarize the findings, each of the nine admission variables was aligned with each of the success measures. Each success measure is related to a varying number of admission criteria. As illustrated in Table 9, there were only three admission variables which were related to all three ADN success criteria—PAAPN science raw score, PN theory GPA, and PN practice GPA. Years since PN graduation is related to no success measures and PAAPN mathematics raw score related to only one.

It is further apparent from Table 9 that 18 of the 27 hypotheses would be retained and 11 hypotheses are not supported.

Summary

This chapter focused on analysis of the data and the results relative to the relationships between nine admission variables and three success measures for PNs completing an ADN ladder program. These relationships were explored using Pearson product moment correlations for each admission variable as it related to each
Table 9
Correlations of Nine Admission Variables with Three Associate Degree Nursing Success Measures

<table>
<thead>
<tr>
<th>Admission Variable</th>
<th>ADN GPA Theory</th>
<th>ADN GPA Practice</th>
<th>NCLEX-RN Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years since PN graduation</td>
<td>.039</td>
<td>.088</td>
<td>-.104</td>
</tr>
<tr>
<td>PAAPN score Mathematics**</td>
<td>.197</td>
<td>.115</td>
<td>.250*</td>
</tr>
<tr>
<td>PAAPN score Verbal**</td>
<td>.248*</td>
<td>.029</td>
<td>.429*</td>
</tr>
<tr>
<td>PAAPN score Science**</td>
<td>.313*</td>
<td>.243*</td>
<td>.475*</td>
</tr>
<tr>
<td>PAAPN score Composite**</td>
<td>.362*</td>
<td>.182</td>
<td>.448*</td>
</tr>
<tr>
<td>PN theory GPA</td>
<td>.646*</td>
<td>.490*</td>
<td>.756*</td>
</tr>
<tr>
<td>PN practice GPA</td>
<td>.216</td>
<td>.451*</td>
<td>.491*</td>
</tr>
<tr>
<td>PN overall GPA</td>
<td>.576*</td>
<td>.516*</td>
<td>.725*</td>
</tr>
<tr>
<td>Number courses completed</td>
<td>.324*</td>
<td>.148</td>
<td>.228*</td>
</tr>
</tbody>
</table>

**Raw scores

\( n = 79 \)

\(*p < .05\)
success measure with the probability for committing a Type I error set at .05.

Six of the nine admission variables were found to be positively related to ADN theory GPA at the .05 alpha level. From highest (.646) to lowest (.248) they are: PN theory GPA, PN overall GPA, PAAPN composite raw score, non-nursing courses completed prior to enrolling in nursing courses, and PAAPN science and verbal raw scores.

Four of the nine admission criteria were positively related to ADN practice GPA at the .05 alpha level. From highest (.516) to lowest (.243) they are: PN overall, PN theory, and PN practice GPAs; and PAAPN science raw score. These levels of relationship were lower than those with ADN theory GPA.

The highest levels of relationship and the largest number of correlations at the .05 alpha level were noted between the nine admission variables and the NCLEX-RN scores. Eight of the nine criteria correlated positively with the highest of all relationships evident between PN theory GPA and the NCLEX-RN score at .756. The second strongest relationship was evident between the PN overall GPA and the NCLEX-RN score at .725.

Finally, only three admission variables were related to all three success variables—PAAPN science raw scores and
score, PN theory GPA and PN overall GPA.

Chapter V will include discussion of the data and recommendations for future study.
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to analyze the relationships between nine admission variables and three ADN success measures for PN graduates entering an ADN ladder program. The study was designed to assess these relationships to identify possible criteria warranting further study as predictors of success in ADN education. This effort is seen as an initial step in the process of improving admission criteria for PNs entering an ADN program.

The research relative to predictors of success in nursing education programs provides little conclusive information relative to the research question. The research does suggest that past academic performance is a meaningful predictor of future academic performance in both general and nursing education. Further, past research indicates a minimal relationship between the practice component of a nursing curriculum and any academic measures. Certain studies, particularly those involving ADN programs, found students' age to be a factor in educational performance. Specifically, there appears to be a curvilinear relationship between
academic performance and age. No previous research was found which focused directly on the PN graduate as an entrant into an ADN ladder program. Therefore, while previous research in both general and nursing education provides some guidance for areas of exploration and suggests some possible outcomes, this study has the potential for providing new insight into PN/ADN ladder program admission practices.

Based on previous research and the researcher's experience, available data on PN graduates who entered the ADN program was examined and nine variables were selected for inclusion in the study. Of the nine, eight were academic criteria selected because academic criteria had proved most fruitful in previous studies of other types of programs. The ninth variable chosen was a demographic variable, years since PN graduation. It was included since it serves as an admission limitation in certain schools and there is a possibility that it reflects the influence of age and experience.

The selected academic variables included four sub-scores on the PAAPN examination—mathematics, verbal, science and composite. Also included were three variations of PN GPA—theory, practice, and overall. The final academic variable selected was the number of non-nursing courses completed prior to enrolling in the
nursing curriculum.

These variables were selected for several reasons. The various components of the GPA are data that are most usually available for any PN who applies to an ADN ladder program and, further, they are currently used as admission criteria in many schools. In the system of the school being studied, theory and practice courses are separate and each is graded with a letter grade. However, in many schools, the practice portion of the curriculum is pass/fail grading. In other schools practice is not graded as a separate course and, in these schools, the student must successfully complete the practice component of the course and then the letter grade is based solely on performance in the theory component of the course. Due to these grading variations, the decision was made to use three PN GPA options—theory, practice and overall—in an effort to increase the usefulness of the findings.

The PAAPN scores were selected for the range of skills tested and the fact that many schools currently use mathematics and verbal skill criteria for admission. In addition, a strong science base is required prior to or during the ADN curriculum in most nursing education programs.

Consideration of the number of non-nursing courses
completed prior to admission was included as a variable to begin validation for the practice of advising students to complete as many non-nursing courses as possible prior to starting nursing classes. The rationale given to students for this practice is that it will provide more time to concentrate efforts on nursing courses due to decreased academic loads and is likely to contribute to improved grades. However, no empirical evidence has been shown to support this practice.

An additional variable, number of years since PN graduation, is an unvalidated limiting admission criterion in certain schools. It would appear to be related to at least two demographic characteristics—age and experience. Age was a variable in several previous studies and seemed to have an identifiable relationship with academic success. Age was not selected as a criterion, however, as age is often difficult to obtain prior to admission and it cannot be used as an admission criterion since it may be perceived as discriminatory.

Experience as a Practical Nurse would seem to have a bearing on ability to perform in an ADN program, especially in the practice component. Data on PN experience were not available on the subjects in this study. However, the number of years since PN graduation is likely to have some relationship to the number of years
of experience as well as to age.

The indicators of success which were dealt with in the literature ranged from success in various semesters of nursing education in both theory and practice and NLN testing as well as terminal indicators such as GPA, LE results and work performance after graduation. The selected success measures were three terminal educational indicators of success—ADN theory GPA, ADN practice GPA and LE score. These criteria utilized terminal program academic and practice criteria as well as a nationally standardized measure—NCLEX-RN.

The 27 hypotheses were developed to seek the level of relationship between each of the nine admission variables and the three success measures. Each hypothesis suggested that a relationship existed between a specific admission variable and a specific success measure. The statistical analysis selected was Pearson product moment correlation. With so little research specific to the question under study, this method was selected as a means of identifying possible relationships which could be further tested for their predictive capabilities in future studies.

As the data were analyzed, the limitations of the study had to be considered. These limitations included the use of a small population from a single community
college nursing program. Also, the correlations were being carried out on a somewhat restricted group due to the admission practices and grade requirements. The use of a restricted group is known to contribute to lower correlation coefficients (Borg & Gall, 1983; Hinkle, Wiersma, & Jurs, 1979).

Associate Degree Nursing Theory GPA

The results of the Pearson r correlations revealed both expected and unexpected levels of relationship. Focusing specifically on the relationships revealed between the success measure, ADN theory GPA, and the nine admission variables, six of the nine variables showed a moderate, positive relationship at the .05 alpha level. All six of the positive relationships occurred with academic variables which is an example of previous academic performance indicating future academic performance. Further, the content commonalities between the PN and ADN program at the school being studied suggested that this relationship would be strong. The strongest positive relationship was with PN theory GPA at .646 with a covariance of 41.7%. The second highest relationship with ADN theory GPA was seen in PN overall GPA. This was expected since a major portion of the PN overall GPA is computed from the PN theory GPA.
In contrast to the previous two PN GPA measures, the PN practice GPA showed no relationship to ADN theory GPA as previous research suggested would occur. An explanation for this lack of relationship may be the diverse nature of the expectations of students in theory and practice courses. Theory courses require mastery of information while practice courses require synthesis and application of that information in the assessment, planning, implementation and evaluation processes of patient care. There may be additional reasons which could be revealed in a study designed for that purpose.

Each of the PAAPN test scores showed a positive relationship with ADN theory GPA at the .05 alpha level with the exception of the mathematics raw score. It is not surprising that the PAAPN science raw score would have a strong positive relationship to ADN theory GPA since nursing theory courses incorporate a large science-based component. Further, a high level of verbal ability would seem to contribute to success since nursing text books are often lengthy, detailed and written at a high level of reading skill.

With a correlation coefficient of .197, no relationship between the PAAPN mathematics raw score and success in the ADN theory courses was evident. Since nursing theory courses deal very little with even basic
mathematics skills, this lack of a relationship was expected. In the ADN program being studied there is a one semester credit medications related course which includes no practice component and deals primarily with administration of drugs, their effects and uses. The actual use of mathematic functions is minimal so even though this course is included in the ADN theory GPA, it would not tend to increase the level of correlation.

The level of correlation of the PAAPN composite raw score to the ADN theory GPA was at the expected level. Since that score is computed from PAAPN mathematics, science, and verbal skills, the composite relationship would be expected to fall between the extremes of those three relationships.

The final positive relationship between admission variables and ADN theory GPA was the number of non-nursing courses completed prior to ADN enrollment. This relationship, though low, may be explained by the reduced number of credit hours in which students would be enrolled, thus allowing them more time to study. Further, it is possible that there may be a reduction of stress since there is more time for family, work or leisure. A third possible explanation for the low relationship is that the extra time away from class is spent earning an income rather than in increased study as
suggested by Capoor (1982). In the final analysis, it may be any one or a combination of these factors or some other unidentified factor which causes this relationship to occur at the observed level.

The number of years since PN graduation until enrollment in nursing courses showed no relationship with ADN theory GPA at the .05 alpha level. Several previous researchers found that age had a curvilinear relationship to ADN overall GPA and Pearson r would not demonstrate this type of relationship. A further possible explanation for the lack of relationship is the influence of a variety of intervening variables such as work experience, other educational experiences, changes in family structure, attitude, and motivational influences. Even though the relationship between years since PN graduation and student age was not identified in this population, the findings of previous researchers suggest that a more indepth analysis of this variable and other related variables such as age and experience is needed to bring about more conclusive results.

**Associate Degree Nursing Practice GPA**

The correlations between the nine admission variables and ADN practice GPA revealed the fewest relationships and those were generally lower than those with ADN
theory GPA and markedly lower than those with the NCLEX-RN score. Since eight of the nine admission variables were academic in nature, this result seems congruent with the research done by Ledbetter (1968) who found no relationship between ACT score, an academic measure, and practice performance of nursing students.

The moderate level of correlations of all three PN GPA variables with the ADN practice GPA measure of success was an unexpected finding. The relationship of PN and ADN practice GPAs was expected to occur at a higher level with a lower relationship of PN overall GPA and very little or no relationship with PN theory GPA. The rationale for this expectation was the similar nature of the two practice areas, previous research findings of low level of relationship between theory and practice courses, and then the expectation for the PN overall GPA to fall midway between since it is computed from both.

However, the correlations fell into a clustered pattern. The PN overall GPA was highest at .516, the PN theory GPA was second at .490, and the PN practice GPA was lowest at .451. Analysis of these results suggests that this pattern may be related to the overall goal of the PN program—to prepare a nurse to perform a wide variety of practice skills at the bedside in providing
patient care. The theory component as well as the practice component of a PN program tends to focus on the manual skills of care activity rather than on the theoretical basis of that care. Since a large portion of ADN practice activity is also based on the skill performance aspect of care, the observed level and ranking of relationships between PN theory and practice GPAs and ADN practice GPA seems reasonable. Further, since PN overall GPA is computed from both theory and practice, the strongest correlation of this variable with ADN practice GPA may well be a function of that combination.

The somewhat lower correlation of PN to ADN clinical GPAs seems incongruous but may be due to the differences in type of performance expected at each level. The ADN practice expectations include many of the same areas as that of PN practice but also involves additional skills in the areas of assessment, planning, implementation and evaluation.

The fourth, and only other, correlation which was significant at the .05 alpha level with the ADN practice GPA is the PAAPN science raw score. This level of relationship is considerably lower than the previous three. The finding that it related at all may be explained by the scientific background required for satisfactory performance in ADN practice courses.
Three PAAPN test scores—verbal, mathematics and composite raw scores—show no relationship to ADN practice GPA. This lack of relationship may illustrate the findings of Crooks (1980) that context-specific predictors appear to be stronger than generalized academic predictors for specific course work. The PAAPN composite raw score, computed from the mathematics, verbal and science raw scores, demonstrated no relationship with ADN practice GPA and this reflects the lack of or very low relationship of the PAAPN components.

The number of non-nursing courses completed prior to enrolling in nursing courses did not correlate with ADN practice performance at the .05 alpha level. It may be that the extra time to study is not particularly useful since practice grades depend more on the ability to perform skills and apply theoretical information than on knowledge of course content. A second possible explanation for the lack of a relationship is that the student who has course work completed prior to admission may choose to be employed instead of spending the extra time for study.

The number of years since graduation from PN school did not correlate with ADN practice GPA at the .05 alpha level. This seeming lack of relationship may be a result of a curvilinear relationship rather than an
actual lack of relationship. This finding may also be due to the assumed advantages of maturity, experience, and motivation balancing the assumed advantages of recent formal educational experience. The wide range of possible intervening variables suggests that this relationship requires additional study and further suggests that the practice of excluding applicants solely on the basis of years since PN school deserves scrutiny.

NCLEX-RN Score

The strongest correlations were evident between the admission variables and the NCLEX-RN scores as compared with the other success variables. In fact, eight of the nine variables were positively related at the alpha level of .05.

The strongest correlation with NCLEX-RN score was the PN theory GPA at .756. The next highest correlation was the PN overall GPA at .725, with the third highest, although substantially lower than the first and second, being the PN practice GPA at .491. Considering the interrelatedness of PN theory GPA and PN overall GPA and the generally low correlations of theory and practice performance, this pattern of relationships was not surprising. With the highest correlation being PN theory GPA, this finding supports the predictive relationship.
of prior academic performance to future academic performance as mentioned earlier. In addition, it supports the finding of course-specific predictors being stronger than general academic predictors of performance in specialized courses (Crooks, 1980). However, the low to moderate level of relationship of the PN practice GPA with NCLEX-RN score is inconsistent with the Brandt and Metheny (1966) and Melcolm et al. (1981) findings that practice GPAs correlate at a very low level with LE scores.

The four PAAPN score variables occurred in a cluster and exhibited the next strongest correlations with the NCLEX-RN. The science, verbal and composite raw scores range from .475 to .429 while the mathematics score falls much lower than the other three, at .250. The need to use scientific principles in the nursing care process as tested by the NCLEX-RN seems to explain the science score relationship. Performance on the NCLEX-RN depends on verbal skills since the format is all multiple choice/situational questions and this factor seems to explain the verbal skills/NCLEX-RN relationship. This finding is consistent with that of Bell and Martindill (1976), Krupa (1983), and Reed and Feldhusen (1972) that verbal ability is consistently found to correlate with LE scores. The lower
correlation of the mathematics score is also consistent with the findings of Krupa (1983) and Reed and Feldhusen (1972). The explanation for this low level of correlation may be that while the NCLEX-RN includes some medication calculation, the material regarding medications tends to be more in the areas of effects, nursing implications and uses. The PAAPN composite score falls at an expected level due to the ranking of the three other PAAPN scores.

The lowest correlation at the .05 alpha level with the NCLEX-RN score was the number of non-nursing courses completed prior to enrolling in the nursing courses. Though low, this finding is consistent with that of Yocum and Scherubel (1985) who found that the number of courses completed was related to success on the LE. The level of correlation is very low at .228 with a covariance of a mere 5.2%; yet, the fact that a relationship exists suggests the need for more study of this admission criteria and possibly the types of courses taken and not taken.

Among the NCLEX-RN and admission variable correlations, the only criteria which exhibited no relationship was the number of years since PN graduation. It is likely that the wide variety of intervening variables such as work experience, maturity, and family
circumstances may effect this relationship. Further, Pearson r would not effectively demonstrate the apparent curvilinear relationship between age and NCLEX-RN success. This criterion variable deserves more study, especially if it is to be used to exclude applicants from a program.

Summary

The Pearson product moment correlations revealed that only three of the nine admission criteria for the PN graduate entering the ADN program correlated at a .05 significance level with all three ADN success measures. These three criteria, which showed moderate to high relationships, were PAAPN science raw score, PN theory GPA and PN overall GPA. The correlations further revealed that the highest levels and the greatest numbers of relationships occurred between the admission criteria and the NCLEX-RN for this specific population.

PAAPN verbal and composite raw scores and number of non-nursing courses completed ranged from very low to moderate levels of relationship with the two academically oriented success criteria—ADN theory GPA and NCLEX-RN score. PN practice GPA correlated at a moderate level with ADN practice GPA and NCLEX-RN score. The PAAPN mathematics raw score correlated at a very low
level with only the NCLEX-RN score. And finally, the number of years since PN graduation showed no relationship to any of the three criteria in the population being studied.

These findings are consistent with previous research in that prior academic performance tends to predict future academic performance. It also serves to reiterate the findings that more specific academic measures can be used to advantage but reveals the need to examine these relationships carefully since some of the relationships are new findings, not previously mentioned in the literature. Specifically, this refers to the relationships and patterns revealed in the three PN GPA criteria to ADN practice GPA.

The relationships among admission variables and ADN practice GPA reaffirmed that much work remains to be done in this area. The successful practice of nursing seems to require skills which have not yet been well defined and rendered measurable. This greatly hampers the search for relationships among admission variables and success measures in the nursing practice component of nursing education and the work world. However, the moderate level of relationships of PN GPAs to ADN practice GPA provide some useful initial data for further study.
Despite the tendency in the literature toward suggesting that certain demographic variables are related to success in an ADN program, this tendency did not become evident in the one such variable examined in this study. The years since PN graduation which might be expected to have some relationship to age and experience demonstrated no relationship. However, other researchers may wish to examine these and other demographic variables further.

Recommendations

Within the current structure of PN/ADN ladder programs, the dilemma and challenge for nursing programs is to develop an admission process which is lawful and effective. Since program space, clinical sites, and qualified faculty are at a premium and students' time and resources should be considered, it is of crucial importance to identify admission criteria which are related to student success. The literature search revealed that numerous studies have been done which examine a large variety of criteria as they relate to and predict success for students in ADN, DN and BSN programs. No studies were available which explored possible effective admission criteria for the PN entering a PN/ADN program. This work, as an initial step
in this area, examined relationships between data which may be available and lawful for use as admission criteria for the PN graduate entering an ADN program.

Perez (1977) specifically states that valid selection criteria are needed in order to make the best use of limited faculty, clinical facilities and financial resources. Clemence and Brink (1978) suggest a process of identifying valid admission criteria starting with individual school efforts and building upon that by pooling information and ultimately arriving at meaningful criteria. It is from this perspective and from the findings of this study that the following recommendations for future research are presented.

1. Replication studies are recommended which explore the same relationships in other programs and geographic areas.

2. Further correlation research is needed which deals with the relationships between additional admission criteria and additional success measures.

3. The review of literature revealed a serious deficit in the area of criteria for success in the nursing work world. Lacking that, meaningful assessment of work success is impossible, not to mention identifying correlates with it or predictors of it. Research needs to move toward clearly identifying the
expectations of the successful nurse and measurement of the attainment of these expectations.

4. Based on research identified in items 1, 2 and 3, exploration could be conducted to identify the strongest relationships among admission variables, ADN program success measures and success in the work place. This need remains despite identification of the problem by Abdellah (1970).

5. As the strongest relationships are identified and work success expectations are delineated and measured, it would be expected that research would focus on the more rigorous predictive studies related to predicting success in nursing education, on the licensure examination and in the work setting.

Research conducted according to the progression outlined in these recommendations would ultimately contribute to the ability of schools of nursing to discriminate among applicants and select, with reasonable assurance, individuals who are likely to succeed in nursing education and in the field of nursing. This effort is seen as a part of the initial phase as outlined in the first recommendation.
APPENDICES
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACT</td>
<td>American College Test</td>
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<tr>
<td>AD</td>
<td>Associate Degree</td>
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<td>ADN</td>
<td>Associate Degree Nurse</td>
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<td>BSN</td>
<td>Bachelor of Science in Nursing</td>
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<td>DN</td>
<td>Diploma Nurse</td>
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<td>EPPS</td>
<td>Edwards Personal Preference Survey</td>
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<td>GED</td>
<td>General Educational Development</td>
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<td>High School Percentile Rank</td>
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<td>HSR</td>
<td>High School Rank</td>
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<td>Kuder Preference Test</td>
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<td>LE</td>
<td>Licensure Examination</td>
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<td>Licensed Practical Nurse</td>
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<td>LVN</td>
<td>Licensed Vocational Nurse</td>
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<td>MMPI</td>
<td>Minnesota Multiphasic Personality Inventory</td>
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<tr>
<td>NCLEX-RN</td>
<td>National Council Licensure Examination for Registered Nursing</td>
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<td>NLN</td>
<td>National League for Nursing</td>
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<td>PAAPN</td>
<td>Pre-Admission Assessment for Practical Nursing</td>
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<td>PN</td>
<td>Practical Nurse</td>
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<td>RN</td>
<td>Registered Nurse</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>SAT</td>
<td>Scholastic Aptitude Test</td>
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<td>SBTPE-RN</td>
<td>State Board Test Pool Examination for Registered Nursing</td>
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<td>SCAT</td>
<td>School and College Aptitude Test</td>
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<td>SVIB</td>
<td>Strong Vocational Interest Blank</td>
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APPENDIX B

GLOSSARY

ADN completion program — See ladder program.

ADN curriculum — All courses required in the second year of the PN/ADN ladder program and includes nursing theory and practice and non-nursing courses.

ADN student — Individual who is eligible to write the NCLEX-PN or who has successfully completed the NCLEX-PN and is enrolled in an Associate Degree in Nursing program.

Advanced standing program — See ladder program.

American Nurses Association — A professional organization for Registered Nurses which has only Registered Nurses as members.

Associate Degree in Nursing Program — A two year college-based nursing education program which prepares graduates to take the National Council Licensure Examination for Registered Nursing (NCLEX-RN). The content of the curriculum is nursing specific courses along with English and social and biological sciences.

Associate Degree Nurse (ADN) — A Registered Nurse (RN) who has completed a two year, college-based, nursing education program and who has successfully completed the National Council Licensure Examination for Registered Nursing (NCLEX-RN).

Baccalaureate in Nursing Program — A four year college based nursing education program which prepares graduates to take the National Council Licensure Examination for Registered Nursing (NCLEX-RN). This type of program tends to have two years of liberal arts and sciences followed by two years devoted primarily to nursing specific courses.

Career mobility — In nursing this refers to the ability
of nurses to move up the educational ladder from Practical Nursing to Associate Degree Nursing or from Associate Degree Nursing or Diploma Nursing to Bachelor of Science in Nursing and to a Masters or Doctorate in Nursing.

Diploma Nursing Program -- A two to three year hospital based nursing education program which prepares graduates to take the National Council Licensure Examination for Registered Nursing (NCLEX-RN). Most commonly, the first year is predominantly liberal arts and sciences and the second year (and third, if offered) is primarily devoted to nursing courses.

Ladder program -- (Specifically for this study). Associate Degree Nursing program which is designed to admit Licensed Practical Nurses by granting credit or otherwise substantially acknowledging previous learning and providing approximately one year of additional nursing education to prepare graduates for the National Council Licensure Examination for Registered Nursing. Also called one-plus-one, advanced standing, ADN completion, or step-up programs.

Licensed Practical (Vocational) Nurse (LPN, LVN) -- A licensed nurse who has completed one year of practical nursing education in a college or hospital based program and who has successfully completed the National Council Licensure Examination for Practical Nursing (NCLEX-PN).

National Council Licensure Examination for Practical Nursing (NCLEX-PN) -- The national examination for graduates of Practical Nursing programs used to determine minimal competency in practical nursing. Successful completion of this examination is required for Practical Nursing licensure and the legal right to practice nursing at that level.

National Council Licensure Examination for Registered Nursing (NCLEX-RN) -- The national examination for graduates of Associate Degree, Diploma, or Bachelor of Science in Nursing programs used to determine minimal competency in registered nursing. Successful completion of this examination is required for Registered Nursing licensure and the legal right to practice nursing at that level.
National League for Nursing (NLN) -- A professional organization for nursing which includes nursing and public membership. Provides schools of nursing with program and student evaluation tools and completes a voluntary school accreditation process.

NCLEX-PN score -- Standardized score earned by a Practical Nursing school graduate on the National Council Licensure Examination for Practical Nursing.

NCLEX-RN score -- Standardized score earned by a graduate of a program preparing registered nurses on the National Council Licensure Examination for Registered Nursing.

Non-nursing courses -- Courses which are required for program completion and include content which relates to nursing but are taught by non-nursing faculty. These courses include communications, biological sciences, humanities, and social sciences and may be completed prior to or concurrently with required nursing courses. May be PN or ADN as specified.

Nursing practice courses -- Skill application courses in the nursing program which include basic skills, medical-surgical nursing, medication administration, leadership, obstetrics, pediatrics, and mental health. Instruction is given by nursing faculty in the laboratory or health care agency. May be PN or ADN as specified.

Nursing practice GPA -- GPA computed over all nursing practice courses. May be PN or ADN as specified.

Nursing theory courses -- classroom courses in the nursing program which are taught by nursing faculty and relate directly to the practice of nursing. May be PN or ADN as specified. Includes courses such as Foundations of Nursing, Medical-Surgical Nursing, Pediatric Nursing, Obstetrical Nursing, Nutrition, Concepts of Nursing, Perspectives in Nursing, Leadership, and Pharmacology.

Nursing theory GPA -- GPA computed over all nursing theory courses. May be PN or ADN as specified.

One-plus-one program -- See ladder program.
Overall nursing GPA -- GPA for all courses included in the nursing curriculum. Includes nursing theory and practice and non-nursing courses required for completion of the curriculum. May be PN or ADN as specified.

PN curriculum -- All courses required in the PN program and includes nursing theory and practice and non-nursing courses.

Practical Nursing program -- A one year college or hospital based program which prepares graduates to take the National Council Licensure Examination for Practical Nursing. Program content is almost entirely nursing with few non-nursing courses.

Pre-Admission Assessment for Practical Nursing (PAAPN) -- A test developed by the National League for Nursing (NLN) to assist in identifying applicants who are capable of succeeding in a practical nursing program. It consists of mathematics, verbal, and science topic areas and a raw score and a percentile score are reported for each area along with a composite raw score and percentile score.

Registered Nurse (RN) -- A licensed nurse who has completed two, three, or four years of nursing education in a hospital or college based program and who has successfully completed the National Council Licensure Examination for Registered Nursing (NCLEX-RN).

Step-up program -- See ladder program.

Years since graduation from PN school -- The number of full years from completion of PN program until start of nursing courses in ADN program.
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