AN EXAMINATION OF LOCUS OF CONTROL, PERSONALITY TRAITS, AND SELECTED DEMOGRAPHIC VARIABLES AS FACTORS RELATING TO THE SUCCESS OF FIRST-YEAR STUDENTS IN AN ASSOCIATE DEGREE NURSING PROGRAM

DISSERTATION

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Two major purposes existed for this study. The first purpose was to compare how persisters and nonpersisters in the first year of a two-year nursing program differed in locus of control, selected personality traits, and seven demographic variables. The second major purpose was to develop a predictive model for the persisters and the non-persisters.

The particular personality variables examined were intelligence, superego strength, extraversion, anxiety, tough poise, and independence as measured by the 16PF. Demographic characteristics examined were age, marital status, having prekindergarten age children, annual income, previous college experience, previous nursing-related employment, and present employment status.

The subjects consisted of ninety-one females enrolled in a freshman nursing class in a community college. Fifty-five students continued with the program throughout the year (the persisters) while thirty-six students either

voluntarily left the program or were dismissed because of academic failure (the nonpersisters).

At the beginning of the school year, each subject completed the Rotter I-E Scale, the 16PF, the Nelson-Denny Reading Test (NDRT), and a nursing student questionnaire designed to gather demographic data. The task was accomplished in a group setting.

Using the z test for difference between two means, scores on the NDRT and scores on the B and G traits of the 16PF were significantly higher beyond the .05 level for the persisters. The persisters were also found to be significantly lower ($p < .05$) in externality than the nonpersisters.

When examined independently, the only demographic variable found to be significant in differentiating the two groups was annual income. A 2 x 4 chi-square analysis was performed. The obtained $x^2 = 14.11$, d.f. = 3 was significant at the .05 level.

To develop a predictive model for persisters and nonpersisters, a stepwise discriminant analysis was conducted. The analysis identified seven variables which combined to form a discriminant function with a Wilks' lambda of .591 and a correct classification of the two groups in 80.2 per cent of the cases. The seven variables were the NDRT ($F = 30.66$), I-E ($F = 19.47$), previous nursing experience ($F = 14.70$), having prekindergarten age children ($F = 12.60$),

age (*F* = 10.82), 16PF B Trait of intelligence (*F* = 9.34), and 16PF G Trait of superego strength (*F* = 8.19).

The summary findings were that persisters had significantly higher scores on the NDRT and the B and G traits, significantly lower externality, and were generally younger with no previous nursing experience, and more likely not to have prekindergarten age children than the nonpersisters.

The major significance of this research comes from its use of data gathered at the beginning of an educational program to make predictions which can be available to teachers, counselors, and administrators who may make use of the information to improve the chance potential nonpersisters have of completing the nursing program, or perhaps to assist students in reexamination of their career choice.

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CHAPTER I

INTRODUCTION

The nursing profession has experienced rapid growth during the past ten years. Greater emphasis on preventive medicine and rehabilitation, rapid advances in medicine, and the expansion of health care services have contributed to this growth. About one million persons are employed as registered nurses (RN's) in the United States (12). This is a 45 per cent increase over the past decade. Although the number of nurses employed has surged upward, a shortage continues. The need for qualified nurses is particularly acute in the rural areas and in the inner cities according to reports presented at the 1979 National League for Nursing Convention (9). Schools of nursing are challenged to find the most effective means of selecting and educating promising students to fill positions awaiting them upon graduation.

A particularly grave problem facing institutions that prepare nurses is a high attrition rate. The attrition rate for nursing students approximates one third of all students admitted to all types of nursing programs (10). The largest drop-out rate occurs within the first year after admission to a school of nursing (15). A high

attrition rate poses a distinct problem as most nursing programs have more applicants than available positions. An admitted student who is unable or unwilling to complete the program occupies a position which was denied another applicant who possibly would have succeeded. Therefore, a high attrition rate in a nursing school is both costly and wasteful for the students, the faculty, the institution, and society. The need to determine factors capable of identifying those who will, or will not, continue in a nursing program is a crucial one. Early identification of those students who may not persist in the program is particularly vital in an Associate Degree Nursing (ADN) program which is an accelerated program preparing students in two to three years to qualify for the examination for nursing certification.

According to Kohen, Nestel, and Karmas (8), major gaps exist in the knowledge of the determinants of persistence and nonpersistence in undergraduate programs. Numerous studies, including those reported by Costello (3), Felton (4), Jones (5), Stronck (16), and Weinstein, Brown, and Wahlstrom (18), have examined selection procedures which would identify those who will persist in an ADN program. Scores on academic ability tests, college entrance examinations, and high school grades have provided the most reliable predictors in the past for academic success in higher education. Yet, Schwirian (15) found that academic

difficulty or failure accounts for less than one half of the attrition in nursing programs. In her national survey of schools of nursing, Schwirian discovered that little attention has been given to the noncognitive attributes of personality, attitudes, and personal variables. Thus it seemed important and appropriate to examine criteria which tap these areas. Added information to identify the probable persisters and nonpersisters in the first year of a nursing program can be helpful to counselors and teachers as they work with the students to minimize attrition and maximize success.

Statement of the Problem

The problem of this study was to compare selected personal characteristics of students who withdraw or fail (nonpersisters) during the first year of an ADN program with those same characteristics of students who successfully complete (persisters) the first year of the program.

Purposes of the Study

The purposes of this study were

1. To compare how persisters and nonpersisters in the first year of an ADN program differ in their belief in external versus internal control of events in their lives;

2. To compare how persisters and nonpersisters in the first year of an ADN program differ in the following personality traits and factors: intelligence, superego

strength, extraversion, anxiety, tough poise, and independence;

3. To compare how the persisters and nonpersisters in the first year of an ADN program differ on the following variables: age, marital status, number of children who are prekindergarten age, annual family income, scores on the Nelson-Denny Reading Test, previous college experience, previous nursing-related employment, and present employment status;

4. To develop a predictive model for persisters and nonpersisters in the first year of an ADN program.

Hypotheses

The following specific hypotheses were used for the study.

1. There will be a significantly lower average score on "externality" as measured by the Rotter Internal-External Scale (I-E Scale) for those students who are persisters in the first year of an ADN porgram than for those who are nonpersisters.

2. Using Cattell's Sixteen Personality Factor Questionnaire there will be

   a. A significantly higher average Standard Ten Score (STEN) on Source Trait B, intelligence, for the persisters in the first year of an ADN program than for the nonpersisters.

b. A significantly higher average STEN on Source Trait G, superego strength, for the persisters in the first year of an ADN program than for the nonpersisters.

c. A significantly higher average STEN on Second-Order Factor I, extraversion, for the persisters in the first year of an ADN program than for the non-persisters.

d. A significantly lower average STEN on Second-Order Factor II, anxiety, for the persisters in the first year of an ADN program than for the nonpersisters.

e. A significantly higher average STEN on Second-Order Factor III, tough poise, for the persisters in the first year of an ADN program than for the non-persisters.

f. A significantly higher average STEN on Second-Order Factor IV, independence, for the persisters in the first year of an ADN program than for the non-persisters.

3. There will be a significantly higher percentage of students, twenty-three years old or older, who will be persisters in the first year of an ADN program than students who are younger than twenty-three.

4. There will be a significantly higher percentage of married students, or formerly married students, who will be persisters in the first year of an ADN program than students who have never been married.

5. There will be a significantly higher percentage of students without prekindergarten age children who will be persisters in the first year of an ADN program than students with prekindergarten children.

6. There will be a significantly higher average family annual income for those who are persisters than for those who are nonpersisters during the first year of an ADN program.

7. The average score on the Nelson-Denny Reading Test will be significantly higher for those who persist in the first year of an ADN program than for those who are non-persisters.

8. There will be a significantly higher percentage of students who have taken college courses prior to their admission to an ADN program who will be persisters in the first year of the program than students who enter the ADN program without previous college courses.

9. There will be a significantly higher percentage of students who have previously worked as a licensed vocational nurse (LVN) or as a nurses' aide before admission to the ADN program who will be persisters in the first year of the program than students who have not had such experience.

10. There will be a significantly higher percentage of students who are employed outside the home less than twenty hours per week who will be persisters in the first

year of the ADN program than students who are employed outside the home twenty hours or more per week.

Significance of the Study

Administrators, counselors, and teachers of nursing education are faced with a dilemma. To increase the percentage of nursing students who successfully complete their training it appears certain that some means of early identification of the potential dropout, or nonpersister, is needed. However, "little research has been conducted in nursing education or in higher education attempting to predict the probably attrition of students in undergraduate programs" (7, p. 226). Research addressing the attrition question has focused primarily on achievement or aptitude scores (1, 3, 4, 19). While reference to established performance measures contributes to an understanding of students, their interpretation would be enhanced when considered with other measures as suggested by Jones (5) and Rose (13).

The major significance of this study comes from its use of data to assist nursing educators and counselors to understand how students' beliefs about themselves and the causes of events in their lives, designated personality traits, and selected personal data are reflected in successful performance and persistence during the first year of nursing school. The procedures described for predicting

attrition can be used for future curriculum development, recruitment of students, personal and vocational counseling, and teacher-student understanding. Knowledge gained from the study can be used further in assisting students in selection of remedial or tutorial opportunities, or re-examination of career choice.

Definition of Terms

1. Associate Degree Nursing (ADN) program.--An ADN program is a two-year course which provides a general education combined with nursing education on a college level. Students receive classroom instruction and coordinated clinical experience in the nursing care of patients at hospitals and community agencies which qualify them to take the state's examination to become a registered nurse.

2. Locus of control.--Julian B. Rotter's (14) term for the perceived origin of the events in one's life. Individuals with an internal locus of control perceive themselves as being responsible for those events while those with an external locus of control see themselves as being the victims of fate and governed by circumstances beyong their control.

3. Persisters.--Those nursing students who successfully complete the first year in a nursing program.

4. Nonpersisters.--Those nursing students who either drop out or fail during the first year in a nursing program.

5. Successful completion of the first year of the ADN program.--This describes the student who has been enrolled for twelve or more hours each semester for two consecutive semesters during the regular school year and who has achieved at least a grade of C in all nursing and natural science courses and maintained a cumulative grade point average of 2.0, with 4.0 being the maximum score possible.

6. Source trait.--Raymond B. Cattell's (2) term for those characteristics that are basic and fundamental to behavior patterns.

7. Second-order factor, or second-stratum factor.--Raymond B. Cattell's term for broader traits which result from combinations of the primary factors. They often provide a more convenient capsule-description of personality.

Delimitations of the Study

Boundaries of this study included

1. Conduct of the study on a single community college in East Texas;

2. Limitation of the study to females since only seven males were enrolled in the nursing class of ninety-eight students.

Subjects for the Study

The subjects were ninety-one community college female students enrolled in the first year of an associate degree of nursing program during the academic year 1979-1980.

Summary

Nursing programs are endeavoring to find the most effective means of selecting and educating promising students to fill positions in the health care fields. They are faced with an attrition rate which approximates one third of the students admitted to nursing schools, with the largest dropout rate occurring during the first year. A number of studies have been reported which focus primarily on cognitive factors and past academic performance as they relate to success in the academic training of nurses. One major area that has not been researched thoroughly concerns noncognitive attributes of personality and personal variables.

Thus, the purpose of this study was to examine students' beliefs about the causes of events in their lives, selected personality traits, and certain demographic variables as factors related to persistence or nonpersistence in the first year of a two-year nursing school. An additional goal was to develop a predictive model for early identification of the potential nonpersister by using discriminant analysis (6, 11, 17). Information gained can enable college administrators, teachers, and counselors to better understand and meet the needs of nursing students who are potential nonpersisters.

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CHAPTER II

REVIEW OF THE LITERATURE

Effective selection, training, and counseling of students are of vital concern to those associated with these tasks in nursing education (57, 64). A need exists for the determination of characteristics that differentiate nursing students who persist in a nursing program from those who fail to persist in such a program (57). High attrition represents a large-scale wastage of both human and economic resources. The need to identify characteristics capable of predicting potential failures and successes is therefore a critical one (64).

This chapter presents an examination of the literature relating to studies of success and failure in college, including demographic variables and personality factors. Literature on three specific measuring instruments is also included: the Rotter Internal-External Scale, the Sixteen Personality Factor Questionnaire, and the Nelson-Denny Reading Test.

Studies of Success and Failure in College

A review of the literature by Tinto (61) reveals a number of research studies concerning the prediction of success or failure in college. Cognitive criteria such as

achievement test scores and previous academic achievement have been used most frequently to predict future school success or failure. Studies by Juola (31), Khan (33), and Lavin (38) each demonstrated the relationship of high school grades to achievement in college. Mounting evidence questions the validity of these traditional measures of potential performance, particularly for community colleges with their open-door admissions policies. Lindquist (41) found that the American College Test (ACT) had little, if any, practical application in predicting the achievement for students enrolled in community college vocational education programs. Dalton (19) also concluded that the ability to predict college grades from the Scholastic Aptitude Test (SAT) and high school achievement seems to be decreasing. According to Stronck (60) letters of recommendation do not serve as good predictors of future school performance either.

Astin (2) concluded that the public two-year college has the type student and environmental attributes associated with dropping out. These students have relatively low ability and motivation. They are often married and older. Also, the two-year college has environmental conditions that contribute to dropout rates, such as no residential facilities, limited financial aid, and few extracurricular activities. The study by Astin considered the general student population enrolled in two-year colleges. However, unlike most community college students, who have not

selected a clear career goal, students applying for nursing programs have already chosen a specific career which they hope to pursue. Muzio and Ohashi (43) stress that RN students have unique characteristics and unique needs.

Demographic Information

Demographic data, such as age, marital status, socio-economic status, previous college experience, and present or past work experience, have been studied in relation to their influence on academic success. Little empirical evidence is yet available which compares the older, married student with the traditional younger, unmarried one. The evidence reported indicates conflicting results pertaining to the characteristics of the mature student. Herridge (23) found that low achievers tended to be young, single, and often black. Ngo (44) reported that the factors of age and marital status were related to achievement. Married students and students over thirty obtained higher grades than did single and younger students. Sex and the holding of a part-time job were the only variables predictive of success among community college students according to a study by Baron (5). Female students and working students were more likely to be academically successful. Age, curriculum, marital status, and other factors were not predictive. Lindquist (41) studied the predictive ability of age, sex, and marital status. While Lindquist concluded that these factors were

not useful predictors of students' achievement in vocational education programs at the community college level, Knoell and Medsker (35) reported that older undergraduate students maintained a higher degree of persistence and were more likely to graduate on time than their younger classmates. Atwood and Ellis (3) noted that the older students have strong personal needs which help them return to school. Chapman (17) speculated that a strong inner drive may be the factor that helps the older student to show greater achievement than do younger ones. Zahn (66), however, found that the older student had difficulty in accepting new evidence that conflicted with deeply held beliefs.

Until the early 1960's, nursing education was reserved for the single woman in the traditionally college-age range of eighteen to twenty-three who possessed personality characteristics quite similar to her classmates (48). With the advent of Associate Degree Nursing (ADN) programs in community colleges, the door was opened to both sexes of all ages regardless of marital status. Although the male nursing student continues to account for less than 10 per cent of the total enrollment, the older, married female has become more and more visible (2). The increased enrollment of older women may well be a reflection of the rapidly expanding population of women matriculating in post-high-school level courses (45).

Information supports the idea that older students can perform equally as well and possibly better than the traditional students from the eighteen- to twenty-three-year-old college-age group. Houston (27) found that age correlated positively with all subtest scores on the Nursing Board Examination. Yet evidence indicates that adult students lack self-confidence in the college setting (22). However, educators of adults generally agree that the fears mature students have about their ability to learn when compared with the traditional eighteen- to twenty-three-year-old college students are unfounded, as reported by Barwick (8).

Smallwood (59) studied the problems of mature women who attended a community college in a metropolitan area in North Texas. She found five major concerns of adult women students centered around coordinating noncollege responsibilities, particularly child care and jobs; solving academic problems; acquiring a job and a career; facing interpersonal relationship problems; and meeting financial needs. Hess and Coon (24) found that two major factors preventing students from being admitted to or staying in nursing programs are academic deficiencies and lack of money. Each of these concerns, or a combination of them, pose a problem for the older woman seeking additional formal education.

Personality Variables

The use of certain personality variables as predictors of academically successful students has received considerable study. Roe (49) claimed that personality characteristics and occupational choices were definitely related. Holland (26) found the personality variables as measured by the California Psychological Inventory (CPI) highly correlated with college freshman grades. Kirk, Goodstein, and Cummings (34), however, found that the Strong Vocational Interest Blank (SVIB) did not discriminate between successful and nonsuccessful nursing students. Using the SVIB and the Otis Self-Administering Test of Mental Ability, they found that neither test predicted withdrawal from nursing programs for academic unsuitability or grade point average. Mowbray and Taylor (42) used both the Kuder Preference Record and the SVIB in schools of nursing without much success.

Other examiners have used the Minnesota Multiphasic Personality Inventory (MMPI) and the Sixteen Personality Factor Questionnaire (16PF) in attempting to make predictions relating to success in nursing programs. Levitt, Lubin, and Dewitt (39) employed the MMPI to determine if there were significant differences in performance on the inventory between those who did well and those who had difficulty in nursing schools. No significant differences were noted. Using a battery of psychological tests including the 16PF and the SVIB, Johnson and Leonard (28) attempted to

determine the effectiveness of these instruments in predicting theory and practice grades for nursing students. Test scores indicated that nursing students were average in scholastic aptitude compared with other females at the University of Wisconsin. Their personality test scores indicated that they were more intelligent, assertive, and experimenting than women in general. Sharp (58) found ten of the MMPI scales predictive of college attrition.

Administering the Edwards Personal Preference Schedule (EPPS) to 120 ADN students, Jones (29) found that persisters in the nursing program had a greater need for achievement, deference, and heterosexuality. Similar findings resulted from a study by Bailey and Claus (4) comparing personalities of students in diploma and baccalaureate programs with the norms of college women in general. The EPPS revealed traits of nursing students to be needs for nurturance, abasement, succorance, and order.

Bar-Tal (6) studied individual differences and made attributional analyses of academic-related behaviors. He concluded that while performance is affected by cognitive learning skills, performance is, also, greatly determined by the reasons people perceive as causes of their successes or failures. Those individuals with high achievement needs perceive their successes as caused by their own ability and effort and their failures as caused by lack of effort. People with low achievement needs blame their failures on

lack of ability and do not take credit for their ability when they experience success.

Few schools of nursing administer personality and vocational interest tests routinely. Schwirian (57) discovered that less than 4 per cent of the nursing schools use noncognitive attributes, such as personality and attitudes, in gaining information about their students. Data of this nature are gained primarily through preadmission interviews and from student applications. Weinstein, Brown, and Wahlstrom (64) have stressed that while interviews can be useful under certain conditions, their overall usefulness is questionable. They further suggest that testing can be quite helpful, particularly when used to identify areas for remediation.

Locus of Control

One personality characteristic which helps to account for a student's ability or inability to succeed is the locus of control. This component of personality relates to the attribution of responsibility for success or failure. The idea for the development of the locus of control construct came from Julian B. Rotter (51), a social learning theorist. The refinement of the construct is described by Rotter (50), and Rotter, Chance, and Phares (53). An extensive bibliography of studies related to this dimension of the individual is provided by Phares (46).

The first research on the locus of control variable was conducted by Rotter (50) who was interested in determining the extent to which people believe that the sources of reinforcement in their lives are internal or external. Rotter measured this belief by an Internal-External (I-E) Scale. His theory is that people behave as they do because of their beliefs about causes of events in their lives. Externals blame experiences on the environment or on others. Internals feel responsible for past experiences and for future ones. Perception of control influences a wide range of behaviors (30). Those who score in the direction of internal control appear more active in their attempts to control and master the environment. They seek out more information to help them reach their goals. They are less influenced by social pressures, tend to be better adjusted and can tolerate frustration and can cope with stress (53). Studies indicate that when internals can accurately perceive certain events as being controlled by external causes, they are more active in trying to change those events or the causes of them than are externals (30, 52). A review of the literature by Phares (46) indicates that perceived locus of control is a relatively stable characteristic that people carry from situation to situation as a generalized belief about their power of control.

Bar-Tal and Bar-Zohar (7), in reviewing the literature of locus of control and educational implications, indicate

that internal perception of control is positively related to academic achievement. Their findings suggest that mediating motivational and cognitive reactions, which differentiate internals from externals, may account for this relationship. In the academic setting, a student who feels that his academic success depends upon external forces such as fate, luck, or the whims of teachers, displays an external locus of control. Students who believe that they can be academically successful if they really want to, apply themselves to the attainment of this goal. These students exhibit an internal locus of control. The relationship between children's locus of control and academic achievement has been studied carefully (7, 25, 37, 46). However, few studies have examined locus of control in college students (11, 46), and even fewer studies of this factor have involved technical or vocational programs (20). Wuensch and Lao (65) reported at the annual meeting of the American Psychological Association in 1976 that a study of nine groups of undergraduate students showed that internal students made higher grades than external students. Roueche and Mink (54) found a relationship of locus of control to achievement in community college students, and Blum (9) reported that, even when ability was controlled, locus of control and the importance attributed to academic achievement interacted to predict college grades.

Personality Factors

Perhaps the leading exponent of indirect, nonverbal testing of personality is Raymond B. Cattell (14) who has accomplished much work on locating basic personality traits. Using factor analysis Cattell (13, 15, 16), through extensive research, designed the 16PF as an instrument to identify traits, or hypothetical constructs, to generate conclusions about subsequent behavioral events. The 16PF has wide use in the fields of Occupational Psychology and Clinical Psychology. A large volume of research is available on the 16PF test as reported by Cattell, Eber, and Tatsuoka (16), and Karson and O'Dell (32).

Cattell believes that "knowledge of understanding traits will allow us to make predictions about our own behavior and that of others" (21, p. 251). Cattell has factor analyzed the sixteen primary factors, or source traits, deriving from the analysis nine second-order, or second-stratum, factors which link the first-order traits together. "Two factors originally accepted in the 16PF as primaries continue to stand essentially on their own in the second-order analysis, and are thus properly considered second-stratum factors," according to Cattell (16, pp. 116-117). These are factors B and G, intelligence and superego strength, respectively. The first four of the second-stratum source traits have received more study than the others. These are Factor Q_I, introversion versus extraversion; Factor Q_{II}, low

anxiety versus high anxiety; Factor Q_{III}; tenderminded emotionally versus tough poise; and Factor Q_{IV}, subduedness versus independence (16).

The 16PF has been used to examine personality traits of baccalaureate nursing students and practicing nurses as evidenced by Adams and Klein (1), Bonaparte (10), Burton (12), Johnson and Leonard (28), Schwirian (57), and Townes and Wagner (62). However, a search of the literature indicates that the use of the 16PF Questionnaire with community college nursing students has been quite limited. Burton (12, p. 82) recommended that "second-order factors on the 16PF would provide a more discriminative measure than the primary factors" for predicting successful and unsuccessful nursing students.

The Reading Test

Rubin and O'Mahoney (56) examined attrition-risk populations in nursing education and found "basic reading ability and reading ability in scientific areas were the most potent preparedness factors related to success" (56, p. 440). A study by Roueche and Snow (55) discovered that community colleges primarily use testing and counseling to place or advise students about developmental courses or programs. They further noted that limited reading skill was a major factor in attrition at the community college level and reported that "the most commonly used test with all

community and senior colleges is apparently the Nelson-Denny Reading Test" (55, p. 27). Townsend (62) suggests that the test can serve as a screening device for college students to measure vocabulary, comprehension, and reading rate.

Summary

This chapter has surveyed the literature relating to studies of success and failure in college, including demographic variables and personality factors. Studies of the I-E Scale, the 16PF, and the Nelson-Denny Reading Test were presented.

It appears that most schools of nursing continue to rely most heavily on past academic performance as the most reliable predictors of success (18, 40). However, since many of those who fail to continue in nursing programs have somewhat equal academic potential as do those who continue, there remains a genuine need for continued research to find information, tools, and techniques that might be utilized by the teaching staff and counselors in working with students as they progress through their academic preparation. Knopke has shown that "to date little research has been conducted in nursing education or in higher education attempting to predict the probable attrition of students in undergraduate programs" (37, p. 226). Attrition is evidently a multi-dimensional process. The study of related literature

afforded stimulus and direction for the design of the study to be presented in the next chapter.

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CHAPTER III

PROCEDURES OF THE STUDY

In this chapter the population studied is described and the instruments used are examined. The procedures for collecting the data are outlined and the treatment of the data is detailed. A presentation is also made of the process by which information was gained from other Texas Associate Degree Nursing (ADN) programs to ascertain the degree to which information gained from the study can be generalized to other schools.

Population for the Study

The population for the study included ninety-one female ADN first-year students enrolled in a selected community college in East Texas. The study involved all of the females in the 1979-1980 freshman nursing class. Since only seven males were in the class, they were excluded from the study.

Instruments

Four instruments were included in the study: The Nelson-Denny Reading Test, Rotter's Internal-External Scale, Cattell's Sixteen Personality Factor Questionnaire, and a Nursing Student Questionnaire.

The Nelson-Denny Reading Test (NDRT) measures three major elements of reading ability: vocabulary, comprehension, and reading rate (4). The alternate form test reliability coefficients range from .90 for grade nine to .96 for grade sixteen. The reliability coefficients were computed by Pearson product-moment correlations and corrected with the Spearman-Brown formula. The NDRT manual reports validity in the .60's based on studies correlating test performance with scholastic achievement. Crites (7) notes that there is evidence of validity for a variety of purposes for the NDRT. A research study with twelfth graders demonstrated concurrent validity using Pearson product-moment correlation (12). The correlation of the NDRT total score and the Scholastic Aptitude Test was .83.

Orr (18) indicates that the NDRT shows evidence of careful construction. At the college level, a stratified random sampling procedure was used with 3,558 students from five types of colleges (4). Crites reports that reliabilities for the test, based upon a carefully conducted study of 110 college students, appear to be adequate for both general screening purposes with the total scale and diagnostic work with the subscales. He recommends the test to counselors, pointing out that the test is well constructed and excellently standardized.

The NDRT is composed of a one-hundred-item vocabulary section and a thirty-six-item reading comprehension section,

both of traditional multiple-choice types. There is also a reading rate score available. Raw scores can be converted into percentile ranks, standard scores, and grade equivalents.

The Internal-External (I-E) Scale, developed by Julian B. Rotter, is a "29-item, forced-choice test including six filler items intended to make more ambiguous the purpose of the test" (19, p. 10). Each item has two statements, one designated an "internal" choice, and the other denoting an "external" response. The score is the total number of external choices which one makes. Therefore, a high score suggests externality. The scores may range from 0 to 23. The scale measures whether the individual believes that reinforcements are beyond the individual's control or believes that the person controls much of what happens to the particular individual. People who believe their lives are controlled by outside forces beyond their control are called externals. Those who see their own personal locus of control as inside themselves are viewed as internals.

Rotter (19) reports internal consistency of .73 for elementary psychology students at Ohio State University with an equal number of males and females, and .69 in a study using 100 tenth, eleventh, and twelfth graders. On three different sample populations Rotter reports test-retest reliability coefficients of .78 and .72 for one month period. Anastasi (2) indicates that split-half and Kuder Richardson

reliabilities of the twenty-nine-item scale cluster around .70. She states that the I-E Scale has been carefully constructed and evaluated.

Rotter (19) found that discriminant validity was indicated by the low relationship of several variables. A correlation of the -.11 with intelligence was found using the Ohio State Psychology Examination. Two other correlations with intellectual measures yielded similar results, -.09 and .01, according to Rotter. On social desirability, he indicates that a correlation of -.22 represents the mean correlation for different samples of students using Marlowe-Crowne Social Desirability Scale.

The Sixteen Personality Factor Questionnaire (16PF) provides measures on sixteen source traits. The questionnaire comes in various forms. Form A, which was used in this study, consists of 187 items, with from ten to thirteen items comprising each scale. The scales were developed by Raymond B. Cattell (5) using factor-analytic techniques. Nine second-order composites have been established. This study used the four principal second-stratum source traits and also considered the primary source traits B and G, which are related to intelligence and superego strength respectively. All of the other primary source traits are involved in the composites of the four major second-stratum factors.

The reliability and the validity of the 16PF have been carefully measured. Cattell, Eber, and Tatsuoka (5) report

that split-half reliabilities for each of the sixteen factors range from .71 to .93, averaging about .83 or .84. They report internal construct validities ranging from .73 to .96, averaging about .88, measured by a carefully planned converging series of factor analysis using computer synthesis.

The Nursing Student Questionnaire, page 81, was designed in the following manner. In May, 1979, twenty-five second-year nursing students were asked to list factors other than grades and personality traits which they considered important in determining whether or not a student continued with the nursing program. All items which were mentioned by over 60 per cent of the students were included on the original questionnaire.

Sixteen persons were then selected in June, 1979, to evaluate the applicability of the items on the questionnaire. The group was composed of four nursing instructors, three counselors, six second-year students who graduated in May, 1979, and three dropouts from that particular class. These persons were randomly selected from their respective groups and asked to complete a critique form (page 82) of the instructions for the questionnaire and to react to the items as (a) appropriate, (b) no opinion, or (c) inappropriate, as determinants of whether or not students persisted in the nursing program. Items included in the final questionnaire were those that had received favorable ratings by three fourths or more of the judges.

Procedures for Collecting the Data

Arrangements were made with the Director of Nursing at the selected community college to conduct the study during the 1979-1980 school year with students who were enrolled in the first year of the ADN program. The Nelson-Denny Reading Test was completed by each prospective nursing student under the supervision of one of the college counselors prior to the time the student registered for the fall semester. Each student received identical instructions.

The Nursing Student Questionnaire, the I-E Scale, and the 16PF were administered by the researcher during the second week of school. The instruments were administered on a group basis in order to minimize possible variance due to the effects of differing environmental conditions existing on different testing dates. All of the students responding to these forms completed them within one hour and twenty minutes.

Responses to the personal data questionnaire were coded numerically on computer cards. The I-E Scale, the 16PF, and the Nelson-Denny Reading Test were scored for each student and the scores were placed on computer cards.

The Director of Admissions for the selected school furnished the researcher the names of students as they withdrew from the nursing program during the course of the year. The Nursing Department supplied the names of those students who

were dropped from the program by instructors because of excessive absences, academic failure, or other reasons.

Treatment of the Data

Each hypothesis was restated in the null in chapter four for testing when all data were available. To check the significance for each individual variable the z test or the chi-square test was used. A z test for differences between means was employed to determine if there were significant differences for hypotheses one, two, and seven. To examine hypotheses three through five and hypotheses eight through ten, the z test for the difference between two proportions was used. Chi-square was conducted to find the significance of hypothesis six. These statistical techniques are described by Brase and Brase (3), Ferguson (7), and Newmark (15).

The data for the fifteen variables within the ten hypotheses were punched on computer cards. Notation was also made on the cards as to whether each card was for a persister or a nonpersister in the ADN program at the close of the 1980 school year. The persisters and the nonpersisters were compared by a two-group discriminant analysis. Computations were provided by using the Statistical Package for the Social Sciences, the SPSS (11, 16).

Discriminant analysis is a multivariate technique which maximizes the use of information and provides a set of

coefficients that best predicts the assignment of a person to the appropriate group. Discriminant analysis provides a statistical base for separating individuals into groups according to specific characteristics as discussed by Cohen and Cohen (6), Kelly, Beggs, and McNeil (13), Kerlinger and Pedhazur (14), Nunnally (17), and Snedecor and Cochran (21). Sanathanan (15) identifies discriminant analysis as a single discriminant score with two groups which contains all of the classificatory information present in the several variables used. She indicates that it is usually difficult to discriminate between two groups on the basis of one variable at a time because of substantial overlaps among those groups in each variable. A much better separation, or discrimination, of the groups can be achieved by looking at a suitable weighted combination of several variables, known as the discriminant score (1, 10, 23).

Where prediction is an explicit goal, the approach has often been through univariate statistics where each variable is examined one at a time and treated as if each particular variable were a separate predictor. Where the variables are not totally independent, techniques which do not consider intercorrelations can give misleading results and lead to wholly inaccurate comparisons between groups as pointed out by Tatsuoka (22).

In line with the preceding information, a discriminant analysis was conducted using the specified dependent

variable (Y), persistence, and fifteen independent variables (X_{1-15}). The independent variables consisted of the scores obtained on the instruments which measured locus of control, personality traits and factors, and reading skills ($X_{1-7,\ 12}$) and the biographical data ($X_{8-11,\ 13-15}$). The criterion and predictor variables appear in Table I.

TABLE I

CRITERION AND PREDICTION VARIABLES

Number	Corresponding Variable
1. Criterion	
Y	Persistence, Nonpersistence
2. Predictors	
X_1	I-E score
X_2	Trait B STEN
X_3	Trait G STEN
X_4	Factor I STEN
X_5	Factor II STEN
X_6	Factor III STEN
X_7	Factor IV STEN
X_8	Age (under 23, over 23)
X_9	Marital status (married, never married)
X_{10}	Children (none prekindergarten, one or more prekindergarten)
X_{11}	Income
X_{12}	Nelson-Denny score
X_{13}	Prior college experience (yes, no)
X_{14}	Previous nursing experience (yes, no)
X_{15}	Present employment (full time, not full-time)

To reduce the number of variables before developing a predictive model, a stepwise discriminant analysis was used to select those variables from the original fifteen that contain most of the classificatory information. Variables were entered into the analysis on their ability to maximize the F ratio and minimize Wilks' lambda for the test of differences between the two groups, persisters and nonpersisters. The stepwise approach started by choosing the single best discriminating variable. This variable was then paired with each of the other independent variables one at a time, and a second variable was selected. Subsequent variables were selected in a similar manner until adding further variables did not give a high enough partial F value. Using the guideline from stepwise regression, a partial F value of one was taken as the minimum value below which a variable was excluded. Seven variables were judged from this procedure as contributing significantly toward discriminating between the two groups being studied: (1) Nelson-Denny Reading Test, (2) I-E Scale, (3) nursing experience, (4) having no children of kindergarten age or younger, (5) age, (6) 16PF Trait B, and (7) 16PF Trait G. Completing the discriminant analysis yielded discriminant function coefficients, group centroids for determining the critical or cut-off score, and classification results.

Survey of Texas ADN Programs

Since this study was conducted on only one campus, there existed a need for an indication of how well the findings might generalize to other ADN programs in Texas. There are currently thirty ADN programs in operation throughout the state. On July 17, 1979, a letter (Appendix C, page 85) with an attached questionnaire (Appendix D, page 86) was mailed to each of the program directors. They were asked to respond to ten questions which related to the demographic information included on the Nursing Student Questionnaire designed for this study. Twenty-six completed forms were returned. Information gained from the survey is presented in Appendix E, page 88.

The survey indicated that the level of competition varies from school to school, but there were approximately 5,800 applicants for the 2,400 available positions in the thirty Texas ADN programs. A profile of the average ADN student in Texas which emerged from the survey is that of an Anglo-American female between the ages of twenty-three and twenty-eight. She is a high school graduate who probably, a 70 per cent chance, earned some college credit before being admitted to the ADN program. There is a 50 per cent chance that she is employed on a part-time basis and a 10 per cent chance that she works at a full-time job. Her chance of having previous nursing-related work experience is about 30 per cent, and she can expect a 60 per cent chance

of successfully completing the first year of training to become a registered nurse. The profile relates closely to that of the average student in this study, as presented on page 56.

Summary

Data for the study were obtained from four instruments. Three of the instruments separately measured locus of control, personality traits, and reading skills. The fourth instrument provided information about selected demographical characteristics. The subjects were ninety-one female students at an East Texas community college.

Each hypothesis was treated by a test for a difference of two means, a test for a difference of two proportions, or chi-square where appropriate to determine any significant difference between persisters and nonpersisters in the first year of a two-year nursing program. A stepwise two-group discriminant analysis, using the SPSS computer program, was employed to devise a prediction model which maximally discriminated the potential nonpersister from the potential persister.

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CHAPTER IV

PRESENTATION OF THE DATA

Three purposes of the study were to compare how persisters and nonpersisters in the first year of an ADN program differ in their beliefs in external versus internal control of events, differ on selected personality traits and factors, and differ on seven demographic variables. A fourth purpose was to develop a predictive model for persiters and nonpersisters.

There were ninety-one subjects. Fifty-five satisfactorily continued with the program throughout the year. Thirty-six students became nonpersisters. They either voluntarily left the program for various reasons or were dismissed from the program because of academic failure.

The presentation of the data in this chaper is organized into five subdivisions which follow the sequential order of the ten hypotheses. One exception relates to hypothesis seven concerning the Nelson-Denny Reading Test. Data for that instrument were reported before hypotheses three through six, since the NDRT received the same statistical test used with hypotheses one and two. The five subdivisions are locus of control, personality traits and

factors, reading skills, demographic results, and discriminant analysis

Locus of Control

The null hypothesis (H_o) for the first variable was that no difference existed between the means on the Rotter I-E Scale for persisters and nonpersisters. Scores on the I-E Scale range from 0 to 23. Higher scores relate to externality and lower scores relate to internality. The results of the scores of the two groups are listed in Table II.

TABLE II

RESULTS ON THE I-E SCALE

Group	Mean ($\bar{x}$)	Standard Deviation (s)	Number of Subjects (n)
1. Persisters	6.98	3.48	55
2. Nonpersisters	9.89	3.10	36

The alternate hypothesis (H_1) indicated that there was a difference in the means on the I-E Scale, with persisters having a significantly lower score on externality than nonpersisters, H_1: $\bar{x}_1 < \bar{x}_2$. The critical value for a left-tail test with a level of significance of .05 was the appropriate test to use in this situation. The critical value was calculated using the following formula.

$$\text{critical value} = -1.645\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$= -1.645\sqrt{\frac{3.48^2}{55} + \frac{3.10^2}{36}}$$

$$= -1.645\sqrt{.220 + .267}$$

$$= -1.645(.698) = -1.148$$

Since $\bar{x}_1 - \bar{x}_2 = 6.98 - 9.89 = -2.91$ is in the critical region, H_o is rejected. At the 5 per cent level of significance, the claim that Group 1 shows less externality is justified.

Scores on the Rotter I-E Scale for persisters and nonpersisters are presented in Figure 1. The mode for both

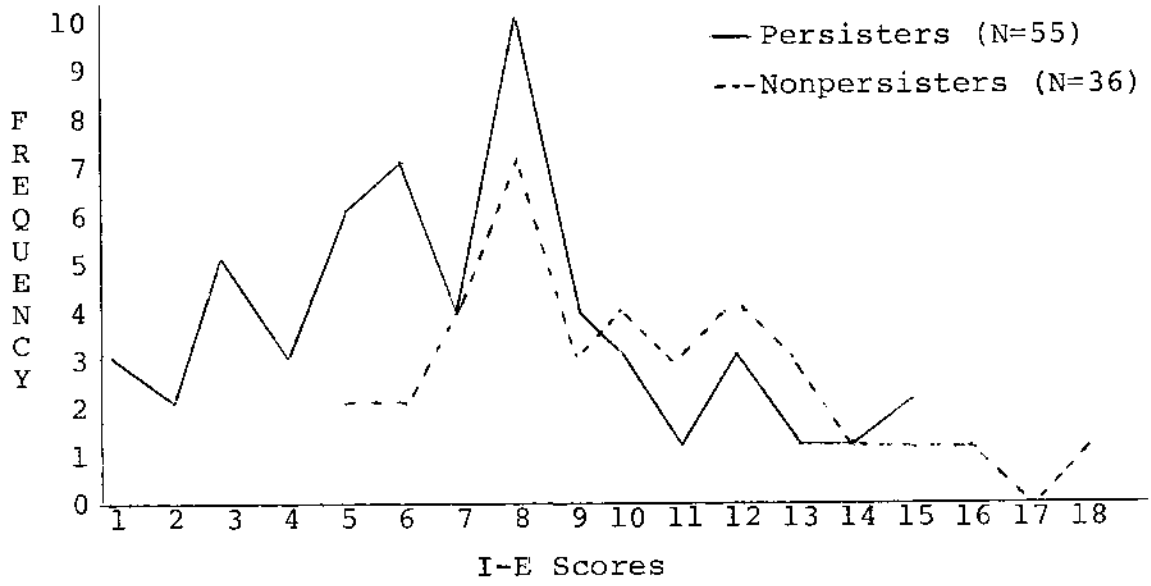

Fig. 1--Scores on the Rotter I-E Scale

groups is 8. Scores for persisters range from 1 to 15, with 7 being the median, while the nonpersisters' scores range from 5 to 18, with 9.5 as the median. Lower scores for persisters point toward greater internality, and higher scores for nonpersisters point toward greater externality.

Personality Traits and Factors

The second hypothesis had six subsections. The null hypothesis for each of the subsections was that no difference was present between the means of the Standard Ten Scores (STEN's) of the 16PF earned by persisters and nonpersisters for

1. Source Trait B.--Intelligence
2. Source Trait G.--Superego strength
3. Second-Stratum Factor I.--Extraversion
4. Second-Stratum Factor II.--Anxiety
5. Second-Stratum Factor III.--Tough poise
6. Second-Stratum Factor IV.--Independence

A STEN may range from one to ten. The larger STEN relates to the identifiers for each of the traits or factors given above. The alternate hypothesis for each subsection above, except for Second-Stratum Factor II, was stated H_1: $\bar{x}_1 > \bar{x}_2$. The critical value for a right-tail test involving a difference of two means with a level of significance of .05 is

$$\text{critical value} = 1.645 \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

The alternate hypothesis for the Second-Stratum Factor II was H_1: $\bar{x}_1 < \bar{x}_2$. This H_1 was tested by the same critical value formula on page 50 given for a left-tail test with .05 level of significance. Means, standard deviations, and critical values of the selected 16PF traits and factors appear in Table III.

TABLE III

MEANS, STANDARD DEVIATIONS, AND CRITICAL VALUES OF SELECTED 16PF TRAITS AND FACTORS

16PF	Group 1 Persisters N = 55	Group 2 Nonpersisters N = 36	Differences in the Means	Critical Values $\alpha = .05$
Trait B				
$\bar{x}$*	5.15	3.94	1.21**	0.68
s***	1.91	1.93	..	..
Trait G				
$\bar{x}$	6.85	6.17	0.68**	.62
s	1.78	1.73	..	..
Factor I				
$\bar{x}$	4.73	4.65	.08	.66
s	1.96	1.82	..	..
Factor II				
$\bar{x}$	5.77	5.90	-.13	-.62
s	1.73	1.78	..	..
Factor III				
$\bar{x}$	5.70	6.16	-.46	.56
s	1.73	1.50	..	..
Factor IV				
$\bar{x}$	4.90	4.71	0.19	0.54
s	1.64	1.48	..	..

*$\bar{x}$ = Mean; **$p < .05$; ***s = Standard Deviation.

Trait B, higher scholastic mental capacity, and Trait G, stronger superego strength, were significant at the .05 level. The H_o was rejected for these two traits. None of the Second-Stratum Factors were significant at the .05 or at the .10 level. However, noting that nonpersisters had a larger mean for Factor III, tough poise, than did persisters, a left-tail test with a level of significance of .05 and then for .10 was examined. The particular factor was significant at the .10 level in the opposite direction of H_1. The critical value at the .10 level of significance for a left-tail test measuring Factor III was -.436. The difference between the means of the two groups on this prticular factor was -.46, which placed it within the critical region for rejection of H_o. This means that the persisters scored significantly lower than nonpersisters at the .10 level of significance on the tough poise factor, indicating that they possess greater warmth, emotional sensitivity, and imagination. Although not within the level of significance, the means for the other three Second-Stratum Factors were in the direction predicted.

Reading Skills

Hypothesis seven stated in the null showed $H_o: \bar{x}_1 = \bar{x}_2$ indicating no difference in the means on the Nelson-Denny Reading Test total score earned by persisters and nonpersisters. The means were of the grade equivalent

converted from the raw scores on Form C of the test. Results are reported in Table IV.

TABLE IV

MEANS, STANDARD DEVIATIONS, RANGE, MEDIANS, AND CRITICAL VALUES FOR THE NELSON-DENNY READING TEST

Nelson-Denny Reading Test (NDRT)	Group 1 Persisters (N = 55)	Group 2 Nonpersisters (N = 36)	$\bar{x}_1 - \bar{x}_2$	Critical Value $\alpha = .05$
$\bar{x}$	13.5	10.9	2.6*	.814
s	1.8	2.6	..	..
range	6-15	6-15	..	..
median	14.2	10.7	..	..

*$p < .05$

The null hypothesis was rejected and the alternate hypothesis was accepted with a 95 per cent confidence level. H_1 stated that there would be a significantly higher total score average on the NDRT for those who were persisters in the first year of an ADN program than for those who were nonpersisters.

The range of scores for both groups indicated a span of reading skill scores from grade level 6 to grade level 15. However, the median grade level for Group 1 was 14.2 as compared to 10.7 for Group 2. Group 1 had thirteen students (23.6 per cent) who scored at the highest grade level, while Group 2 had only two students (5.5 per cent) to score at

that level. Only three persisters (5.4 per cent) placed below the tenth-grade reading skills level, whereas twelve nonpersisters (35 per cent) were below the tenth-grade level. The graph in Figure 2 illustrates that persisters have stronger reading skills than do nonpersisters.

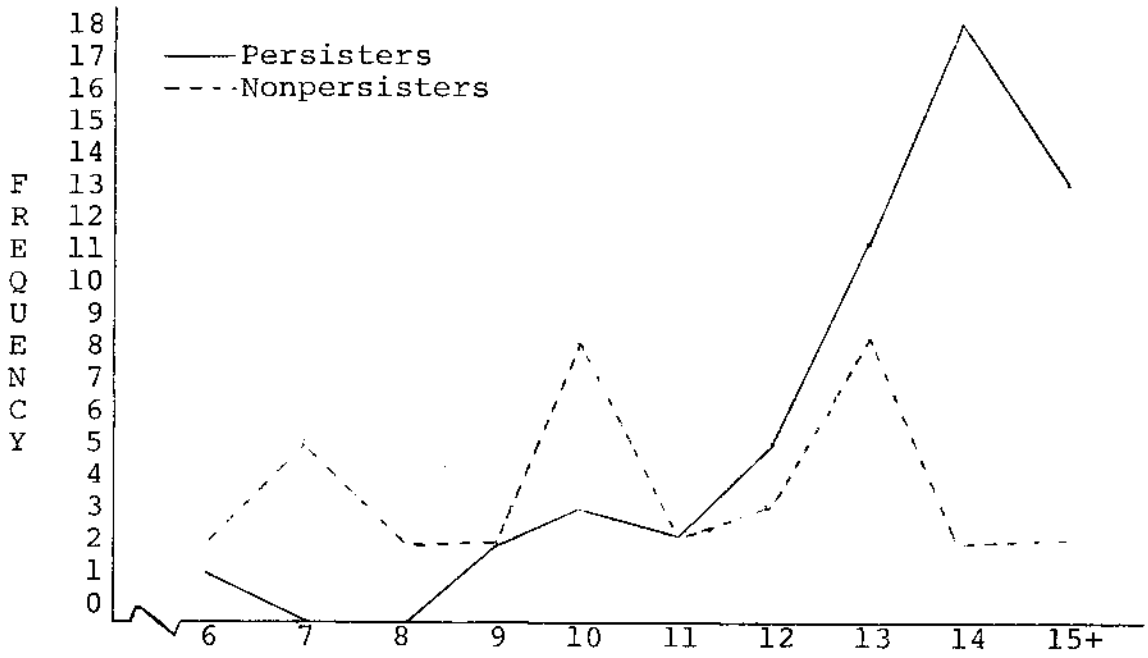

Fig. 2--Grade quivalent scores on the Nelson-Denny Reading Test.

Demographic Results

Seven demographic variables were included on the Nursing Student Questionnaire. Six of these were treated as dichotomous variables, as shown in Table V.

Hypotheses for the six variables predicted that a significantly higher percentage of subjects in each of the groups listed would be persisters than subjects in the opposite group for each factor. The six variables were

TABLE V

SUMMARY OF N'S FOR DICHOTOMOUS DEMOGRAPHIC VARIABLES

Variable	N for Persisters	N for Nonpersisters	Total
Age			
Under 23	21	13	34
23+	34	23	57
Marital status			
Married or previously married	39	22	61
Never married	16	14	30
Prekindergarten age children			
yes	19	7	26
no	36	29	65
Previous college work			
yes	44	25	69
no	11	11	22
Previous nursing-related work experience			
yes	36	18	54
no	19	18	37
Employed for 20 or more hours per week outside the home			
yes	13	8	21
no	42	28	70

1. Twenty-three years or older
2. Married or previously married
3. No prekindergarten age children
4. Previous college experience

5. Previous nursing-related experience

6. Employed for twenty or less hours per week outside the home.

Null hypotheses for each of the six variables were that there would be no difference between persisters and non-persisters. The desired information called for tests involving a difference of two proportions. All predictions were in a specified direction; therefore, a critical value for a one-tail test was calculated for each problem. The difference in the proportions was compared with the critical value for the particular problem. The critical value for a right-tail test involving a difference in two proportions with α at .05 is

$$\text{critical value} = 1.645\sqrt{\frac{\hat{p}\hat{q}}{n_1} + \frac{\hat{p}\hat{q}}{n_2}}$$

$$\text{where } \hat{p} = \frac{r_1 + r_2}{n_1 + n_2} \text{ and } \hat{q} = 1 - \hat{p}$$

r_1 = the number of persisters with the predicted trait

n_1 = the total number of subjects with the predicted trait

r_2 = the number of persisters with the unpredicted trait

n_2 = the total number of subjects with the unpredicted trait

$r_1 + r_2$ = the total number of actual persisters for a particular trait

$n_1 + n_2$ = the total number of subjects in the two groups.

Comparing the difference of proportions for each of the six demographic variables with the calculated critical value for the particular variable revealed no significance at the .05 level, as shown in Table VI.

TABLE VI

CRITICAL VALUES AND DIFFERENCES IN PROPORTIONS FOR SIX DICHOTOMOUS DEMOGRAPHIC VARIABLES

Variable	Number of Persisters	Total Number by Category	Differences in Proportions*	Critical Value $\alpha = .05$
Age 23 and over	34	57	-.021	.174
Under age 23	21	34		
Married or previously married	39	61	-.106	.179
Never married	16	30		
Prekindergarten age children				
yes	19	26	-.177	.187
no	36	65		
Previous college work				
yes	44	69	.138	.197
no	11	22		
Previous nursing-related work experience				
yes	36	54	.165	.181
no	19	37		
Employed 20 or more hours per week outside the home				
yes	13	21	.019	.200
no	42	70		

*None of the differences in proportions were significant at the .05 level.

One other demographic variable was examined. This was the annual family income. A significant difference was found to exist between persisters and nonpersisters in relationship to this characteristic. Table VII illustrates the observed and expected frequencies for the variable in

TABLE VII

OBSERVED AND EXPECTED FREQUENCIES OF INDIVIDUAL SUBJECTS FALLING INTO FOUR INCOME CATEGORIES

Group	Annual Family Income				Total
	0 to $5,000	5,000 to 10,000	10,000 to 15,000	Over 15,000	
Persisters					
Observed	4	17	18	16	55
Expected	9.67	16.32	12.69	16.32	
Nonpersisters					
Observed	12	10	3	11	36
Expected	6.33	10.68	8.31	10.68	
Total	16	27	21	27	91

question, and Table VIII gives the computation for the chi-square statistic.

A particularly notable result of the above information is that 33 per cent of the nonpersisters had an annual family income of $5,000 or less. Above a $5,000 yearly income, finances do not appear to make a great difference as to whether or not a student continues in the ADN program.

From the data in the above table, chi-square was computed using the following formula.

$$x^2 = \sum \frac{(O - E)^2}{E}$$

TABLE VIII

CHI SQUARE: TEST OF INDEPENDENCE
FOR ANNUAL FAMILY INCOME

Cell	O	E	O-E	$(O-E)^2$	$\frac{(O-E)^2}{E}$
1	4	9.67	-5.67	32.14	3.32
2	17	16.32	.68	.46	.03
3	18	12.69	5.31	28.20	2.22
4	16	16.32	.32	.10	.01
5	12	6.33	5.67	32.14	5.08
6	10	10.68	- .68	.46	.04
7	3	8.31	-5.31	28.14	3.39
8	11	10.68	.32	.10	.01
Total	..	..	..	..	14.11*

*$p < .05$

Checking a chi-square table, it was determined that, with 3 degrees of freedom, 14.11 was significant at the .05 level. The following formula was used in computing the degrees of freedom (d.f.) for independence.

d.f. = (number of rows - 1) (number of columns - 1)
d.f. = (2 - 1) (4 - 1)
d.f. = (1) (3) = 3

Discriminant Analysis

A two-group stepwise discriminant analysis was performed to identify which of the fifteen independent

variables maximally discriminated between one group (persisters) and the second group (nonpersisters) in the study. As indicated by Table IX, seven variables emerged. In order of their strength as discriminators, the variables were the NDRT, the I-E Scale, previous nursing experience, prekindergarten age children, age of the nursing student, the B Trait and the G Trait. The standardized weights shown may be

TABLE IX

PREDICTOR VARIABLES AND WEIGHTS OBTAINED BY STEPWISE DISCRIMINANT ANALYSIS

Variable	Standardized Weight	Unstandardized Weight
Nelson-Denny Reading Test	-.640	-.299
I-E Scale	.478	.143
Nursing experience	.415	.845
Prekindergarten age children	-.385	-.855
Age	.272	.556
B Trait	-.254	-.132
G Trait	-.190	-.108
Constant	. .	2.906

interpreted as providing an indication of the relative importance of each variable as a predictor when all data are standardized. The discriminant score may be calculated using unstandardized weights with unstandardized data. When unstandardized discriminant function coefficients are used, a constant is added as an adjustment for the variable means.

A discriminant function was derived from the seven variables which distinguished between the two groups. The statistical analysis weighted these variables and combined them in a linear fashion, producing two groups statistically distinct from each other. From the discriminant analysis, a set of weights was found. They resulted in values yielding distributions for the two groups, which were as far apart as possible relative to the spread of values within each of the groups, thus minimizing the amount of overlap and accordingly reducing the likelihood of misclassification. Table X presents the standardized discriminant function coefficients

TABLE X

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS OF VARIABLES BY STEPWISE SELECTION FOR DISCRIMINANT ANALYSIS

Step	Variable	Standardized Discriminant Function Coefficient	Degrees of Freedom	F to Enter	Wilks' Lambda
1	NDRT	-.640	1 & 89	30.66*	.744
2	I-E Scale	.478	2 & 88	19.47*	.693
3	Nurse experience	.415	3 & 87	14.70*	.664
4	Prekindergarten age children	-.385	4 & 86	12.60*	.630
5	Age	.272	5 & 85	10.80*	.610
6	B Trait	-.254	6 & 84	9.34*	.600
7	G Trait	-.190	7 & 83	8.19*	.591

*$p < .001$

of the seven variables which discriminate persisters from nonpersisters in the first year of an ADN program.

Since nonpersisters were assigned the number one and persisters were assigned zero for the computer analysis, positive coefficients are more closely aligned with nonpersistence and the negative coefficients are more closely related to persistence. Thus, characteristics that point toward nonpersistence are lower NDRT scores, higher external locus of control, previous nursing experience, having prekindergarten age children, being older, and scoring lower on the B and G traits of the 16PF. Predicted persistence results from higher NDRT scores, lower external locus of control, no previous nursing experience, not having prekindergarten age children, being younger, and scoring higher on the B and G traits.

The discriminant function was developed using all of the subjects in the study. The function was achieved by the statistical decision rule of maximizing the between-group variances relative to the within-group variance. The linear combinations for a discriminant analysis was derived from the following equation.

$$Z = W_1X_1 + W_2X_2 + W_3X_3 + \ldots + W_7X_7$$

where Z = the discriminant score

W = the discriminant coefficient

X = the independent variable.

Each variable chosen was a significant discriminator via the F test. The resultant discriminant function was also significant, suggesting differences between persisters and nonpersisters ($\chi^2 = 44.93$, $p < .001$, $n = 91$) on the combination of variables used.

Using the procedure illustrated in Table XI, each individual in the 1980 ADN freshman class being studied was predicted to be a potential persister or nonpersister based on that person's discriminant score.

TABLE XI

METHOD FOR PREDICTING AN INDIVIDUAL'S CLASSIFICATION

Variable	Individual's Score on the Variable	Unstandardized Weight	Product of Score & Weight
NDRT	14	-.299	-4.186
I-E Scale	6	.143	.858
Nurse Experience	1	.845	.845
Prekindergarten age children	1	-.855	- .855
Age	1	.556	.556
B Trait	6	-.132	- .792
G Trait	5	-.108	- .540
Constant			2.906
Total	..	..	-1.208

Since the individual's discriminant score in Table XI is less than the cut-off score of .121 and in the direction of

persisters, the person was classified as a potential persister.

A cutting score was used as the criterion against which each person's discriminant score was judged to determine the group to which the person should be assigned. As the groups studied were of unequal size, a weighted score was calculated by the following formula.

$$\text{Cut-off Score} = \frac{N_2 Z_1 + N_1 Z_2}{N_1 + N_2}$$

with N_1 = the number in Group 1 (persisters)

N_2 = the number in Group 2 (nonpersisters)

Z_1 = the centroid (mean) for Group 1

Z_2 = the centroid (mean) for Group 2

The computer-reported centroid for Group 1 was -.665, and for Group 2 it was 1.016.

$$\text{Cut-off Score} = \frac{36(-.665) + 55(1.016)}{55 \qquad 36}$$

$$= \frac{-43.903 + 55.895}{55 \qquad 36}$$

$$= \frac{10.992}{91}$$

$$\text{Cut-off Score} = .121$$

Those students whose discriminant function classification score was higher than .121 were designated as potential nonpersisters. Those whose classification score was lower than .121 were designated as possible persisters.

The SPSS computer program used standardized weights to produce an individual discriminant score for each subject. Predictions were then compared with the known group classification. The results are shown in Table XII, which presents a classification matrix.

TABLE XII

CLASSIFICATION MATRIX FOR ADN PERSISTERS AND NONPERSISTERS

Actual Group Membership	Number of Cases	Predicted Group Membership	
		Group 1	Group 2
Group 1, Persisters	55	46 83.6%	9 16.4%
Group 2, Nonpersisters	36	9 25.0%	27 75.0%

Grouped cases correctly classified: 80.22 per cent.

The proportional chance criterion for unequal sizes for the two particular groups was 52 per cent as determined by the following formula.

$$\text{Proportional chance criterion} = p^2 + (1-p)^2$$

where p = the proportion of individuals in Group 1

$1-p$ = the proportion of individuals in Group 2

$= (.604)^2 + (.396)^2$

$= .365 + .157$

$= .522$

The 80 per cent correct classification is well above the 52 per cent proportional chance criterion. To further

illustrate correct classification and misclassification, Figure 3 shows how those who were persisters were classified. The predicted space for each subject is based on the person's discriminant score. The cut-off score of .121 separates the area for predicted persisters from predicted nonpersisters. Lower scores are in the direction of predicted persistence. Correct classification was made for 83.6 per cent of the persisters, and 16.4 per cent were misclassified.

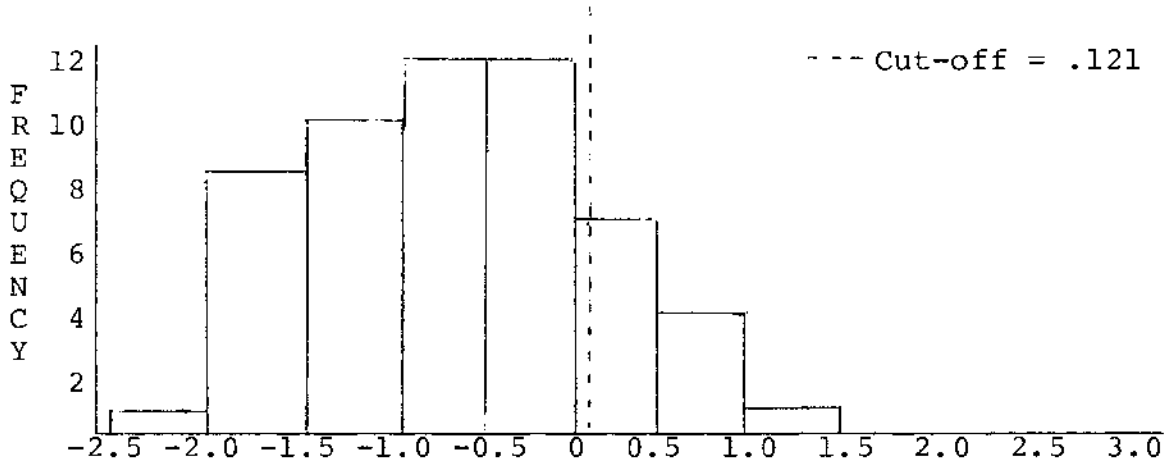

Fig. 3--Classification of actual persisters by discriminant scores.

Figure 4 presents the classification of students as predicted nonpersisters. Seventy-five per cent were correctly classified, and 25 per cent were misclassified.

The statistics relevant to the determination of significance of the discriminant function include a canonical correlation of .639 and a .591 Wilks' lambda. A canonical correlation of .639 can be interpreted as meaning that

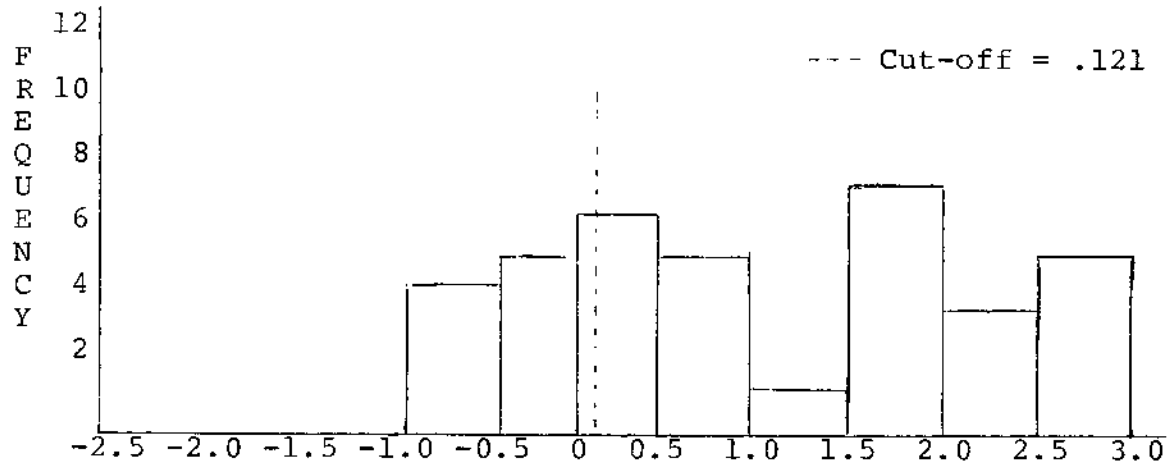

Fig. 4--Classification of actual nonpersisters by discriminant scores.

41 per cent of the variance between the two groups is accounted for by the discriminant function. A Wilks' lambda of .591 confirms the above by showing that 59 per cent of the variance in the two groups is left to chance. This Wilks' lambda corresponds to a chi-square of 44.93 which, with 7 degrees of freedom, is significant at the $p < .001$ level.

With no measure of study habits, values, motivation, and other personality characteristics which have been noted to play a part in predicting dropouts and with probable measurement error, perfect assignment could not be anticipated. Some first-year ADN students dropped from the program for positive reasons. These included transfer to other universities and colleges, medical causes, parents moving to another location, and other nonacademic reasons. However, perfect accuracy in correct classification was

found beyond certain extreme points on the discriminant function scale. Very high and very low function scores were 100 per cent accurate in predicting persistent or nonpersistent behavior.

Summary

The results of the analysis of the data were presented in this chapter. An overview of the statistical treatments utilized was given.

The findings of the statistical analysis of the ten hypotheses were presented. As a group, persisters were found to have, at a level of significance of .05, lower scores on externality and higher grade-level reading scores than nonpersisters. They also had significantly higher scores on the B and G Source Traits of the 16PF. No significance was found for the four Second-Order Factors of the 16PF which were investigated. Annual family income was a significant variable, with those students having low incomes, particularly below $5,000, being high-risk potential dropouts. Examined individually, the other demographic variables related to age, marital status, having prekindergarten age children, previous college work, previous nursing experience, and being employed full-time outside the home did not differ significantly between the two groups.

A two-group stepwise discriminant analysis was performed to distinguish between potential persisters and

potential nonpersisters. The discriminant function which resulted correctly classified 80 per cent of the subjects. Using only the scores on the Nelson-Denny Reading Test, 74.7 per cent of the subjects were correctly classified as indicated in Appendix F, page 90.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In this chapter an overview of the study is made and conclusions are drawn. Recommendations for further study are suggested.

Summary

The introduction of ADN programs in the 1950's to the American educational scene is unquestionably a development of great importance for the health care field. The move, designed to reduce the shortage of nurses, provides an opportunity for the education necessary to become a registered nurse for persons who previously had not possessed substantial financial means nor the time to pursue the traditional four-year baccalaureate nursing program. A combination of factors including low cost, convenient location, and a concentrated two-year training program attracts many students. Despite these favorable conditions, many students who gain entrance to ADN schools find that they are are unable to succeed. Studies have shown that about one third of all nursing students either voluntarily withdraw or are dropped from classes because of poor academic performance. The dilemma of increasing demands for more trained nurses and the high attrition rate in nursing programs pose

a large concern for those involved at all levels with the training of prospective nurses.

Therefore, the purposes of this study were to compare differences between persisters and nonpersisters in an ADN program related to each of the following. (1) Locus of control; (2) selected personality traits and factors; (3) reading skills; and (4) the demographic variables of sex, marital status, presence of preschool-age children in the home, annual family income, previous college experience, previous nursing employment, and present employment status. A final purpose was to develop a predictive model for persisters and nonpersisters in the first year of an ADN program using a two-group stepwise discriminant analysis.

Data for the study were gathered from ninety-one female first-year ADN students in the early part of the school year at a college in East Texas. The particular nursing program has been in operation since 1959.

Four instruments were used to gain information: the Nelson-Denny Reading Test, Rotter's I-E Scale, Cattell's 16PF, and a Nursing Student Questionnaire. The last instrument was developed by incorporating suggestions and recommendations from previous research and from input from college counselors, nursing instructors, and students.

The ten hypotheses were treated by using tests for differences of two means, tests involving a difference of two proportions, and chi-square as each of these techniques was

applicable. Using the SPSS, a two-group stepwise discriminant analysis was developed to classify potential persisters and nonpersisters.

In completing the study it is important to address the following two questions.

1. What can be concluded regarding the research hypotheses based upon the reported data?

2. What recommendations can be made for future research?

Conclusions

The following are the main conclusions in this study.

1. Locus of control was significantly related to persistence or nonpersistence, with the nursing students who continued for the entire first year displaying greater internality and those who left the program showing more externality.

2. Persisters displayed significantly higher overall intelligence than did nonpersisters as measured by Scale B of the 16PF. This agrees with the bipolar description often given for low and high Trait B scores of quitting versus persevering.

3. Scores on Trait G, superego strength, significantly differed between the two groups studied. This finding indicates that persisters tend to be more determined, responsible, conscientious, and emotionally stable than nonpersisters.

4. No significant difference in the two groups was evident for the four second-order factors of extraversion, anxiety, tough poise, and independence.

5. A significant difference in the average total reading scores of the persisters and nonpersisters was measured. A difference of 2.6 grade levels between the means of the two groups was apparent.

6. The annual family income reported by persisters was significantly higher than the annual family income reported by nonpersisters. Thirty-three per cent of the nonpersisters had an annual income of $5,000 or less.

7. There was no significant difference between the proportions of the two groups on each of the six dichotomous demographic variables examined. However, the following information was gained which gives an overview of the particular group of nurses studied. The average age was twenty-seven. The mean age for the two groups, persisters and nonpersisters, was also twenty-seven. Ages ranged from eighteen to fifty. Thirty-seven per cent were below the traditional college age of eighteen to twenty-two, while the remaining 63 per cent were twenty-three or older. Approximately 61 per cent of both the younger and older students persisted, as compared to the remaining 39 per cent of each age group who did not satisfactorily complete the first year of an ADN school. Sixty-seven per cent of the subjects were married or had been married, and 26 per cent had children

who were kindergarten age or younger. A large number of the students, 76 per cent, had some previous college training before entering the nursing program. Fifty-nine per cent had worked in some type of nursing-related job. At the beginning of the year, only 23 per cent reported working outside the home for twenty or more hours per week. The status of the last item of information could have changed, perhaps several times, during the current school year. The preceding coincides closely with data gained from the survey of Texas ADN programs reported in Appendix E, page 88.

8. Examination of the scores and nominal factors of individual students revealed overlapping on each variable for students in the two identified groups. This indicated that scores or positions on individual variables would not provide an accurate forecast of a student's probable performance in the nursing program. The need to consider interrelationships among variables was evident. To reduce the number of variables, a stepwise discriminant analysis was conducted, resulting in seven variables being selected for maximally discriminating between persisters and nonpersisters in the class. Using these seven discriminant variables, a discriminant score was calculated for each student. The students were assigned to one of two groups which was closest in probability to the determined potentiality of persistence or nonpersistence in the ADN program. It appears that the use of a few discriminant variables

permits meaningful predictions regarding whether an entering nursing student will drop from the program or continue for the entire first year. Eighty per cent accuracy was achieved in the classification of the same group which was used to develop the function. Although this procedure results in an upward bias in the predictive accuracy of the function, it is better than not testing the function. The predictive system will be cross-validated, using the 1980-1981 first-year ADN nursing students.

The major significance of this research comes from its use of data gathered at the beginning of an educational program to make predictions which can be available to teachers, counselors, and administrators who may make use of the information to improve the chance potential nonpersisters have of completing the program, or perhaps to assist students in reexamination of career choice. The ability to predict an event is of little practical importance unless the prediction ability is functional. The methods described for predicting attrition or persistence can be used to assist teachers in planning their instructional programs. Administrators can use the information in institutional planning and counselors can aid students in course selections and in taking advantage of remedial or tutorial opportunities.

Recommendations

Accountability in higher education has been emphasized for the past several years. With the current economic

situation, accountability undoubtedly will continue to receive much attention from both the public and those directly involved with education. The responsibilities of higher education within an ever-changing society require institutions of learning to be continually responsive and adaptive. With these challenges in mind, the following section on recommendations is presented.

This study was limited to female students in one ADN program for one specific year. In terms of future research, validating the discriminant function for classification with future nursing classes or samples is essential. A replication of the study with different samples in different geographical areas might be useful. Studies in the future might focus on any one of the discriminant variables identified in this study.

There are undoubtedly other predictor variables and interactions to be explored that were not considered in the present study. Different analyses of the data should also be encouraged. Additional studies might explicitly address the relationship between sets of independent variables and sets of institutional variables and their relative impact upon student nurses' behavior during their first year of training.

In many instances individual behaviors are only symptoms of institutional characteristics. An investigation of any

differences between paricular traits of the faculty and the performance of students might be explored.

Further research in the area of predicting potential persisters and nonpersisters might profit by utilizing a sampling technique producing a profile of the two groups for each individual school of nursing. The writer recommends that the ADN programs throughout the state establish a means whereby applicants interested in nursing who have experienced difficulty being accepted by one nursing program can be referred to other programs with vacancies or to programs in which the particular applicant might experience success.

Nonpersisters include a wide range of persons. Although most students do leave because of academic difficulties, others transfer to other disciplines or to other colleges or universities, and a number are stopouts. This last group is composed of those students who temporarily leave a program and return at a later date. Perhaps a look at the nonpersisters as several uniquely distinct groups would be more revealing than lumping them together as one body.

The Nursing Student Questionnaire used in the study needs to be revised to include other possible discriminating information. The profile of a potential persister or nonpersister could be expanded by incorporating information related to academic self-confidence, goals for attending an ADN program, and academic and social expectations.

The following recommendations are made for the particular institution in which the study was conducted. However, they are probably of value to all community colleges with nursing programs.

1. The faculty should play an active role in counseling students, ensuring that the students receive appropriate tutorial, remedial, or financial assistance, and making programs flexible to better accommodate varied learning abilities to reduce student attrition.

2. Facilities and instructional staff should be provided and time allotted for prospective nursing students who read below the tenth-grade level to participate in a reading skills developmental program and a practice lab. Supportive counseling should be available for those who view this as a punitive measure.

3. Training procedures to develop greater internality should be developed. Teachers should become more aware of the influence locus of control and one's perceptions of the environment have on behavior. It has been noted that the key elements for a training program or environment that enhances the development of internal control seem to be a purposeful structure, a consistency of reinforcement, and the creation of an accepting environment where control can be taken in problem-solving situations. This information has direct implications for the teaching policies of

institutions and the programs established by student development specialists on the campus.

4. Individuals and groups in the community, in both public and private sectors, should be helped to recognize their responsibility for financial assistance to prospective nursing students. Financial assistance, including work-study programs, need to be greatly expanded, and greater use made of federal loans and grants.

In summary, the urgency of meeting student needs early is reinforced in a community college by an awareness that maximum matriculation is two years. This study reports the first step in an approach to identify potential persisters and nonpersisters in nursing education, and the results are quite tentative. Nonetheless, it does provide some clues as to the directions for additonal research.

APPENDIX A

Name _____ Date _____

NURSING STUDENT QUESTIONNAIRE

Please complete this form as accurately as possible by either checking the appropraite blanks or placing the appropriate number in those blanks where a number is requested.

Rhe information which you furnish will be treated in a confidential manner.

Age:
- 17-22 ___
- 23-28 ___
- 29-34 ___
- 35 + ___

Sex:
- Male ___
- Female ___

Marital status:
- Single ___
- Married ___
- Divorced ___
- Widowed ___
- Other ___

Children: If you have children living at home, give the number who are

- Prekindergarten age ___
- Grades K through 6 ___
- Grades 7 through 12 ___
- In college ___

Ethnic Group:
- Anglo-American ___
- Black-American ___
- Mexican-American ___
- Asian-American ___
- American Indian ___

Approximate annual family income:
- $ 5,000 or less
- 5,000 - $10,000 ___
- 10,000 - 15,000 ___
- 15,000 - 20,000 ___
- 20,000 - 25,000 ___
- 25,000 - 30,000 ___
- 30,000 - or above ___

How many hours of college credit did you have before entering the nursing program? ___

Educational background:
- GED (Gen. Ed. Diploma) ___
- High school diploma ___
- Other ___

Present employment:
- Not employed ___
- Employed part time ___
- Employed full time ___

Did you have previous nursing-related work experience before entering the nursing program? Yes___ No___

If you answered yes to the above question, indicate the length of time employed and the type of work which you did.

Length of Employment	Type of Work
_____	_____
_____	_____

APPENDIX B

To :
From : Bob J. Bell
Date : June, 1979
Subject: Evaluation of the Nursing Student Questionnaire

Please read over the attached demographic questionnaire designed for students entering the nursing program at Texarkana Community College this fall. Respond to the following four questions.

1. Are the instructions to the student clear and concise: Yes___ No___ If you marked no, please make suggestions or corrections in the space below.

2. Using the following page, rate each item of the attached questionnaire as A for appropriate, B for no opinion, or C for inappropriate as you evaluate the applicability of each item being a factor in a nursing student's remaining in the nursing program or withdrawing from the program.

3. Below, make any recommendations or corrections you have for the terms on the questionnaire.

4. Check the classification which is true for you.

   (a) An instructor ___
   (b) A counselor ___
   (c) A graduating nursing student ___
   (c) A former nursing student ___

Thank you for your time in responding to this request. Please return this form and the attached questionnaire to me in the enclosed envelope as soon as possible.

TABLE XIII

RATING SHEET FOR NURSING STUDENT QUESTIONNAIRE

Check: Column A for appropriate
Column B for no opinion
Column C for inappropriate

Item	A	B	C
1. Age			
2. Sex			
3. Marital status			
4. Children			
5. Ethnic group			
6. Family income			
7. Previous college credit			
8. Educational background			
9. Present employment			
10. Previous nursing experience			

TABLE XIV

RESPONSES OF A PANEL OF JUDGES TO THE ITEMS FOR THE NURSING STUDENT QUESTIONNAIRE
(N = 16)

Item	Appropriate	No Opinion	Inappropriate
1	16	. . .	. . .
2	13	1	2
3	15	. . .	1
4	16	. . .	. . .
5	13	. . .	3
6	16	. . .	. . .
7	16	. . .	. . .
8	14	. . .	2
9	15	1	. . .
10	14	. . .	2

Texarkana Community College

2500 NORTH ROBISON ROAD

TEXARKANA, TEXAS 75501

APPENDIX C

July 17, 1979

Director
Central Texas College-ADN Program
Highway 190 West
Killeen, Texas 76541

Dear Director:

I would appreciate your assistance. I am writing my dissertation at North Texas State University under the supervision of Dr. Byron Medler. The study is concerned with selected personality factors and selected demographic data which may distinguish between students who successfully complete the first year of an Associate Degree Nursing (ADN) program and those who withdraw or fail.

The study will be conducted on only one campus. Answers to the enclosed questionnaire will provide a guide on how well the information gained can be generalized to other ADN programs in Texas.

Enclosed is a self-addressed, stamped envelope for your convenience. An early reply will be greatly appreciated. Thank you for your cooperation.

Sincerely,

Bob J. Bell, Chairman
Social Science Division

BB/mjh

APPENDIX D

ADN QUESTIONNAIRE

Please complete this form as accurately as possible. Answer the items based on the information which you have about the 1979-1980 freshman class or previous classes.

1-A. The number of students you expect in the 1979-1980 freshman nursing program.

____below 50

____51 to 100

____101 to 150

____151 to 200

____over 200

1-B. What was the total number of applicants for the class?_____

2. The average age of expected freshman class?

____17-22

____23-28

____29-34

____35 +

3. What percentage of the class is expected to be males?

____less than 5 per cent

____6-10 per cent

____11-15 per cent

____over 15 per cent

4. What percentage of the freshman class is expected to be married?_____

5. What percentage of the class will belong to each of these ethnic groups?

_____Anglo-American

_____Black-American

_____Mexican-American

_____Asian-American

_____American-Indian

6. What percentage of your students will enter with a General Education Diploma (GED)? _____

7-A. Approximately what percentage of the first-year ADN class will be full-time employed? _____

7-B. Approximately what percentage of the first-year ADN class will be part-time employed? _____

8. What percentage of your students are expected to have had previous nursing-related work experience? _____

9. What percentage of your students will have earned previous college credit before entering the nursing program? _____

10. Over the past three years what percentage of the ADN students have either withdrawn or failed during their first year? _____

APPENDIX E

RESULTS OF THE ADN QUESTIONNAIRE

Twenty-six of the thirty ADN schools in Texas responded to the questionnaire, Appendix D, presented on the two preceding pages. Results are given below and in Table XV, page 89.

The number of schools indicating their expected enrollments for the 1979-1980 freshman nursing class was

Expecting less than 50 students	5
Expecting from 51 to 100 students	16
Expecting from 101 to 150 students	3
Expecting from 151 to 200 students	0
Expecting over 200 students	2

The total number of applicants for the different positions open in the twenty-six schools was approximately 5,800.

The number of schools identifying the expected average age of the freshman class was

Ages 17 to 22	2
Ages 23 to 28	18
Ages 29 to 34	5
Age 35 and over	0

The responses for questions three through ten are given in Table XV.

TABLE XV

TWENTY-SIX ADN PROGRAMS' EXPECTED PER CENT OF CHARACTERISTICS OF FRESHMAN NURSING STUDENTS

Characteristic	No Response	None	1-10 Per Cent	11-20 Per Cent	21-30 Per Cent	31-40 Per Cent	41-50 Per Cent	51-60 Per Cent	61-70 Per Cent	71-80 Per Cent	81-90 Per Cent	91-100 Per Cent
Males	..	..	22	4	..	..	..	..	..	..	..	..
Married	2	..	1	..	..	..	1	11	4	6	1	..
Anglo	3	..	..	1	1	..	1	2	..	6	3	9
Black	2	2	15	6	..	..	..	..	..	..	..	..
Mexican	3	6	14	1	1	..	1	..	..	..	..	..
Asian	3	12	11	..	..	..	..	..	..	..	..	..
Indian	3	22	1	..	..	..	..	..	..	..	..	..
GED	3	1	15	4	1	2	..	..	..	..	..	..
Full-time work	3	2	12	4	2	1	2	..	..	..	..	..
Part-time work	2	1	1	1	2	4	8	1	..	4	1	1
Nurse experience	2	..	3	1	10	2	5	2	..	..	..	1
Previous college	1	..	1	1	1	2	1	2	2	5	7	3
Withdraw or fail	1	..	1	7	8	5	2	1	1	..	..	..

APPENDIX F

TABLE XVI

CLASSIFICATION MATRIX FOR ADN PERSISTERS AND NONPERSISTERS USING ONLY THE NDRT

Actual Group Membership	Number of Cases	Predicted Group Memberhsip	
		Group 1	Group 2
Group 1, Persisters	55	47 85.5%	8 14.5%
Group 2, Nonpersisters	36	15 41.7%	21 58.3%

Grouped cases correctly classified: 74.7 per cent.

Using only the Nelson-Denny Reading Test, 74.7 per cent of the students were correctly classified as persisters or nonpersisters. The prediction for persisters was more accurate with 85.5 per cent being selected as persisters correctly, while only 58.3 per cent of the nonpersisters were correctly identified.

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