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Learning and Performance Systems

**PREDICTORS OF SUCCESS FOR ASSOCIATE DEGREE
NURSING PROGRAMS IN A TEXAS COMMUNITY COLLEGE SYSTEM**

A Dissertation in

Workforce Education and Development

by

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ABSTRACT

The purpose of this study was to identify the predictors of persistence among students who successfully completed the requirements for associate degree nursing programs in the Lone Star Community College System. The Bean and Metzner model of nontraditional undergraduate student attrition provided the underlying theoretical framework for this study. Subjects were a convenience sample of 215 nursing students aged 18 to 59 years old ($M = 31.54$) who had enrolled in the two-year ADN programs offered by the five colleges in the college system in 2004. Research questions were developed to explore the relationships among demographic, financial, and academic variables, and program completion. A data collection sheet was designed to facilitate the systematic collection of data for each student in the study. Data were gathered, abstracted, or computed from several sources. Information was obtained from individual student files, class records, college transcripts, and institutional records. Data were analyzed using descriptive statistics, Chi-square, *t*-tests, and backward stepwise logistic regression.

Race/ethnicity, financial aid, and cumulative pre-requisite grade point average, combined with HESI math and reading comprehension scores and English, psychology, and biology grades were shown to significantly predict the successful completion of the ADN program. Students of White-Non-Hispanic origin were more likely than students of a different race/ethnicity to successfully complete the nursing program. Students who

successfully completed the nursing program had higher scores on both components of the HESI test, higher academic GPAs for all courses, and higher cumulative pre-requisite grade point averages than students who did not complete the program. Furthermore, students who received some form of financial aid were more likely to successfully complete the nursing program than were students who had not received financial assistance. Cumulative pre-requisite grade point average, HESI reading comprehension score, and Biology 2402 GPA predicted program completion. Cumulative pre-requisite grade point average was the strongest predictor of program completion.

Based on study results, administrators and faculty should work together to design and implement an institution-specific comprehensive retention plan with suitable interventions. Further research could build on study findings by replicating this research as closely as possible, controlling for other environmental factors such as family responsibilities, employment status, and social support.

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Chapter 1

INTRODUCTION

Historical Perspective

The nursing shortage in the United States has been dramatically increasing in recent times, and at a time when the aging population and the need for health care services are projected to increase significantly as well. In July 2002, the Health Resources and Services Administration reported in *Projected Supply, Demand, and Shortages of Registered Nurses: 2000-2020*, that in the year 2000, approximately 30 states had experienced a shortage of registered nurses (RNs). In addition, the report's authors projected a significant increase in this shortage by the year 2020 and the inclusion of 15 additional states, including the District of Columbia (Health Resources and Services Administration, 2002). By 2012, the U.S. Bureau of Labor Statistics projected that the number of new and replacement nurses needed would be in excess of one million. Consequently, for the first time in the nation's labor and workforce projection data, Registered Nursing has been identified by the U.S. Department of Labor as the top occupation in terms of job growth through the year 2012 (Health Resources and Services Administration, 2002).

The nursing shortage dilemma has been compounded even further by the continuous struggle of both two-year nursing programs at community colleges and four-year programs at universities to increase enrollment and retention levels to meet the ever-rising demand for nursing care. According to the National Council of State Boards of Nursing (as cited by American Association of Colleges of Nursing, 2002), the number of

first-time, U.S. educated nursing school graduates who took the NCLEX-RN, the national licensure examination for registered nurses, decreased by 20% from 1995–2003. A comparison with 1995 revealed that 19,820 fewer students in this category of test takers took the exam in 2003 (American Association of Colleges of Nursing, 2002).

Enrollments in all basic RN preparation programs have declined each year over the last five consecutive years. According to the National League for Nursing (as cited in American Association of Colleges of Nursing, 2005), between 1995 and 1999, the number of programs of most types increased in the United States. Despite this overall growth in the total number of nursing programs (from 3,137 to 3,220 or 2.6%), the number of students enrolled in and graduating from nursing programs has declined with the exception of a 4% increase in doctoral programs. Consistent with enrollment declines, a 13.6% overall decline in graduations from all types of programs occurred between 1995 and 1999. The clear trend is toward an increase in the number of programs occurring simultaneously with a decrease in the number of enrollments and graduations from those programs (American Association of Colleges of Nursing, 2005).

Currently, the Texas Board of Nurse Examiners does not collect data on attrition in nursing programs. However, other factors including enrollment and graduation trends, suggest that many nursing programs throughout the United States are experiencing high attrition rates among their students. Community colleges that offer the Associate Degree in Nursing (ADN) are especially affected by this trend. White and Mosely (as cited in Sandiford & Jackson, 2003) suggested that attrition rates as high as 41% are seen in some institutions, predominantly the community colleges with open admission policies. Many

states such as California and Texas have high dropout rates. According to the California Postsecondary Education Commission, in the 2003–2004 academic year, nursing programs at community colleges statewide had an attrition rate of 17.1%, compared with 10.8% for Bachelor of Science degree in Nursing (BSN) programs at four-year colleges (California Postsecondary Education Commission, 2003). Comparatively, preliminary data on the retention of ADN and BSN students in Texas for academic year 2003–2004, indicated that the total retention rate was 88.5%, representing a total loss of 1,101 students, compared to 95.8 % or a total loss of 291 students (Texas Department of State Health Services, 2005).

A study by nurse researchers at the University of Pennsylvania (as cited in American Association of Colleges of Nursing, 2005) found that have more nurses available to be at the bedside could save thousands of patient lives each year. The researchers also determined that patients who have common surgeries in hospitals with high nurse-to-patient ratios have an up to 31% greater chance of dying. The study found that every additional patient in an average hospital nurse's workload increased the risk of death among surgical patients by 7%. In addition, it was suggested that having too few nurses may actually cost more money given the high costs of replacing burnt-out nurses and caring for patients with poor outcomes (American Association of Colleges of Nursing, 2005).

Consequently, the importance of nurse attrition reduction activities by state, local government, nursing institutions, and other stakeholders is imperative and cannot be overstated. An adequate and steady supply of quality health care providers is critical to

the stability of medical services throughout Texas, especially in rural and underserved urban areas, where ensuring an adequate supply has always been a challenge (Statewide Health Coordinating Council, 2005). Therefore, it now becomes pivotal in this health care crisis and current economic climate for nurse educators to reduce attrition rates among nursing students and promote academic success.

The Problem

Despite graduation trends in Texas from 1998–2004 that indicate a 63.6% increase in graduates of BSN programs and a 15.3% increase in graduates of ADN programs, a consistent and increasing rate of attrition among nursing student in ADN programs still exists (Texas Department of State Health Services, 2005). Increased enrollment has been found to be the primary reason for graduation increases. However, this overall increase in enrollment does not indicate a parallel increase in nursing graduates and reduction in attrition rates. Several reasons have been cited for nursing student attrition as reported by nursing programs, including academic failure, financial difficulties, family constraints, health problems, and students' second thoughts about the program (whether it was the right choice for them) (Texas Department of State Health Services, 2005).

The problem of nurse attrition paints a very challenging picture for Texas (Statewide Health Coordinating Council, 2005), and is especially important during a time when the demand for new RN graduates and health care services exceed the supply of nurses. Currently, there are approximately 201,194 licensed nurses and 93,342 certified nurse aides, accounting for 53.5% of the total health workforce in Texas. These numbers differ from study to study, but a majority agrees that the most severe health workforce

shortage in the state of Texas is the nursing shortage (Statewide Health Coordinating Council, 2005). Compounding the problem is the fact that Texas's aging population is increasing drastically, incidences of obesity are on the rise, and related chronic illnesses associated with obesity are also increasing (Statewide Health Coordinating Council, 2005), in combination with increasing numbers of medically uninsured patients and the changing demographics of the state population.

Nursing school capacity is an issue in Texas, and is not unique to only a few institutions, but to a majority of community colleges offering the ADN program. According to a 2005 study by the Texas Higher Education Coordinating Board (as cited in Texas Department of State Health Services, 2005), 34% (approximately 4,220) of the total qualified applicants in 2003 were denied admission to the state's initial RN-licensure programs (Texas Department of State Health Services, 2005). With the capacity of nursing schools a factor in enrollment rates and no urgent fix to the problem, improvement of retention rates would appear to be critical.

A total of 37 community colleges and junior colleges in Texas offer ADN programs. These programs include a balance of general studies, nursing education and clinical experiences. The course plan prepares a graduate to function as a direct care provider. Courses are usually in the biological, physical, and social sciences. Clinical experiences are in nearby hospitals (Texas Nurses Association, n.d.). Although the number of institutions that provide some form of nursing programs seems large enough, a majority suffer from the problem of attrition among nursing students.

The Lone Star College System is among the Texas community colleges that are not exempt from the phenomenon of student attrition within nursing programs. Situated in the North Houston metro area of Texas, the Lone Star College System serves 1,400 square miles in Harris and Montgomery Counties, and has a student population of approximately 50,000 enrolled in credit courses and about 14,000 enrolled in continuing education. The system is among the largest and fastest growing community college districts in Texas, with five distinct colleges: (1) Lone Star College–Cy-Fair, (2) Lone Star College–Kingwood, (3) Lone Star College–Montgomery, (4) Lone Star College–North Harris, and (5) Lone Star College–Tomball.

Current student enrollment has seen a drastic increase over the past few years. Furthermore, the nursing programs at each college has modified their recruitment efforts and increased the number of students accepted to the program. Nonetheless, attrition rates as high as 40% have been seen in the nursing programs of a few colleges within the system. Consequently, considerable revenue as well as student services are reduced and lost. In addition, student attrition has had an adverse effect on students and further compromised the nursing shortage in Texas communities. This trend has been somewhat consistent over a period of time; to date, no formal study has been conducted in this area. This fact has provided an impetus for understanding the factors that predict nursing students' persistence in the ADN program. If such predictive factors can be identified, then intervention strategies can be designed and implemented to increase retention rates.

Purpose of the Study

The purpose of this study was to identify the predictors of persistence among students who successfully completed the requirements of the Associate Degree Nursing programs in the Lone Star Community College System by studying the relationship between student persistence and certain demographic, financial, and academic variables. Data were examined from five colleges in the Lone Star Community College System. Each college offers an ADN program; admissions requirements and procedures are similar across programs.

The associate degree nursing programs at the individual colleges of the Lone Star Community College System established admission criteria that students must meet prior to application submission. Students must complete a set of pre-requisite courses with a minimum GPA of 2.5 and grade of “C” or above in those courses. For the purpose of this study, prerequisite courses include Human Anatomy and Physiology I and II, General Psychology, and Composition and Rhetoric. Additional courses may be completed prior to admission in order to increase an applicant’s chance of being selected for the program. However, these courses can be completed after admission. These courses include Human Anatomy and Physiology II, Microbiology and Pathology, Life-span Growth and Development, and Interpersonal Communication. Students must also complete the reading comprehension and math assessment tests of the Nurse Pre-Entrance Exam (HESI) and achieve scores of 70% or higher to be eligible for admission. These admission criteria, according to Bean and Metzner (1985), are students’ characteristics when entering college as well as academic outcomes that influence student persistence.

The research study was conducted by specifically looking at student reading comprehension and math scores on the HESI, which is administered to incoming nursing students; age, race/ethnicity, and gender; cumulative pre-requisite GPA, biophysical science, psychology, and English course GPAs; and financial aid to see if these variables were predictive of successful completion of the nursing program. If a relationship is found to exist among the variables, and the findings provide insight into the populations most adversely affected by attrition—for example, minority populations and those with academic and financial difficulties—then this information can be used by nursing program administrators to develop retention strategies and implement intervention programs to eliminate the disproportionate burden of attrition in these affected populations.

Research Questions

This research study will address the following questions:

1. To what extent do demographic characteristics differentiate between nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
2. To what extent are there differences in reading comprehension scores and math scores of the Nurse Pre-Entrance Exam (HESI) among nursing students who successfully completed the ADN nursing program and those students who did not complete the program?

3. To what extent are there differences in cumulative pre-requisite course grade point average among nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
4. To what extent are there differences in biophysical science, psychology, and English course GPAs among nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
5. To what extent does financial differentiate between nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
6. What, if any, of the demographic characteristics, cumulative pre-requisite course grade point average, HESI scores, biophysical science, psychology, and English course GPAs, and financial aid predict the successful completion of the requirements of the ADN nursing program?

Hypotheses

The research hypotheses developed for this study were:

1. There will be significant difference in successful completion of the ADN nursing program between the demographic characteristics of nursing students.
2. There will be significant differences between the reading comprehension scores and math scores of the Nurse Pre-Entrance Exam (HESI) of nursing students who successfully completed the ADN nursing program and those students who did not complete the program.

3. There will be significant differences between the cumulative pre-requisite grade point average of nursing students who successfully completed the ADN nursing program and those students who did not complete the program.
4. There will be significant differences between the biophysical science, psychology, and English course GPAs of nursing students who successfully completed the ADN nursing program and those students who did not complete the program.
5. There will be significant difference in successful program completion between those students who received financial aid and those students who did not received any form of financial aid.
6. Demographic characteristics, pre-requisite grade point average, HESI scores, biophysical science, psychology, and English course GPAs, and financial aid will be significant predictors of successful completion of the requirements of the ADN nursing program.

Significance of the study

High attrition rates are a major concern for nursing education—a significantly high attrition rate negatively affects the supply of RNs needed in an already tight employment marketplace. Effective admission and progression standards are imperative because physical space and financial and human resources limit enrollment capability (Sadler, 2003). In conjunction with limited resources, the advent of the nursing shortage due to high attrition rates in nursing programs is creating a burden on the health care system, students, and the institution. Furthermore, state and federal support continues to decline (Statewide Health Coordinating Council, 2005). Consequently, the increased importance

of retention and graduation to nursing education add emphasis to determining predictors of the successful completion of associate nursing programs, especially those offered at the community college level. This study focused on factors as the major reason for attrition and tried to show that non completion is an indicator of these underlying factors.

The study was institution-specific and provided important institutional information to nursing program administrators and faculty that enables a better understanding of the attrition problem within the culture of their institution. Thus, the data can be used to design a comprehensive retention plan with suitable interventions.

The results are also very important in recruitment activities by enabling admissions to be less focused on specific student attributes as a single determinant of student persistence and more selective of individuals who are more compatible with the nursing profession and therefore more likely to succeed in the nursing program. In addition, the results lay the groundwork for additional studies designed to expand the knowledge base about predictive factors and consequences associated with the problem of attrition.

Definition of Terms

Attrition—the number of students who withdraw from studies prior to completion for a range of reasons, including difficulties in balancing study and other commitments, academic failure, personal problems, financial problems etc.

Persistence—completing all educational requirements that lead to graduation.

Associate Degree Nursing (ADN)—degree program that is completed after two consecutive years of clinical instruction, usually within a community college or junior college setting.

Retention—reduction of attrition.

Registered Nurse (RN)—from one of the three educational options (diploma program, associate degree, and bachelor's degree), who after graduation passed a national licensure examination and then qualified to practice as a licensed Registered Nurse. Registered Nurses work in hospitals, doctors' offices, nursing homes, and home health agencies, and in public and occupational health (Healthcare Decisions Group, 2000).

Integration—the extent to which students involve themselves in academic and social domains of college life (Tinto, 1975).

Limitations

The limitations of this study were as follows:

1. The size of the sample was limited to students enrolled in the Associate Degree-Nursing program who withdrew, failed, or successfully completed their program.
2. A convenience sample was used and participants were not randomly assigned to any group and may not be comparable on all other factors, so a selection bias may be present.
3. The research area was not randomly selected. The data were collected from the 2004–2006 cohorts of community college students from five colleges in the Lone Star

Community College System in Texas; therefore, generalizability may be limited to similar groups and study settings in Texas.

Assumptions

1. The methods used in collecting and managing the data were efficient and confidential.
2. All student files and records were accurate.
3. All questions on the admission application were answered by the students.
4. The method of acceptance of all nursing students was consistent for each individual college in the institution.
5. There was no significant variance in prerequisites requirements, course material, and testing methods among the schools during the study period.
6. The Nurse Pre-Entrance Exam (HESI) is a valid and reliable tool.
7. Financial aid information was accurate.

Underlying Theoretical Framework

The Bean and Metzner (1985) model of nontraditional undergraduate student attrition provided the underlying theoretical framework for this study (Figure 1.1). The model proposes that a student's decisions about persistence in college are influenced by three sets of variables: background and defining variables, academic variables, and environmental variables. Figure 1.1 provides a visual depiction of Bean and Metzner's (1985) Conceptual Model of Student Attrition.

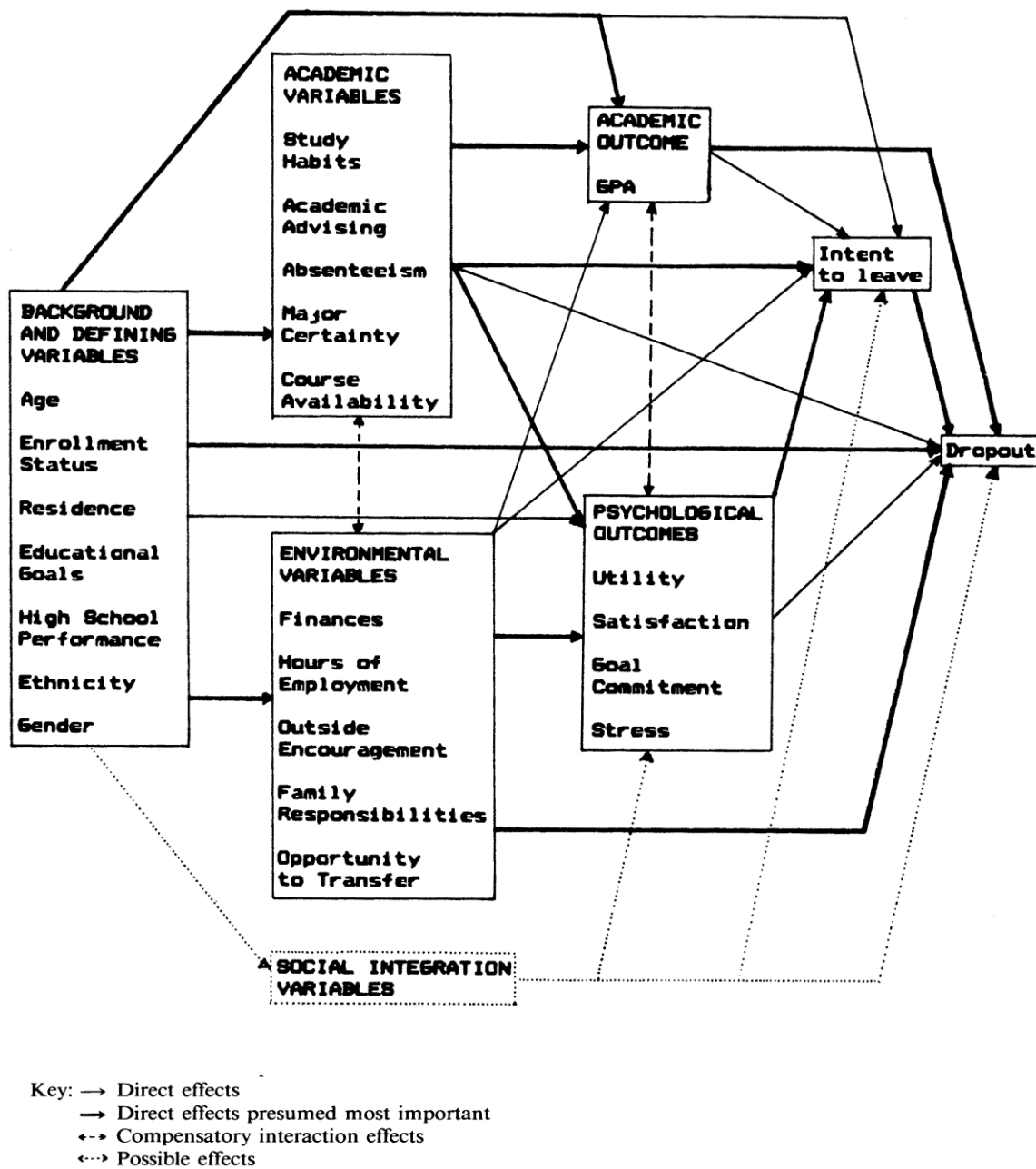


Figure 1.1. Conceptual Model of Nontraditional Student Attrition

Source: Bean, J.P., & Metzner, B.S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, 55, 485-540.

Background and defining variables included gender, race, age, educational goals, high school performance, and number of hours enrolled. These variables, according to the model, illustrate a student's characteristics on entering college. It is proposed that educational goals and high school performance are the most predictive variables, although they may interact with other variables. Academic variables include study hours, study skills, academic advising, absenteeism, major and job certainty, and course availability. These variables represent the student's participation in the academic progression at the college.

Bean and Metzner (1985) proposed academic variables directly influence each student's academic performance, in turn influencing persistence. Consequently, high performing students with good academic grades (as measured by grade-point average) due to good study skills, high class attendance, adequate study hours, good academic advising, major and job certainty, and greater course availability will persist in a program at higher rates than students with poor academic performance (Bean & Metzner, 1985).

Environmental variables include finances, family responsibilities, hours of employment, outside engagement, and opportunity to transfer to other programs or colleges and are factors external to the collegiate environment that may affect students' persistence during their attendance of college. Environmental variables are predicted to have a direct effect on a student's decision to withdraw or dropout from a college program. Bean and Metzner (1985) based this prediction on two basic assumptions: (1) the interaction between the nontraditional students and the external environment is greater than the interaction between the student and the institution; and (2) there is

negligible social integration into extracurricular activities because nontraditional student interaction with the college environment is primarily focused on academic programs.

According to Bean and Metzner (1985), these three sets of variables interrelate and result in an array of academic and psychological outcomes that directly influence persistence and retention in college.

The Hypothetical Model

Guided by the Bean and Metzner (1985) model of nontraditional undergraduate student attrition, a hypothetical model was identified that incorporated various variables. This study did not attempt to test all variables identified in Bean and Metzner's (1985) model, but examined the influence of select background and defining, academic, and environmental variables from the model, as well as admission exam scores, on successful completion by ADN nursing students in a community college system in Texas. Variables constructed from the model of nontraditional undergraduate student attrition included age, race/ethnicity, gender, finances, cumulative pre-requisite grade point average (GPA), and biophysical science, psychology, and English course GPAs.

In keeping with the model developed by Bean and Metzner (1985), the background and defining variables were categorized into demographic variables, including age, race/ethnicity, and gender. Bean and Metzner proposed that these variables have both a direct and interactive influence on student persistence. In this model, however, only the direct effect was considered.

Existing institutional data were used for this study. Data on academic variables in the Bean and Metzner's (1985) model, such as study hours, study skills, academic

advising, absenteeism, major and job certainty, and course availability, were either not available or not regularly updated in the institution's database. The gathering of these data, as mentioned below, would have been time-consuming and expensive. As a result, these variables were not used in the academic variable construct. According to Bean and Metzner (1985), their model presumed a direct effect of GPA on persistence decisions. Grade point average, an academic outcome that the model of nontraditional undergraduate student attrition regards as a direct consequence of various academic variables, was viewed as the academic variable construct of the hypothetical model, as well as admission exam scores. In this model, pre-requisite GPA, reading comprehension and math scores on the pre-entrance exam, and biophysical science, psychology, and English course GPAs, were hypothesized to have a direct effect on persistence.

The environmental variable in the model used financial aid as a single construct and was hypothesized to have direct effects on persistence. With respect to the present study, the additional environmental variables (family responsibilities, hours of employment, outside engagement, and opportunity to transfer to other programs or colleges) were not relevant to the final model in explaining variance in nursing program outcomes. The collection of environmental data was to have to been done using surveys of the cohorts tracked in this research study, but the strategy was felt to be expensive, time-consuming, and technically difficult, with modest benefits in terms of enhancing the predictive power of the hypothetical model. Furthermore, several prior studies have suggested that environmental data were not powerful predictors or held comparatively little explanatory power when compared with cognitive (academic) variables (The Center

for Student Success, 2002). Consequently, the use of additional environmental data and their expected importance was not highlighted in the present study.

In this model, the psychological outcomes were excluded from the framework since there was no particular interest in perceived attitudes about college. Neither compensatory interaction effects nor any other interactions were included in the study framework. Only direct effects presumed most important were included. Figure 1.2 provides a visual depiction of the hypothetical model.

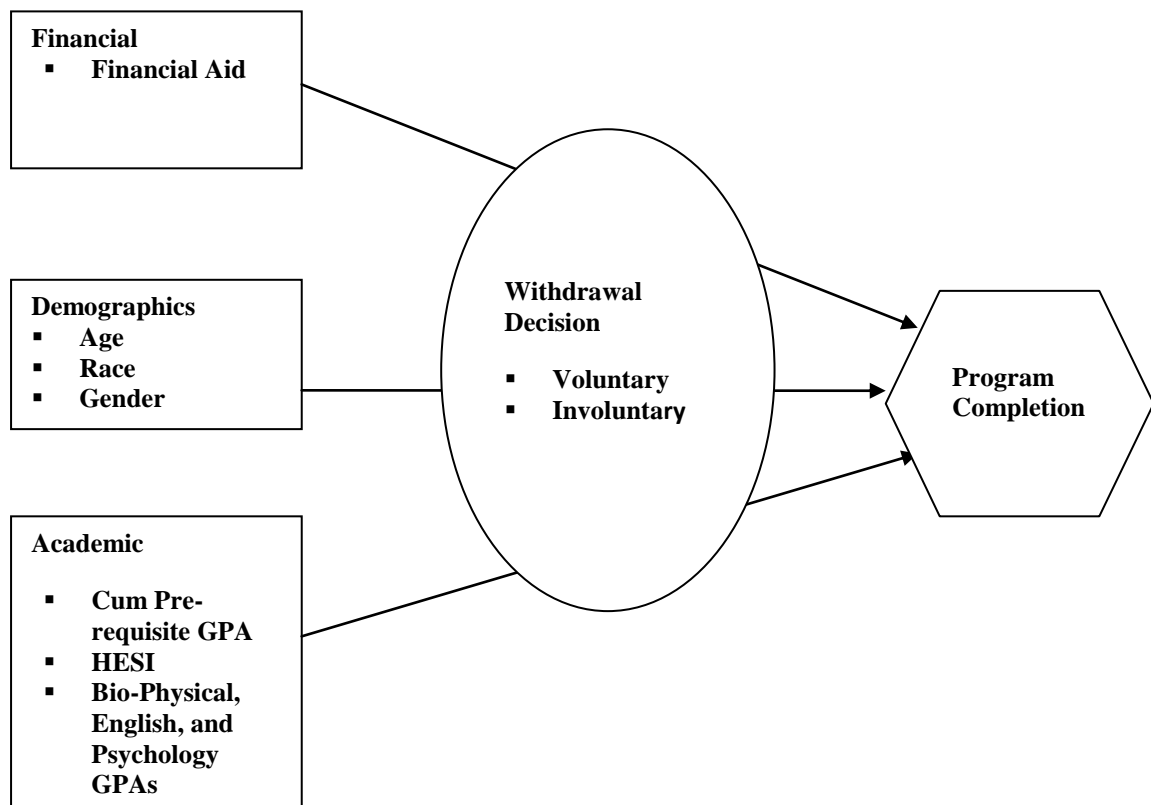


Figure 1.2. Hypothetical Model: Summary of the relationship demographic, financial, and academic variables that lead to completion of the two-year nursing program.

Chapter Summary

This chapter provided information on the historical perspective, problem, purpose, significance and limitations, research questions, and underlying theoretical framework for this study. Lone Star College System has seen as much as 40% attrition rates in the nursing program of few colleges within the system. The purpose of this study was to identify the predictors of persistence among students who successfully completed the requirements of the ADN programs at the Lone Star Community College System by studying the relationship between student persistence and certain demographic, financial, and academic variables. A hypothetical model guided by the Bean and Metzner model of nontraditional undergraduate student attrition, was identified and used as the theoretical framework of this study. Results of this study will provide important institutional information to nursing program administrators and faculty to develop a better understanding of the attrition problem within the culture of their institution. Chapter 2 contains a review of selected literature on prior and current findings from nursing and educational studies. In chapter 3, the methods used to research this problem are discussed. Chapter 4 provides the results and their statistical interpretations. In chapter 5, the results are related to other similar research and recommendations for continued research are offered.

Chapter 2

LITERATURE REVIEW

Effective admission and progression standards are imperative because physical space and financial and human resources limit enrollment capability (Sadler, 2003). Additionally, the advent of the nursing shortage due to high attrition rates in nursing programs is creating a burden on the health care system. Consequently, the increased importance on retention and graduation in nursing education has given added emphasis to identifying the factors that influence successful completion of associate nursing programs, especially those offered at the community college level. The purpose of this study was to determine the relative importance of various predictive factors of persistence among students in the Lone Star Community College System. Factors that include age, gender, race, financial assistance, pre-requisite course GPA, biophysical science, psychology, and English course GPAs, and scores on admission exams have all been shown to be predictive of persistence among nursing students.

The literature review was conducted using MEDLINE, EBSCO, and other scholarly databases, including online searches. The key descriptors included attrition, retention, nurse education, academic persistence, admission exams, and nursing programs. The review examined prior and current findings on variables identified as demographic characteristics, financial assistance, admission entrance factors, and academic performance, and the influences of these variables on the successful completion

of nursing programs. This review highlights the common themes relating to attrition and academic success found in both the nursing and education literatures.

Academic Effects

Numerous factors contribute to student attrition in tertiary institutions, and the literature suggests that these issues are multidimensional and complex (Pitkethly & Prosser, 2001; Tinto, 1975). Early research on student attrition suggested limited associated factors and addressed retention as a measure of success based on academic and social involvement (Tinto, 1975). Tinto (1975) formulated a predictive theoretical model that explained the process of the interaction between the student and the institution that led students to discontinue their program at tertiary institutions, and also the different forms of drop-out behavior that resulted from the process. Tinto argued that the student's integration into the institution's academic and social systems most directly relates to his/her continuance in the program.

Several previous higher education studies have consistently demonstrated an association between college attrition and pre-college academic ability measures, such as high school GPA and achievement test scores. For example, in a study comparing the characteristics of college students who successfully completed their undergraduate program and students who dropped out, Johnson (1994) found that the completers' grades in the final year of high school were significantly higher than those for students who dropped out. Daugherty and Lane (1999) conducted a longitudinal study to examine differences between undergraduate students who graduated and students who eventually dropped out. The authors included an array of predictor variables that were collected

during the first year of college and data on attrition status were gathered and examined four years later. The independent variables included specific stress perceptions, self-perceived alienation, family legacy status, and academic ability. Academic ability was measured by secondary school GPA and SAT score. Using discriminant analysis, the authors found that higher secondary GPA and SAT scores were significantly associated with decreased susceptibility to attrition.

Astin, Tsui, and Avalos (1996) came to a similar conclusion that students with higher high school GPAs and higher standardized test scores had a greater probability of graduating. Additional studies on attrition and retention have identified a positive correlation between previous academic performance and high college GPAs, thus leading to the conclusion that students with higher high school GPAs tend to continue performing well in college and university prerequisite courses and are more likely to complete the college program successfully than those with low GPAs (Astin, Korn, & Green, 1994; Cleveland-Innes, 1994; Farabaugh-Dorkins, 1991).

Although academic performance variables such as high school GPAs and standardized test scores (ACT and SAT), used alone or in combination, have been demonstrated as significant predictors of the successful completion of college programs, there is a lack of consistency in the literature on the clarity of these variables. Munro (1981), for example, suggested that characteristics of new entrants, such as high school grades and test scores, help in predicting students' integration into college but did not have a direct effect on attrition. Pascarella and Terenzini (1983) similarly concluded that high school grades and test scores had no direct impact on persistence. They also found

that students' experiences after arrival on a college campus had more impact than students' background characteristics when considering persistence.

A number of prior studies demonstrated a consistent association between college academic accomplishment and attrition, with evidence indicating that students who perform better academically are more likely to complete their program of study than those who perform lower (McGrath and Braunstein, 1997; Ryland, Riordan, & Brack, 1994). In a quantitative study conducted at a private college, McGrath and Braunstein (1997) investigated an array of demographic, academic, and financial variables in an attempt to identify the most significant predictors of student retention from freshman to sophomore year. Through stepwise logistic regression analyses, the authors found that first-semester grade point average was the single most significant variable in predicting persistence between the first and second years of the college program. The authors concluded that one of the main reasons that first-year students remained at college was that they were academically prepared to persist.

Early studies of student nurse retention have been mostly explorative and descriptive in nature. Weak correlation and low percentage explanations of variance have been consistent and a cause of conflict among correlation studies of attrition with academic or non-academic characteristics of nurse students (Jeffreys, 1998). However, MacGuire (as cited in Kevern, Ricketts, & Webb, 1999) suggested that the quality of the student is an important factor affecting student nurse attrition. MacGuire posited that the more qualified a student, the greater the chance of success. Studies of student nurse

retention are basically centered on academic characteristic such as GPA and environmental factors such as personal, financial, and family influences.

Currently, the trend in nursing education is to require students to complete various science, liberal arts, and other support courses before admission to the nursing program. The Lone Star College System is no exception, and requires students to complete courses such as Human Anatomy and Physiology I and II, General Psychology, Composition and Rhetoric I, and Microbiology and Pathology prior to or in unison with program admission. A large number of studies that looked at the relationship between pre-requisite nursing courses and successful completion of the nursing program found an association. For example, Byrd, Garza, and Nieswiadomy (1999) examined the predictors of successful completion of a baccalaureate nursing program versus failure or dropout. The authors gathered demographic data on a sample of 285 nurse students. GPA analyses were based on data for 278 students. The study reported that 197 students (70.8%) completed the program (graduated), twenty-two students (8%) failed, and 59 (21.2%) dropped out. Findings showed that grades in biological sciences courses, social science courses, and chemistry were predictors of success. The authors concluded that a higher cumulative pre-nursing GPA was a predictor of graduation. However, they warned about generalization of the study results, since most of the students were transfer students and had completed degrees prior to entering the program.

The continued decrease in enrollment and low retention in a nursing program at a large urban community college formed the basis of a study conducted by Sandiford and Jackson (2003). This study set out to develop a model demonstrating the relationship of

various motivational, socioeconomic, and academic variables to students' attrition in the associate nursing program, in order to identify which students would pass or fail generic nursing courses in the first semester of college. The investigators used several theoretical frameworks including Tinto's Student Integration Model, Bean and Metzner's Nontraditional Undergraduate Student Attrition Model, Bean's Student Attrition Model, and Stahl and Pavel's Community College Retention Model to guide their study. Using a discriminant analysis procedure, study findings indicated a significant difference at the $p \leq .001$ level for pre-semester grade point average. Students with a pre-semester grade point average of 2.5 or higher had lower attrition rates than students with a grade point average between 2.00 and 2.49. The investigators concluded that these findings should be beneficial to nursing program administrators as they evaluate the attrition and retention of ADN students.

Dean and Fischer (1992) highlighted the importance of prior academic performance in related coursework to successful completion of a nursing program. The study's primary objective was to determine what qualifications, at a minimum, were essential for a student to be successful in a selective admission nursing program at the Saint Petersburg Junior College in Florida. Institutional data were collected on students' cognitive ability and comprised the explanatory variables. These variables included student GPA at admission; scores on the Multiple Assessment Programs and Services (MAPS) placement test, final grades in selected science, English, and math courses, and GPAs in other selected courses. Success, as the dependent variable, was measured by the successful completion of the nursing program in four semesters and a first-time pass on

the Florida Licensing Examination for Registered Nurses. Using multiple regression analysis, the authors found that a GPA of 2.6 or higher in general education science courses and a final grade of at least a 'B' in the pre-requisite courses of Human Anatomy and Physiology were statistically significant pre-admission predictors of nursing program success.

Both meta-analysis and integrative review of nursing research have demonstrated an association between academic GPAs in science and other prerequisite nursing courses, and successful completion of the nursing program. Campbell and Dickson (1996), through an integrative review and meta-analysis of 47 nursing research studies, sought to explain and assess nursing education research on predictors of retention, graduation, and National Council Licensure Examination (NCLEX) success for baccalaureate-degree nursing students. The authors noted that standardized tests and GPAs for liberal arts, nursing, science, pre-nursing courses, and college cumulative were the most often studied quantitative variables. The results of the integrative review indicated that nursing and science course GPAs were significantly correlated to retention and the greatest cognitive predictors of student success.

Admission/Entrance Examination

Attrition among students in a nursing program can be minimized by identifying those students most likely to successfully complete the program (Sadler, 2003). A variety of admission examinations exist, such as the Nursing Entrance Test (NET), the Registered Nurse Entrance Exam (RNEE), and the Health Education Systems, Inc. (HESI). Most nursing schools require prospective applicants to take at least one of these

tests, which help them to evaluate applicants for admission. However, a search through the relevant literature uncovered a general lack of studies that specifically examined the relationship between attrition and nurse admission exams, indicating a gap in this research area. According to The Psychological Corporation, the publisher of the RNEE, a study conducted in 1994 revealed that when comparing high school grades and scores on the RNEE as predictive variables of academic performance in nursing school, the RNEE scores were a better predictor of nursing grades (Psychological Corporation [TPC], 1996). In addition, scores from the reading comprehension section and the numerical ability section moderately correlated with grades in the nursing program. This finding was revealed in another study conducted in 1995, and reported by the TPC (1996).

In a study using an admissions exam to predict nursing student success in an associate degree program, Gallagher, Bomba, and Crane (2001) examined whether the RNEE, an academic achievement measure assessing verbal ability, numerical ability, life science, physical science and reading comprehension or the NET, a diagnostic instrument designed to assess both academic (essential math skills and reading comprehension) and social skills, was a better predictor of academic success among 121 students in an ADN program. All 121 students had taken the RNEE prior to admission and were contacted to take the NET at the time of admission for the 1995 fall term. Both the NET and RNEE scores were examined as the predictor variables of the successful completion of the first nursing course (NUR 101). Successful completion of the NUR 101 course was defined as achieving a grade of “C” or better. The authors found that in the initial analyses, no statistical significant difference existed between NUR 101 grades of “C” or better and

grades of less than “C” for the mean scores on the academic subtest sections of the NET, and that higher RNEE scores were observed for students who successfully completed NUR 101 than for those students who were unsuccessful. Further analyses were conducted using logistic regression with the NUR 101 grade as the dependent variable and RNEE test scores as the variable of interest. Results revealed that the reading comprehension section of the RNEE was statistically significant and that a score of 32 was predictive of a 50% chance of a student succeeding in the nursing program. The authors also found that a reading score of 59 was predictive of a 50% chance that a student would succeed in achieving a grade of “B” or greater in the program. They concluded that the RNEE is a good overall predictor of the successful completion of courses in the nursing program and completion of the program overall.

Similar findings were reported in a recent study by Higgins (2005), who, in examining ex-post facto data from the records of 213 former nursing students at a community college in north Texas, found that three components of the preadmission exam were related to successful completion of the nursing program. The components from the preadmission test were math, verbal, nonverbal, science, reading, spelling, and vocational adjustment index. A case-appropriate correlation coefficient was employed to determine whether a statistically significant difference existed between components of the preadmission test and successful completion of the nursing program. The author found that the correlation coefficient was statistically significant for science ($r = 0.184$), math ($r = 0.129$), reading ($r = 0.124$) and the completion of the nursing program. In a prior study, utilizing the NET to ascertain the existence of an association between test

component scores and academic success in the first year of nursing school, Abdur-Rahman, Femea, and Gaines (1994) found a significant association among NET math, reading scores, and composite scores and first-semester nursing grades.

Non-academic Effects

Evidence in the literature suggests that non-academic factors and relationship with faculty may have a greater impact on student attrition than do academic factors. Davis and Murrell's (1993) concept of institutional responsibility involving faculty and college system included the construct of student-faculty interaction to enable student success. Braithwaite, Elzueir, and Stark (1994) found that disillusionment and personal problems were the two main influences on student dropout from a nursing program. Adib-Hajbaghery and Dianati (2005) indicated that students were not fully aware of the requirements and expectations of the nursing profession prior to applying to the program.

Bean and Metzner (1985) formulated a causal model based on student attrition with a student construct of environmental, background-defining, and academic factors. Environmental factors were hours of employment, finances, family responsibilities, and outside encouragement. Academic factors included the students' perception of support or restrictions to their study hours, academic advising, absenteeism, and study skills that would move them toward their projected goals. Background-defining factors included previous high school grades, number of enrolled hours, and demographic attributes.

Contrary to findings from previous research, Bean and Metzner (1985) speculated that student persistence was not so much affected by the student's academic and social interaction but more so by persistence, which is largely influenced by the student's

awareness of personal goals. The authors further noted that these personal goals were weighted against supportive or restrictive factors within the student's own environmental, background-defining, and academic characteristics.

Jeffreys (1998) found that environmental factors external to the academic process exert a greater influence on students' academic achievement and retention than do academic factors. Increasingly, the family environment has been addressed as an important factor influencing academic achievement and retention (Jeffreys, 1998). Studies have shown that the impact of family obligations and difficulties is an essential related factor in student nurse attrition. Glossop (2002) found that in a cohort of nursing students, family difficulties were the most commonly reported reason for leaving a program. A dysfunctional family environment adversely affected retention or college adjustment among college students (Jeffreys, 1998).

Race/Ethnicity, Age, and Gender

Based on empirical research, conceptual models, and the higher education literature, multiple student demographic characteristics important to undergraduate nursing student retention have been proposed. Students' demographic characteristics include race/ethnicity, gender, and age, and are depicted prior to beginning a nursing program (Jefferys, 2004). Accordingly, the gender, race/ethnicity, and age variables have been investigated as predictors of student performance, persistence, and program completion. However, there is a lack of recent data on the relationship between students' demographic characteristics (gender, race/ethnicity, and age) and attrition in the nursing literature. Furthermore, study findings have been inconsistent in both the nursing and

higher education literatures. For example, in regard to age, some studies have suggested that older students have shown greater persistence in academic programs than have younger students (Kevern et al, 1999; Manifold & Rambur, 2001) while other studies have revealed contrasting findings (Byrd et al, 1999; Murtaugh, Burns, & Schuster, 1999).

Manifold and Rambur (2001), in a study of the predictors of attrition among American Indian nursing students, analyzed data for 150 students at a tribal college who had enrolled in an the associate degree licensed practical nurse program. Variables included number of dependents, age, gender, high school grades, and entrance exam scores in reading, language, and math. Of the 150 students, only 38 successfully completed the nursing program. Results revealed that the students who completed the nursing program were older and had higher scores on the language and math components of the entrance exam compared to students who did not complete the program. Similar findings were reported in a study by Kevern et al. (1999), who studied 355 pre-registration nursing students to identify any significant relationships between their entrance characteristics and their academic performance and program completion. Data on gender, age, mode of entry, cohort and education center, and entry qualifications, and details of students' branch were obtained from Management Information System electronic records, and were utilized as the independent variables. Reasons for discontinuation, month of discontinuation, and assessments of theoretical knowledge were used as dependent measures. Using a multi-factorial tree-based method, the authors found that education and age were significant predictors of academic performance. Older

students with recent study experience did particularly better than younger students. In addition, older students aged 35 or older, and students aged 25–29 had higher retention rates than those students aged 24 or younger. However, the association between age and program completion was not significant.

In contrast to studies suggesting that older students persist more than younger students, few studies have indicated otherwise. For example, Byrd et al. (1999) conducted a retrospective study of 285 nursing students to examine demographic variables and admission and progression criteria predictive of students' completion of a baccalaureate nursing program. The independent variables used in the analyses included ethnicity, age on entry into nursing courses, previous baccalaureate degree, cumulative social science GPA, cumulative science GPA, cumulative pre-nursing GPA, and letter grade achieved in each nursing course during the first and second semester of the upper-division nursing program. Using logistic regression to develop several models, Byrd et al. found that ethnicity, age, and pre-nursing GPA as a cumulative effect were 77% predictive of successful completion of the baccalaureate nursing program. Younger age was seen as predictive in five of six predictive models. The results also suggested that White ethnicity was a predictor of graduation in four of the study models. However, the authors concluded that the results on ethnicity should be interpreted with caution because ethnicity was unevenly distributed.

In a study predicting the retention of university students, Murtaugh, Burns, and Schuster (1999) used survival analysis to model the retention of 8,867 undergraduate students at Oregon State University between 1991 and 1996. Data on the students in the

study were obtained from a computerized database referred to as the OSU Student Data Warehouse. Although limited data were available, the researchers were able to abstract sufficient information considered to be potential influences on student retention. The model included variables such as age, race/ethnicity, gender, geographic origin, high school GPA, SAT score, and freshman orientation course, and educational opportunities programs. The authors used the Cox proportional hazards regression model to perform multiple-variables analysis. Findings revealed a statistically significant association between age and retention. Younger students were more likely to persist and complete their program. However, the authors indicated that since the p-values decreased with increasing sample size, even weak associations might be judged as statistically significant because the sample size was large; therefore, the magnitude of the differences should be considered rather than the statistical significance.

Student ethnicity as it related to faculty ethnicity can play a pivotal role in student success. Non-White students are at risk in institutions where the faculty are predominantly White. Students face several difficulties, such as personal, academic, and institutional barriers to their success in their program. Subsequently, low retention and graduation rates are seen, especially in nursing programs (Campbell & Davis, 1996). Several studies have suggested that the negative view of non-White students held by White nursing faculty is the foremost barrier to the successful completion of a nursing program by non-White students (Long, 1999; Merrill, 1999). Jordan (1996) conducted a hermeneutic study of the lived experience of four self-identified African-American students enrolled in predominantly White baccalaureate nursing programs. The results

suggested that faculty who presumed African-American students to be cognitively inferior might negatively influence the way they relate to these students. As a consequence, these students may be dropping out of the nursing programs because the environment and climate are unfavorable to their learning. The will to remain in this environment and to persevere academically may be influenced by a more culturally inclusive setting and the resilience to overcome the struggles.

Further studies have shown that gender and age as well as race/ethnicity of nursing students influence attrition (Campbell & Dickson, 1996; Jeffreys, 2007). In their study of enrollment trends from 1986–1992 and persistence and attainment among beginning nontraditional undergraduate students in 1989–1990, Horn and Carroll (1996), after controlling for a variety of variables, found that females were more likely than males to persist. The results suggested that gender was associated with attrition through other environmental factors. In a meta-analysis of 47 nursing education studies investigating predictors of retention, graduation, and National Council Licensure Examination (NCLEX) success of nursing students, Campbell and Dickson (1996) found that age and parental education were the greatest demographic predictors of retention and graduation as well as success on the NCLEX. Similar findings were reported in a retrospective study by Jeffreys (2007), who studied 112 culturally diverse associate degree nursing students on entry, progression, graduation, and licensure success characteristics. Data were collected on academic outcomes, type of retention or attrition, program completion length, licensure, and student profile characteristics such as age, gender, and race. The author found that several variables, including age, gender, and race, influenced

progression, graduation, and first-time pass rate on the nurse licensing exam. On the other hand, Higgins (2005), in a study conducted in a community college setting in North Texas, concluded that the demographic characteristics of age, race/ethnicity, and gender should not be considered as predictors of successful completion of the two-year nursing program, since those factors did not predict students at risk for failure. However, the author indicated that the inconsistency of the finding with the existing literature might be due to a successful ongoing peer-tutoring program available at the time of the study.

Financial Aid

Several researchers have examined the relationship between financial aid and student persistence. However, the findings have not been consistent. In two earlier studies by Blanchfield (1971, 1972) of various potential variables predictive of college attrition based on case study and economic analysis, it was found that, through discriminant function analysis, college tuition partially financed by grants, as well as other factors such as social consciousness, high school rank, and freshman GPA, were significant predictors of persistence and nonpersistence. Similar findings have been reported by Astin (1975), who, examining the influence of financial aid on persistence, found that two forms of financial aids (grants and College Work Study) were positive predictors of student persistence. In addition, Astin found that persistence from freshman to sophomore year for males was negatively associated with loans but positively associated for females for the same persistence period. However, a positive association was found between loans and four-year persistence.

Barnes and Keene (1974), however, in comparing the initial academic achievement of first-year college students who work and do not work, found no significant difference between the two groups of students relating to GPA. The result suggests that the academic performance of students who participated in a work study program in their freshman year was not affected. Peng and Fetters (1978) reported similar results from their longitudinal study of the high school class of 1972. In examining numerous independent variables, including financial aid and their influence on student withdrawal during the first two years of college, the authors found no association between student aid and persistence.

More recent studies have found a positive association among financial aid, long-term persistence, and successful completion of degree program (Cabrera, Nora, & Castaneda, 1993; St. John, Kirshstein, & Noell, 1991). In a longitudinal study, Cabrera, Nora, and Castaneda (1993) examined the role of finances on college persistence by presenting a causal model that relied on several theoretical frameworks. The study consisted of a sample of 466 college students who were attending a large public urban commuter institution in spring 1989. Using linear structural equations for categorical data, the authors tested a quantitative model that incorporated constructs from the financial aid literature as well as the persistence literature. The findings suggested that financial aid is an important predictor of persistence in college. The results further suggested that not only does financial aid balance the opportunities between the financially well-off and low-income students, but also that it assists in the integration of

the student into the institution's academic and social components as well as by influencing their commitment to persist in college.

In a longitudinal study of the impact of different forms of student financial aid on student persistence, St. John, Kirshstein, and Noell (1991) developed and tested a conceptual model that conceptualized persistence as a function of high school experience, social background, academic ability, college experiences, postsecondary aspirations, and student financial aid. The authors used data from the 1980 High School and Beyond (HSB) senior cohort. Persistence as the outcome variable was divided into three college year-to-year transition points: (1) *first-to-second year persistence*, (2) *second-to-third year persistence*, and (3) *third-to-fourth year persistence*. Through a series of logistic regression analyses, and after controlling for several confounders, the authors found that for each of the transitional period, student financial aid had a positive impact on persistence. The findings also revealed that grants and student work program as well as loans were all predictors of persistence and successful completion of a degree. Voorhees (1985) reported similar results in "Financial Aid and Persistence: Do Federal Campus-Based Aid Programs Make a Difference?" He found that all forms of student financial aid, whether packaged alone or in combination, were equally positively significant in promoting persistence. Stampen and Cabrera (1988), after adjusting for various covariates including age, sex, ethnology, and academic ability, found financial aid to be positively associated with persistence. Students receiving some form of aid were more likely to persist than those students who did not receive student aid.

Chapter Summary

A review of the literature revealed that consistent predictors of success in nursing programs have not been clearly identified. Most early research on student attrition suggested limited associated factors and addressed retention as a measure of success based on academic and social involvement (Tinto, 1975). Several previous and recent higher education and nursing studies have consistently demonstrated an association between college attrition and pre-college academic ability measures such as high school GPA and achievement test scores. However, few studies have concluded that high school grades and test scores have no direct impact on persistence. Furthermore, the literature overwhelmingly revealed that college science GPA, cumulative GPA, prerequisite nurse course GPA, in combination or alone, have been reported as predictors of successful completion of education and nursing programs. In regard to pre-admission tests, a search of the relevant literature uncovered a general lack of studies on the relationship between attrition and nurse admission exams, indicating a gap in this research area. Nonetheless, a majority of those studies have found a significant association between some admission test components and student persistence.

Contrary to academic factors, evidence from the literature suggests that non-academic factors such as financial issues, demographic characteristics, and relationship with faculty may have a greater impact on student attrition than do academic factors. Increasingly, the family environment has been addressed as an important influence on academic achievement and retention (Jeffreys, 1998).

The literature revealed that students' demographic characteristics, such as race/ethnicity, gender, and age, have been investigated as predictors of student performance, persistence, and program completion. However, there is a lack of recent data on the relationship between students' demographic characteristics (gender, race/ethnicity, and age) and attrition in the nursing literature. Furthermore, study findings have been inconsistent in both the nursing and higher education literatures. A number of studies have suggested that older students have shown greater persistence in academic programs than have younger students (Kevern et al, 1999; Manifold & Rambur, 2001), while other studies have revealed contrasting findings (Byrd et al., 1999; Murtaugh, Burns, & Schuster, 1999).

Numerous studies have examined the relationship between financial aid and student persistence. However, these findings have not been consistent. Some earlier studies of the influence of financial aid on persistence found that some forms of financial aid were positive predictors of student persistence, while some found no association among financial aid, long-term persistence, and successful completion of a degree program

Although a review of the literature revealed that several demographic, financial, and academic factors have been studied in relation to student persistence in nursing programs, and that strong associations have been demonstrated, inconsistencies were found in a number of findings and there is a paucity of recent data on some potential predictors. Clearly, more research is needed in the area of nursing attrition/retention.

Chapter 3

METHODOLOGY

The purpose of this study was to identify the predictors of persistence among students who successfully completed the requirements of the Associate Degree Nursing programs in the Lone Star Community College System by examining the relationship between student persistence and certain demographic, financial, and academic variables. The study looked at data from five colleges in the Lone Star Community College System. Each college offers an ADN program; admissions requirements and procedures are similar across each program. Specifically, this study looked at student reading comprehension and math scores on the HESI, which is administered to incoming nursing students; age, race/ethnicity, and gender; cumulative pre-requisite GPA, biophysical science, psychology, and English course GPAs; and financial aid to see if those variables were predictive of successful completion of the nursing program. This chapter contains a description of the overall research design, sample, measures, variables of interest, and proposed analyses.

The Problem

Despite graduation trends in Texas from 1998–2004 that indicate a 63.6% increase in graduates from BSN programs and a 15.3% increase in graduates from ADN programs, the rate of attrition among nursing students in ADN programs continues (Texas Department of State Health Services, 2005). Increased enrollment is believed to be the primary reason for the graduation increases. However, the overall increase in enrollment does not indicate a parallel increase in nursing graduates and reduction in

attrition rates. Several reasons have been cited for nursing student attrition as reported by nursing programs, including academic failure, financial difficulties, family constraints, health problems, and students' second thoughts about the program (whether it was the right choice for them) (Texas Department of State Health Services, 2005).

The Lone Star College System is among the Texas community colleges that are not exempt from the phenomenon of student attrition in nursing programs. Situated in the North Houston metro area of Texas, the Lone Star College System serves 1,400 square miles in Harris and Montgomery Counties, and has a student population of approximately 50,000 enrolled in credit courses and about 14,000 enrolled in continuing education. The Lone Star College System is among the largest and fastest growing community college districts in Texas, with five distinct colleges. Current student enrollment has seen a drastic increase over the past few years. Furthermore, the nursing programs at each college have modified their recruitment efforts and increased the number of students accepted into the program. Nonetheless, attrition rates as high as 40% have occurred in the nursing programs at a few colleges within the system. Consequently, a considerable amount of revenue as well as number of student services have been reduced and lost. In addition, student attrition has had an adverse effect on students as well as further compromising the nursing shortage in Texas communities. This trend has been somewhat consistent over a period of time—to date, no formal study has been conducted in this area. This fact has provided an impetus for understanding the factors that predict nursing students' persistence in the A.D.N program. If such predictive factors can be identified, then intervention strategies can be designed and implemented to increase retention rates.

Research Questions

This research study will address the following questions:

1. To what extent do demographic characteristics differentiate between nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
2. To what extent are there differences in reading comprehension scores and math scores of the Nurse Pre-Entrance Exam (HESI) among nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
3. To what extent are there differences in cumulative pre-requisite course grade point average among nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
4. To what extent are there differences in biophysical science, psychology, and English course GPAs among nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
5. To what extent does financial aid differentiate between nursing students who successfully completed the ADN nursing program and those students who did not complete the program?
6. What, if any, of the demographic characteristics, cumulative pre-requisite course grade point average, HESI scores, biophysical science, psychology, and English course GPAs, and financial aid predict the successful completion of the requirements of the ADN nursing program?

Research Design

The study used an analytical cross-sectional study design to examine certain demographic, financial, and academic variables predictive of a student's completion of associate nursing programs. According to Aday and Cornelius (2006), "analytical cross-sectional designs search for explanations by examining the statistical association of variables in a one-time data collection" (p. 30). The number of periods of data collection of student information from five institutions, which make up a community college system, was done at one point in time. For this study, cross-sectional design is appropriate, since it allows for an explicit effort to look back in time at factors that may have influenced one group of students to succeed in the nursing program and the other group not to succeed.

Setting

The setting for this study was a community college system located in the North Houston metro area of Texas. The system serves 1,400 square miles in Harris and Montgomery Counties. According to the 2000 U.S. Census, the combined population of the two counties is approximately 3.7 million. In 2000, the Harris County population consisted of 58.7% Caucasian, 18.5% African American, and 32.9% Hispanic of any race, while the Montgomery County population consisted of 88.3% Caucasian, 3.5% African American, and 12.6% Hispanic of any race (U.S. Census Bureau, n.d.). The college system is among the largest and fastest growing community college districts in Texas, with five distinct colleges, and has a student population of approximately 50,000 enrolled in credit courses and about 14,000 enrolled in continuing education.

The college system is accredited by the Commission of Colleges of the Southern Association of Colleges and Schools to award the associate of art degree, the associate of science degree, the associate of applied science degree, and certificates. The nursing program is approved by the Board of Nurse Examiners for the State of Texas and is also accredited by the National League for Nursing Accrediting Commission. Students enrolled at each college within the system mostly live in the city in which the college is situated and surrounding small towns in adjoining counties.

Population

The population of this study was students who had enrolled in the two-year ADN programs offered by the five colleges in the college system in 2004. Students generally apply for admission to the nursing program during the semester in which they are completing the required admission courses. For each year, each college accepts individuals into the nursing program either for spring or fall enrollment based on a composite representation of the ranking criteria for admission. An individual college accepts different numbers of students based on their capacity and other available resources. These nursing programs offer a balance among general studies, nursing education, and clinical experiences, and programs are generally full time and usually require about four regular semesters and one summer session to complete. The total sample included all 215 students in the cohort who entered in the spring and fall 2004 and expected to graduate in spring 2006. The sample consisted of all students who either had completed or dropped out of the nursing program. No sampling was performed, as the entire population was utilized in the study.

The sample consisted of students who ranged in age from 18 to 59, and were from varying socio-economic backgrounds. Students enrolled in the nursing program at each college within the system mostly lived in the city in which the college is located and surrounding towns in neighboring counties.

Data Collection

Approval for data collection was first obtained from the Institutional Review Board for the Protection of Human Subjects in Research (IRB). Expedited approval was granted by the IRB since the research study included collection of secondary, ex post facto data. A letter was then sent to the institution's Chancellor's Executive Council requesting permission to utilize data on their nursing program for the academic year 2004 through 2006. Permission to collect data from each of the five nursing programs was granted by the Chancellor's Executive Council on March 26, 2008. Follow-up contact with nursing program directors for each of the identified institutions was done by telephone and e-mail to explain the study and obtain institution-wide cooperation.

A data collection sheet (see Appendix A) was designed to facilitate a systematic collection of data for each student in the study. Data were gathered, abstracted or computed from several sources at one point in time during the summer of 2008. Information was obtained from individual student files, class records, college transcripts, and institutional records. The data collection preserved the confidentiality of all students included in the study and did not involve contact with students nor include names or identifying information for the students. Students and each nursing program were each assigned a number to further protect anonymity.

A total of 215 student names were obtained from class records in the nursing department of each college. The students were assigned an ID on the data collection sheet to preserve further confidentiality. Demographic data such as age, race/ethnicity, and gender were collected from student files accessed by a member of the institution's research department. HESI Nurse Pre-Entrance Exam reading comprehension and math assessment scores, sent by HESI, were obtained from the nursing department files. Student grades in seven courses (Human Anatomy and Physiology I and II, Microbiology and Pathology, General Psychology, Life-span Growth and Development, Interpersonal Communication, and Composition and Rhetoric) were obtained from college transcripts. Cumulative pre-requisite GPA were computed for the three pre-requisite courses (Human Anatomy and Physiology I, General Psychology, and Composition and Rhetoric) and added to the data collection sheet. Data regarding financial aid were obtained from institutional records. Withdrawal date, graduation date or date of program completion were extracted from institutional records and added to the data collection sheet as complete program or not. All files were stripped of identifying information.

Independent Variables

Three sets of independent variables were used to test the hypothetical model in the study. These three sets included: (1) Demographic Characteristics; (2) Academic variables; and (3) Financial variable. Demographic characteristics measured students' age (measured as a continuous variable), race/ethnicity (*White non-Hispanic, Black non-Hispanic, Hispanic, Asian-Pacific, other non-Hispanic*), and gender (either *male* or *female*). Demographic variables were collected from institutional records, which were

collected on application and admission to the college. The age variable, calculated from date of birth and measured as a continuous variable, will represent the student's age at the time of enrollment.

Academic variables included cumulative grade point average (GPA) on pre-requisite courses; biophysical science, psychology, and English course GPAs; and reading comprehension scores and math scores of the Nurse Pre-Entrance Exam (HESI). The cumulative pre-requisite GPA were computed for the three pre-requisite courses (Human Anatomy and Physiology I, General Psychology, and Composition and Rhetoric) that were completed prior to submission of the application, while biophysical science, psychology, and English course GPAs were computed from pre-requisite grades and grades earned after enrollment in the nursing program. Biophysical science courses include Human Anatomy and Physiology I and II and Microbiology and Pathology. Psychology course grades include grades for the General Psychology and the Life-span Growth and Development courses. English courses include Interpersonal Communication and Composition and Rhetoric. The HESI, administered as a pre-entrance nursing exam, is a requirement for admission to the nursing program. An entrance assessment instrument, the HESI, evaluates students in the areas of reading comprehension, grammar, math, and vocabulary. Students must complete the reading comprehension and math assessment tests of the HESI Nurse Pre-Entrance Exam with scores of 70% or higher to be eligible for admission. All academic variables are measured as continuous variables.

Financial was measured by one variable—financial aid. Finance represents an external factor believed to influence students' persistence. Three forms of aid, including loans, grants, and college work study, were available to students during the first three terms (spring 2004, summer 2004, or fall 2004) of the cohort. Loans include the Federal Subsidized and Unsubsidized loans. Grants include all federal and state grants and also scholarships provided through the Lone Star College System Foundation or external sources, while work study includes both federal and state work study programs. All three aids, however, were collapsed into one variable. The single financial aid was further classified into two categories (*yes* or *no* for receiving financial aid) and coded 1 for having received any form of financial aid alone or in combination or 0 for not having received financial aid. According to Nora, Carbrera, Hagedorn, and Pascarella (1996), it makes it possible to include all subjects in the sample and utilize all information in the variable if financial aid is dichotomized between those having received versus those who have not. The above-mentioned variables are considered to be consistent with persistence/completion or non-persistence/non-completion of the ADN program.

Dependent Variable

Program completion was a dichotomous dependent measure of student's successful completion of the nursing program. The variable was derived from institutional records that reflect whether a student had completed all requirements of the nursing program that would lead to graduation from the institution at the end of the 2004 cohort. Those students who successfully completed the program were classified as completers (coded 1) while those students who did not complete the nursing program

(either voluntarily or involuntarily) were classified noncompleters (coded 0).

Noncompleters were students who withdrew, failed, or dropped out from the nursing program.

Data Analysis

A number of statistical methods and analyses were utilized. Descriptive statistics were calculated for certain demographic, financial, and academic variables. In addition, Chi-square was used to test the association between categorical variables and Cramer's V to measure the strength of the relationships among these variables. The t -test was used for continuous data to compare two means to see if they differ significantly from each other. The *Cohen's d* was used to measure the effect size of the t -test. In addition, the use of the Chi-square and t -tests also facilitates preliminary analyses in order to reduce the number of variables under consideration for analysis in the logistic regression model. Only those independent variables that were statistically significant at the .05 level were entered into a stepwise logistic regression. This kind of logistic regression will create a model with the greatest explanatory power and was used to examine whether various variables are independently associated with dichotomized program completion as dependent variables. The statistical analyses for each research questions are stated below. All analyses were done using SPSS version 14.0.

Research questions one through five focused on identifying differences in demographic characteristics, reading comprehension scores and math scores of the Nurse Pre-Entrance Exam, cumulative pre-requisite grade point average, biophysical science, psychology, and English course grade point average, and financial aid among nursing

students who successfully completed the ADN nursing program and those students who did not complete. Bivariate comparisons and statistics were used to answer these first five research questions.

For research question one, the study variables under demographic characteristics include age, gender, and race/ethnicity, and are all categorical with the exception of age, which is a continuous variable. Careful analysis of each variable was done with a contingency table of the categories of the variable under the demographic characteristics (gender and race/ethnicity) for both groups of students (completers and noncompleters). Since the samples (completers and noncompleters) are independent, the Pearson chi-square tests of differences were the test statistics used to examine the statistically significant relationship between the independent and dependent variables. This is the simplest type of statistical procedure for examining the relationship between categorical variables (Aday & Cornelius, 2006). Alpha was set at the .05 significance level; if the p-value falls below that significant level, then the differences between the variables will be statistically significant. The Cramer's V was used to determine the strength of the association between variables. For the age variable, the t -test of difference in means was used to examine the statistical significance of differences between the two groups of students (completers and noncompleters).

The variables in research questions two through four are reading comprehension scores and math scores on the Nurse Pre-Entrance Exam, cumulative pre-requisite grade point average, and biophysical science, psychology, and English course grade point averages. These variables are all continuous. The t -test of difference in means was used

to examine the statistical significance of differences between the two groups of students (completers and noncompleters). The t-test is an appropriate statistical procedure to use when comparing the means of two unrelated samples (independent samples) and the variable of interest is interval or ratio level. The financial aid variable in research question five is categorical. Therefore, the Pearson chi-square test of differences was the test statistics used to examine the statistically significant relationship between the independent and dependent variables. Again, alpha was set at the .05 significance level and Cramer's *V* was used to determine the strength of the association between variables.

While research questions one through five focused on identifying differences in those students who completed the nursing program or not, related to the demographic, financial, and academic characteristics, research question six was concerned with the variables predicting successful completion of the nursing program, and provided a greater understanding of the impact and relationship of variables in the overall predictive regression analysis. Multivariate stepwise logistic regression was employed to examine the impact of independent variables (demographic, financial, and academic) included in the hypothetical model to determine if any would be significant in predicting the successful completion of the nursing program. Logistic regression is a versatile statistical procedure and can be used to predict a dependent (dichotomous) variable based on continuous and/or categorical independents and to determine the percentage of variance in the dependent variable explained by the independents. In this case the outcome was program completion group membership – completers/noncompleters. In addition, logistic

regression can also be used to rank the relative importance of independent variables, understand the impact of covariate control variables, and assess interaction effects.

In logistic regression, the independent variables—demographic, financial, and academic characteristics in this case—were both continuous and categorical variables. Since there were a number of demographic, financial, and academic measures, a backward elimination procedure of the stepwise logistic regression was run. The initial analysis included all demographic, financial, and academic variables that were deemed significant in the preliminary analyses to see which variables were significant for inclusion in the final model. The final analysis resulted in only variables that added significantly to the prediction at the .05 significance level. The end objective was to determine the most useful set of independent variables that can be used to predict nursing program completion based on the student sample. The odds ratios along with the 95% confidence interval were used to measure the strength and direction of the association between variables.

In summary, the primary interest of this research study was in the description of a number of facets of nursing attrition/retention related to the student population in the community college system in Texas. The six research questions, their associated hypotheses, and analyses provided basic and important knowledge about those who successfully completed the nursing program and those who did not, heretofore not available for the specific community college system in Texas.

Chapter 4

FINDINGS

For the 2004 academic school year, a total of 215 students enrolled in the ADN program in the Lone Star College System, which made up the population for this study. Of the 215 students, three students were missing demographic, financial, and academic data. After exclusion of the missing data for the variables used in these analyses, 212 students were used in all related analyses as the study population of students who did not complete or completed the nursing program by spring 2006.

The distribution of age, gender, race/ethnicity, financial, and academic variables in the study population is shown in Table 4.1. The mean age was 31.54 ($SD = 8.86$) with approximately 60% of the study population between the ages of 18 and 32, and ranged from 18 to 59 years of age. Approximately 86% of the population was female (182), and males (30) accounted for 14%. The race/ethnicity composition of the population was 65.6% White-Non Hispanic, 8% Black-Non Hispanic, 9.4% Hispanic, 6.6% Asian, and 10% Other. Approximately 36% of the population was not awarded any form of financial assistance and 64% was awarded some form of financial aid alone or in combination. As shown in Table 4.1, the mean GPA for Human Anatomy and Physiology I and II were 3.47 ($SD = .64$) and 3.23 ($SD = .67$), respectively, on a four-point scale. The mean GPA for the following five courses—Microbiology and Pathology; General Psychology; Life-span Growth and Development; Interpersonal Communication; and Composition and Rhetoric—were 3.26($SD = .71$), 3.49 ($SD = .63$), 3.47 ($SD = .68$), 3.62 ($SD = .52$), and 3.48 ($SD = .67$), respectively. The mean scores for math and reading comprehension on

the HESI Nurse Pre-Entrance Exam were 93.88 ($SD = 6.09$) and 84.40 ($SD = 7.58$), respectively. Additionally, the mean cumulative prerequisite GPA for the total population was 3.49 ($SD = .40$).

Table 4.1
Demographic, Financial, and Academic Characteristics of Study Population

Variable	Mean or Percent	Standard Deviation
Age (years)	31.54	8.86
Gender		
Female	85.9%	
Male	14.1%	
Race/Ethnicity		
White-Non Hispanic	65.6%	
Black- Non Hispanic	8%	
Hispanic	9.4%	
Asian	6.6%	
Other	10%	
Financial Aid		
Yes	64%	
No	36%	
HESI Score		
Math	93.88	6.09
Reading	84.40	7.58
Human A&P I	3.47	.64
Human A&P II	3.23	.67
Microbiology	3.26	.71
General Psychology	3.49	.63
Life-span Growth & Development	3.47	.68
Interpersonal Communication	3.62	.52
Composition & Rhetoric	3.48	.67
Cumulative prerequisite GPA	3.49	.40

Completers

Of the 212 students in the study, 134 students completed the nursing program, while 78 students did not complete it. As shown in Table 4.2, the average age for the 134 completer students was 31.33 years ($SD = 8.28$), and approximately 63% male and 37% female. The race/ethnicity composition was 69.8% White-Non Hispanic, 41.2% Black-Non Hispanic, 55% Hispanic, 35.7% Asian, and 63.6% Other. Approximately 68% were not awarded any form of financial assistance and 32% were awarded some form of financial aid alone or in combination. The mean GPAs for Human Anatomy and Physiology I and II were 3.63 ($SD = .56$) and 3.41 ($SD = .60$), respectively. Furthermore, the mean GPA for the additional five courses—Microbiology and Pathology; General Psychology; Life-span Growth and Development; Interpersonal Communication; and Composition and Rhetoric—were 3.45 ($SD = .63$), 3.59 ($SD = .58$), 3.58 ($SD = .58$), 3.70 ($SD = .52$), and 3.60 ($SD = .55$), respectively. The mean scores for math and reading comprehension scores on the HESI Nurse Pre-Entrance Exam were 94.97 ($SD = 5.88$) and 86.25 ($SD = 6.29$), respectively. Additionally, the mean cumulative prerequisite GPA was 3.62 ($SD = .33$) (see Table 4.2).

Non-Completers

As mentioned above, the non-completer group consisted of 78 students. The mean age was 31.90 yrs ($SD = 9.83$); approximately 37% were female, and 63% were male. The race/ethnicity composition was 30.2% White-Non Hispanic, 58.8% Black-Non Hispanic, 45% Hispanic, 64.3% Asian, and 36.4% Other. Approximately 32% were not awarded any form of financial assistance and 68% were awarded some form of financial

aid alone or in combination. The mean GPAs for Human Anatomy and Physiology I and II were 3.20 ($SD = .68$) and 2.92 ($SD = .68$), respectively. Furthermore, the mean GPA for the additional five courses—Microbiology and Pathology; General Psychology; Life-span Growth and Development; Interpersonal Communication; and Composition and Rhetoric—were 2.95 ($SD = .72$), 3.31 ($SD = .69$), 3.27 ($SD = .80$), 3.47 ($SD = .50$), and 3.27 ($SD = .70$), respectively. The mean scores for math and reading comprehension scores on the HESI Nurse Pre-Entrance Exam were 92.00 ($SD = 6.03$) and 81.22 ($SD = 8.55$), respectively. The mean cumulative prerequisite GPA was 3.26 ($SD = .41$) (see Table 4.2).

Research Question One

Demographic Variables

The first research question concerned whether differences existed in demographic characteristics (including age, race/ethnicity, and gender variables) among nursing students who successfully completed the ADN nursing program and those students who did not complete the program. For the age variable, it was hypothesized that a significant difference would exist between age and completion of the nursing program. The hypothesis was tested by an independent samples t -test comparing the age of the students who completed the ADN nursing program with the age of those students who did not complete the program. Comparison of ages for students who successfully completed the ADN nursing program ($M = 31.33$, $SD = 8.28$) and students who did not complete the program ($M = 31.90$, $SD = 9.83$) revealed no significant differences between the groups $t(210) = .45$, $p = .653$, $d = .06$ (see Table 4.3); this was a small, almost nonexistent, effect.

Table 4.2
Descriptive Statistics for Variables Used in Analyses by Completion of Program

Variable	Mean or Percent (<i>SD</i>)	
	Completer (<i>N</i> =134)	Non-Completer (<i>N</i> =78)
Age (years)	31.54 (8.28)	31.90 (9.83)
Gender		
Female	63.2%	36.8%
Male	63.3%	36.7%
Race/Ethnicity		
White-Non Hispanic	69.8%	30.2%
Black- Non Hispanic	41.2%	58.8%
Hispanic	55.0%	45.0%
Asian	35.7%	64.3%
Other	63.6%	36.4%
Financial Aid		
Yes	68.1%	31.9%
No	54.5%	45.5%
HESI Score		
Math	94.97 (5.88)	92.00 (6.03)
Reading	86.25 (6.29)	81.22 (8.55)
Human A&P I	3.63 (.56)	3.20 (.68)
Human A&P II	3.41 (.60)	2.92 (.68)
Microbiology	3.45 (.63)	2.95 (.72)
General Psychology	3.59 (.58)	3.31 (.69)
Life-span Growth & Development	3.58 (.58)	3.27 (.80)
Interpersonal Communication	3.70 (.52)	3.47 (.50)
Composition & Rhetoric	3.60 (.55)	3.27 (.70)
Cumulative prerequisite GPA	3.62 (.33)	3.26 (.41)

Furthermore, the 95% confidence interval for the difference between means is (-3.06, 1.92); because 0 falls within this rather large confidence interval, it is reasonable to believe that no difference exists between these means. Based on the hypothesis test and confidence interval, this study does not provide evidence supporting the hypothesis that completers and non-completers, on average, have different ages. Actually, there is only a very small difference between the mean ages for completers and non-completers—just 0.57 years. (The chosen level of significance [alpha level] for rejection was .05; and the region of rejection was two-tailed and maintained for all subsequent analyses.)

Table 4.3
Comparison of Completers and Non-Completers on Age

Variable	N	M	SD	95% Confidence Interval	
				Lower	Upper
Completer	134	31.33	8.28	-3.06	1.92
Non-Completer	78	31.90	9.83		

$t(210) = .45, p = .653$

It was hypothesized that there will be significant difference in successful completion of the ADN nursing program between different race/ethnicity group of students. A Chi-square test of independence was performed to examine the relationship between these variables. The research hypothesis was supported by the results of the Chi-square test. The Chi-square test showed significant differences between race/ethnicity and completion of nursing program, $X^2(4, N = 212) = 11.26, p = .024, V = .23$ (see Table

4.4). Based on the Cramer's V , the effect size for this analysis was large. Students whose racial/ethnic background was White-Non Hispanic were more likely to successfully complete the nursing program than were students who were of a different race/ethnicity.

Table 4.4
Comparison of Completers and Non-Completers on Race/Ethnicity

Race/Ethnicity	Completer		Non-Completer	
	Count	Percent	Count	Percent
White-Non Hispanic	97	69.8	42	30.2
Black-Non Hispanic	7	41.2	10	58.8
Hispanic	11	55.0	9	45.0
Asian	5	35.7	9	64.3
Other	14	63.6	8	36.4

$X^2 (4, N = 212) = 11.26, p = .024$

The association between gender and completion of nursing program was also examined using the chi-square test of independence procedure. It was also hypothesized, too, that there will be significant difference in successful completion the ADN nursing program between male and female students. This hypothesis was not supported. The Chi-square test showed no significant difference between these variables, $X^2 (1, N = 212) = 0.00, p = .99, V = .001$; this was a very small, almost nonexistent effect. Males and

females did not differ in completion of the nursing program: approximately 63% of males and females completed the program.

Table 4.5
Comparison of Completers and Non-Completers on Gender

Gender	Completer		Non-Completer	
	Count	Percent	Count	Percent
Male	19	63.3	11	36.7
Female	115	63.2	67	36.8

$X^2 (1, N = 212) = 0.00, p = .99$

Research Question Two

HESI Entrance Exam

The second research question concerned an examination of the relationship between Nurse Pre-Entrance Exam (HESI - reading comprehension scores and math scores) and completion of the nursing program. It was hypothesized that there would be significant differences between the reading comprehension scores and math scores on the Nurse Pre-Entrance Exam (HESI) for nursing students who successfully completed the ADN nursing program and those students who did not complete the program. The independent variable was completion of nursing program, with two categories: completer and non-completer. The dependent variables were the math scores and reading comprehension scores on the HESI. The hypothesis was tested by an independent samples *t*-test comparing the math scores of the students who completed the ADN

nursing program with the scores of those students who did not complete the program.

This hypothesis was supported for the math score. The group of students who successfully completed the ADN nursing program had higher math scores ($M = 94.97$, $SD = 5.88$) than students who did not complete the program ($M = 92.00$, $SD = 6.03$). This difference was significant, $t(210) = 3.51$, $p = .001$, $d = .50$ (see Table 4.6). Based on the *Cohen's d*, this was a medium effect.

The hypothesis was also supported for the reading comprehension scores. The Welch's *t*-test was performed to compare the reading comprehension scores for students who completed the ADN nursing program with the scores of students who did not complete the program. This test was utilized because the Levene's test was significant ($p < .05$)—that is, the variances were not homogeneous. Results indicated that students who successfully completed the ADN nursing program had higher reading comprehension scores ($M = 86.25$, $SD = 6.29$) than students who did not complete the program ($M = 81.22$, $SD = 8.55$), $t(125.94) = 4.53$, $p < .001$, $d = .67$ (see Table 4.6); this was a medium to large effect.

Table 4.6
Results of the t-test for Academic Variables (N= 212)

Variable	Mean (SD)		P-value	95% CI
	Completer (N=134)	Non-Completer (N=78)		
Math Score	94.97 (5.88)	92.00 (6.03)	$p = .001$	(1.30 – 4.63)
Reading Score	86.25 (6.29)	81.22 (8.55)	$p < .001$	(2.83 – 7.23)
Human A&P I	3.63 (.56)	3.20 (.68)	$p < .001$	(.26 - .61)
Human A&P II	3.41 (.60)	2.92 (.68)	$p < .001$	(.31 - .66)

Microbiology	3.45 (.63)	2.95 (.72)	$p < .001$	(.31 - .69)
General Psychology	3.59 (.58)	3.31 (.69)	$p = .002$	(.11 - .46)
Life-span Growth & Development	3.58 (.58)	3.27 (.80)	$p = .003$	(.11 - .52)
Interpersonal Communication	3.70 (.52)	3.47 (.50)	$p = .001$	(.10 - .38)
Composition & Rhetoric	3.60 (.55)	3.27 (.70)	$p < .001$	(.15 - .52)
Cumulative prerequisite GPA	3.62 (.33)	3.26 (.41)	$p < .001$	(.25 - .43)

Research Question Three

Cumulative Pre-requisite Grade Point Average

To examine the hypothesis that students who successfully completed the ADN nursing program and those students who did not complete the program, on average, would have different cumulative pre-requisite grade point averages, an independent-samples t -test was conducted. The independent variable was completion of nursing program, with two categories: completer and non-completer. The dependent variable was the cumulative pre-requisite grade point average. There was a statistically significant effect of completion of nursing program [$t(136.12) = 6.56, p < .001, d = .95$]; this was a large, exactly real effect. Moreover, the 95% confidence interval for the difference between means was (0.25, 0.43); because 0 did not fall within this confidence interval, it is plausible that a significant difference existed between these means. Based on the hypothesis test and confidence interval, this study provides evidence that students who

successfully completed the ADN nursing program ($M = 3.62$, $SD = .33$) and students who did not complete the program ($M = 3.26$, $SD = .41$), on average, had different cumulative pre-requisite grade point averages. In fact, there was a very large difference between the mean cumulative pre-requisite grade point average for completers and non-completers—approximately 0.36 points (see Table 4.6). The statistical differences were obtained using a t -test adjusted for differences in variance between the groups.

Research Question Four

Biophysical Science, Psychology, and English Course GPAs

To examine the hypothesis that students who successfully completed the ADN nursing program and those students who did not complete the program, on average, had different biophysical science, psychology, and English course GPAs, a series of independent-samples t -tests were conducted. The independent variable was completion of the nursing program, with two categories: completer and non-completer. The dependent variables were the GPAs for biophysical science; psychology; and English courses.

With regard to the three biophysical science GPAs, students who successfully completed the ADN nursing program had significantly higher Human Anatomy and Physiology I (Biology 2401) GPAs ($M = 3.63$, $SD = .56$) than students who did not complete the program ($M = 3.20$, $SD = .68$), $t(210) = 5.02$, $p < .001$, $d = .69$; this was a medium to large effect. Students who successfully completed the ADN nursing program had statistically greater Human Anatomy and Physiology II (Biology 2402) GPAs ($M = 3.41$, $SD = .60$) than students who did not complete the program ($M = 2.92$, $SD = .68$), $t(210) = 5.41$, $p < .001$, $d = .76$; this was a medium to large effect. In addition, comparison

of Microbiology and Pathology (Biology 2420) GPA for students who successfully completed the ADN nursing program ($M = 3.45$, $SD = .63$) and students who did not complete the program ($M = 2.95$, $SD = .72$) revealed significant differences between the groups, $t(210) = 5.27$, $p < .001$, $d = .74$; this was a medium to large effect. Based on the hypothesis tests and confidence intervals (see Table 4.6), this study provided evidence that students who successfully completed the ADN nursing program and students who did not complete the program, on average, had different GPAs for Biology 2401; Biology 2402; and Biology 2420.

Significant differences between the groups were demonstrated for the two psychology GPAs. In the group of 134 completer students, the General Psychology course (Psychology 2301) GPA ($M = 3.59$, $SD = .58$) was statistically greater than that for the non-completer group ($M = 3.31$, $SD = .69$), $t(210) = 3.19$, $p = .002$, $d = .44$; this was a medium effect. Group mean GPA for Life-span Growth and Development (Psychology 2314) was 3.58 ($SD = .58$) for completers and 3.27 ($SD = .80$) for non-completers, which was significantly different when tested with the t -test adjusted for differences in variances between the groups, $t(124.37) = 3.02$, $p = .003$, $d = .44$; this was a medium effect. The study results, based on the hypothesis tests and confidence intervals (see Table 4.6), provided evidence that students who successfully completed the ADN nursing program and students who did not complete the program, on average, had different GPAs for Psychology 2301 and Psychology 2314.

In regard to English course GPAs, the 134 students in the completer group ($M = 3.60$, $SD = .55$) and the 78 students in the non-completer group ($M = 3.27$, $SD = .70$)

demonstrated a significant difference in the Composition and Rhetoric course (English 1301), $t(132.66) = 3.64, p < .001, d = .52$; this was a medium effect. The completer group ($M = 3.70, SD = .52$) also had a significant higher GPA in Interpersonal Communication (English 1318) than the non-completer group ($M = 3.47, SD = .50$), $t(165.05) = 3.24, p = .001, d = .45$; this was a medium effect. The statistical differences were obtained using a t -test adjusted for differences in variance between the groups. Based on the hypothesis tests and confidence intervals (see Table 4.6), this study provided evidence that students who successfully completed the nursing program and students who did not complete the program, on average, had different GPAs for English 1301 and English 1318.

Research Question Five

Financial Aid

In answering the fifth research question, a Chi-square test of independence was performed to examine the relationship between financial aid and completion of the nursing program. The independent variable was financial aid, with two categories: yes for receiving financial aid and no for not receiving financial aid. The dependent variable was completion of the nursing program, with two categories: completer and non-completer. The result of the analysis supported the related research hypothesis that there will be significant difference in successful program completion between those students who received financial aid and those students who did not received any form of financial aid. As shown in Table 4.7, a Chi-square test of independence showed significant differences between financial aid and completion of the nursing program, $X^2(1, N = 212) = 3.90, p = .048, V = .14$. Based on the Cramer's V , the effect size for this analysis was a medium

effect. The proportion of students who received some form of financial aid and completed the nursing program was greater than the proportion who received no financial assistance. Therefore, students who received some form of financial aid were more likely to successfully complete the nursing program than were students who did not receive any financial aid.

Table 4.7
Comparison of Completers and Non-Completers on Financial Aid

Financial Aid	Completer		Non-Completer	
	Count	Percent	Count	Percent
Receive Financial Aid	92	68.1	43	31.9
No Financial Aid	42	54.5	35	45.5

$X^2 (1, N = 212) = 3.90, p = 048$

Research Question Six

To examine the hypothesis that demographic characteristics; cumulative pre-requisite grade point average; HESI scores; biophysical science, psychology, and English course GPAs; and financial aid would be significant predictors of successful completion of the ADN program, a stepwise logistic regression modeling procedure was used, allowing for twelve potential variables expected to affect student retention. According to results from preliminary analyses using Chi-square tests and *t*-tests, these independent variables appeared to be statistically associated with completion of the nursing program. The independent variables included race/ethnicity, financial aid, cumulative pre-requisite grade point average, HESI math scores, HESI reading comprehension score, Biology

2401, Biology 2402, Biology 2420, Psychology 2301, Psychology 2314, English 1301, and English 1318. To determine which of the variables contributed to explaining the variation in the completion of the ADN nursing program, a backward elimination procedure was used, whereby variables that were not significant were eliminated one by one and the model re-evaluated at every stage to determine the significance of each of the remaining variables. For all regression models, $P = 0.10$ was used as a variable to enter or leave the model. Appendix B shows the final set of variables in the model.

As shown in Table 4.8, stepwise logistic regression revealed that cumulative pre-requisite grade point average (odds ratio [OR], 8.29; 95% confidence interval [CI], 3.19 to 21.53), Biology 2402 (OR, 1.90; 95% CI, 1.07 to 3.40), and HESI reading comprehension score (OR, 1.09; 95% CI, 1.04 to 1.15) were the only significant predictors of successful completion of the ADN program at the .05 significance level (see Appendix B). Cumulative pre-requisite grade point average was the single most important predictor, followed by Biology 2402; the HESI reading comprehension score was the least significant. These three variables as factors in program completion made correct predictions in approximately 78% of the analyzed cases. The hypothesis that demographic characteristics; cumulative pre-requisite grade point average; HESI scores; biophysical science, psychology, and English course GPAs; and financial aid would be significant predictors of the successful completion of the requirements of the ADN nursing program was supported for only three variables: cumulative pre-requisite grade point average, HESI reading comprehension score, and Biology 2402.

Table 4.8
Results of the Stepwise Logistic Regression for Completion of Program (N =212)

Variable	<i>B</i>	<i>SE B</i>	OR (95% CI)
Human A&P II (Biology 2402)	.644	.296	1.90 (1.07 - 3.40)
HESI reading comprehension score	.091	.025	1.09 (1.04 - 1.15)
Cumulative prerequisite GPA	2.12	.487	8.29 (3.19 - 21.53)
Constant	-18.10	2.90	

Chapter 5

SUMMARY, DISCUSSION, CONCLUSIONS, and RECOMMENDATIONS

The purpose of this study was to identify the predictors of persistence among students who successfully completed the requirements of the Associate Degree Nursing programs in the Lone Star Community College System by studying the relationship between student persistence and certain demographic, financial, and academic variables. The study examined data from five colleges in the Lone Star Community College System. Each college offers an ADN program, and admissions requirements and procedures are almost similar across programs.

Summary

Six research questions were addressed in this study: (1) To what extent do demographic characteristics differentiate between nursing students who successfully completed the ADN nursing program and those students who did not complete the program? (2) To what extent are there differences in reading comprehension scores and math scores of the Nurse Pre-Entrance Exam (HESI) among nursing students who successfully completed the ADN nursing program and those students who did not complete the program? (3) To what extent are there differences in cumulative pre-requisite course grade point average among nursing students who successfully completed the ADN nursing program and those students who did not complete the program? (4) To what extent are there differences in biophysical science, psychology, and English course GPAs among nursing students who successfully completed the ADN nursing program and those students who did not complete the program? (5) To what extent does financial

differentiate between nursing students who successfully completed the ADN nursing program and those students who did not complete the program? and (6) What, if any, of the demographic characteristics, cumulative pre-requisite course grade point average, HESI scores, biophysical science, psychology, and English course GPAs, and financial aid predict the successful completion of the requirements of the ADN nursing program?

The six associated research hypotheses tested in this study were: (1) There will be significant difference in successful completion of the ADN nursing program between the demographic characteristics of nursing students; (2) There will be significant differences between the reading comprehension scores and math scores of the Nurse Pre-Entrance Exam (HESI) of nursing students who successfully completed the ADN nursing program and those students who did not complete the program; (3) There will be significant differences between the cumulative pre-requisite grade point average of nursing students who successfully completed the ADN nursing program and those students who did not complete the program; (4) There will be significant differences between the biophysical science, psychology, and English course GPAs of nursing students who successfully completed the ADN nursing program and those students who did not complete the program; (5) There will be significant difference in successful program completion between those students who received financial aid and those students who did not received any form of financial aid; and (6) Demographic characteristics, pre-requisite grade point average, HESI scores, biophysical science, psychology, and English course GPAs, and financial aid will be significant predictors of successful completion of the requirements of the ADN nursing program.

The final sample included all 212 students in the cohort who entered in the spring and fall of 2004 to graduate in spring 2006. Of the 212 students in the study, 134 students completed the nursing program, while 78 students did not. The study used an analytical cross-sectional study design. A data collection sheet was designed to facilitate a systematic collection of data for each student in the study. Data were gathered, abstracted or computed from several sources at one point in time during the summer of 2008.

Demographic variables consisted of age (measured as a continuous variable), race/ethnicity (White non-Hispanic, Black non-Hispanic, Hispanic, Asian-Pacific, other non-Hispanic), and gender (either male or female). Academic variables included cumulative grade point average (GPA) on pre-requisite courses, biophysical science, psychology, and English course GPAs, and reading comprehension scores and math scores on the Nurse Pre-Entrance Exam (HESI). The financial factor was measured using one variable—financial aid—and was further classified into two categories (*yes* or *no* for receiving financial aid).

Descriptive statistics were calculated for certain demographic, financial, and academic variables. In addition, a number of statistical methods and analyses were utilized for analysis of quantitative data. A Chi-square test of independence was used to test the association between categorical variables. The *t*-test was used for continuous data to compare two group means. Logistic regression was used to examine whether various study variables were independently associated with dichotomized program completion as the dependent variable.

The examination of the study results indicates that certain demographic, financial, and academic variables were statistically related to completion of the nursing program based on data analyses using the Chi-square test of independence and/or *t*-tests. The demographic variable of race/ethnicity, and academic variables such as the cumulative pre-requisite grade point average, GPAs for Biology 2401, Biology 2402, Biology 2420, Psychology 2301, Psychology 2314, English 1301, and English 1318, were statistically related to completion of the nursing program. In addition, a relationship was found between the successful completion of the ADN program, and reading comprehension scores and math scores on the HESI Nurse Pre-Entrance Exam. Financial aid also demonstrated a relationship with completion of the nursing program.

Conversely, the examination of the study results also indicated that there was no relationship between successfully completing the ADN program and demographic variables of age and gender. These results were also based on the Chi-square test of independence and/or *t*-tests. In addition, when the variables that were statistically related to completion of the nursing program based on data analyses using the Chi-square test of independence and/or *t*-tests, were analyzed using multiple regression analysis, only three variables statistically related to completion of the nursing program were found to be significant predictors of student persistence in the nursing program. These include cumulative pre-requisite grade point average, Biology 2402, and reading comprehension scores on the HESI Nurse Pre-Entrance Exam.

Discussion

Study results supported the hypothetical model guided by the Bean and Metzner (1985) model of nontraditional undergraduate student attrition as an accurate explanation of student persistence in the ADN program. Race/ethnicity, financial aid, cumulative pre-requisite grade point average combined with HESI math and reading comprehension scores, English, Psychology, and Biology grades were shown to account for significant prediction in the successful completion of the ADN program in the study population. Therefore, the reasons for nursing students' successful completion of their program focused mainly on academic and financial preparation to persist.

Age, Race/Ethnicity, and Gender

In comparing the ages of students who successfully completed the nursing program to the ages of students who did not complete the program, the preliminary analysis revealed no significant differences between the groups. The effect of completion of the nursing program was a small, almost nonexistent effect. The calculated mean age for the students who did not complete the program was only slightly higher than that for students who completed the program. The finding here appears to be logical, since many more non-traditional students (i.e., students much older than traditional students who just graduated from high school) are entering these nursing programs. The nursing programs are attracting much older students, who themselves are already in the health profession and are seeking a change in the field.

Similar to the preliminary analysis, the age variable was not significant in the logistic regression analysis. These findings were not consistent with the findings in the

existing literature. Campbell and Dickson (1996), in a meta-analysis of 47 nursing education studies that looked at predictors of retention and graduation, found that age was one of the greatest demographic predictors of retention and graduation. Others also found a relationship between student age and program completion. For example, Manifold and Rambur (2001) examined predictors of attrition among American Indian nursing students. They analyzed data for 150 students in a tribal college who had enrolled in an associate degree licensed practical nurse program, and found a relationship between age and retention. Results revealed that the students who completed the nursing program were older compared to those who did not complete the program. Murtaugh et al. (1999), in a study of the potential influences of student retention, found a statistically significant association between age and retention, indicating that younger students were more likely to persist and complete their program.

The results of the Chi-square test of independence found a significant difference between race/ethnicity and completion of the nursing program. The proportion of students of White-Non Hispanic origin who graduated from the nursing program was larger than the proportion of students who were Black, Hispanic, Asian, or from other racial/ethnic groups, suggesting that students of White-Non Hispanic origin were more likely than students of a different race/ethnicity to successfully complete the nursing program. This appears to be logical, since the college system is located in communities in which the population is predominantly White. Furthermore, the nursing programs have a greater enrollment of White students compared to other ethnic groups. In addition, other racial/ethnic groups, such as Blacks, may feel neglected and not be receiving sufficient

assistance from the faculty and the institution, thus leading to withdrawal or dropout from the program. However, when adjusted for other variables using logistic regression, the association between race/ethnicity and program completion was no longer significant. These findings are inconsistent with those of Byrd et al. (1999), who conducted a retrospective study of 285 nursing students to examine demographic variables and admission and progression criteria predictive of students' completion of a baccalaureate nursing program. Using logistic regression to develop several models, Byrd et al. found that ethnicity, among other variables, as a cumulative effect was 77% predictive of the successful completion of a baccalaureate nursing program. The results suggest that White ethnicity was a predictor of graduation in four of the study models. The authors concluded that the results for ethnicity should be interpreted with caution because ethnicity was unevenly distributed. Although the reasons for the findings are unclear, one possible explanation is that other variables have greater predictive power than race/ethnicity.

The results of the preliminary analysis using the Chi-square test of independence and the adjusted logistic regression model revealed no significant association between gender and completion of the nursing program. Males and females did not differ in program completion: the proportion of male students who successfully completed the nursing program was similar to the proportion of female students who graduated from the program. This lack of association is contrary to past reports which suggest that either males or females are more likely to succeed. Horn and Carroll (1996), after controlling for a variety of variables, found that females were more likely than males to persist.

However, gender was associated with attrition through other environmental factors. Alternatively, Higgins (2005), in a study conducted in a community college setting in North Texas, concluded that the demographic characteristics of gender did not predict student risk for failure and should not be considered as predictors of the successful completion of the two-year nursing program.

Academics

Among the several academic variables associated with completion of the nursing program, significant associations were found between the entrance HESI test components for reading comprehension, math, academic GPAs in Biology 2401, Biology 2402, Biology 2420, Psychology 2301, Psychology 2314, English 1301, and English 1318, cumulative pre-requisite grade point average, and successful completion of the nursing program. The group of students who successfully completed the nursing program had higher scores on both components of the HESI test, higher academic GPAs in all courses, and higher cumulative pre-requisite grade point averages than students who did not complete the program. These differences ranged from medium to large. The distribution of math and reading scores, course grades, and cumulative pre-requisite GPAs for students who completed the program and those students who did not showed no considerable overlap, meaning that many students who completed the nursing program did better than many students who did not complete the program. This was particularly evident in the cumulative GPAs, which had the largest effect, followed by Biology 2402, Biology 2420, Biology 2401, and reading comprehension scores, respectively. However, when adjusted for the other variables using logistic regression, several associations were

no longer significant. Biology 2401, Biology 2420, Psychology 2301, Psychology 2314, English 1301, English 1318, and HESI math score were not significant predictors of completion of the nursing program in the equation.

One key finding from this study is the consistently significant association between the completion of the nursing program and reading comprehension score, Biology 2402, and cumulative pre-requisite grade point average. Students who completed the nursing program had higher reading comprehension scores, Biology 2402 grades, and cumulative pre-requisite grade point averages than students who did not complete the program. For the reading comprehension scores, the results were congruent with those of Gallagher, Bomba, and Crane (2001) and Higgins (2005). Gallagher and colleagues examined whether the RNEE, an academic achievement admissions exam assessing verbal ability, numerical ability, life science, physical science, and reading comprehension, was a better predictor of academic success among 121 students in an ADN program. Using logistic regression analyses, results revealed that the reading comprehension section was statistically significant and that a score of 32 was predictive of a 50% chance of student success in the nursing program. The authors also found that a higher reading score was predictive of a 50% chance of student achievement of a grade of “B” or better in the program. They concluded that the RNEE is a good overall predictor of the successful completion of courses in the nursing program and completion of the program itself. Higgins (2005) used a case-appropriate correlation coefficient to determine whether a statistically significant difference existed between components of the preadmission test and successful completion of the nursing program. The author found that the reading

component of the preadmission exam was related to successful completion of the nursing program. The correlation coefficient was statistically significant for reading and the completion of the nursing program. The NET, an admissions diagnostic instrument designed to assess both academic (essential math skills and reading comprehension) and social skills, was used to examine whether an association existed between test component scores and academic success in the first year of nursing school. Abdur-Rahman et al. (1994) found a significant association between NET reading scores and first-semester nursing grades.

The association between completion of the nursing program and the academic variables of Biology 2402 and cumulative pre-requisite grade point average, which were statistically significant in both the preliminary analyses and the logistic regression, has been widely reported. Campbell and Dickson (1996), in an integrative review and meta-analysis of 47 nursing research studies, assessed nursing education research on predictors of retention and graduation. The authors noted that GPAs for nursing, science, and pre-nursing courses, and college cumulative GPA were the most frequently studied quantitative variables. The results of the integrative review indicated that nursing and science courses GPAs were significantly correlated to retention and the greatest cognitive predictors of student success. Similarly, Dean and Fischer (1992) studied the relationship between prior academic performance and successful completion of a nursing program. Using multiple regression analysis, the authors found that a GPA of 2.6 or higher on general education science courses and a final grade of at least a 'B' on the pre-requisite courses of Human Anatomy and Physiology were statistically significant pre-admission

predictors of nursing program success. Sandiford and Jackson (2003) studied the relationship between several academic variables and attrition in an associate degree nursing program. Using a discriminant analysis procedure, the authors found a significant difference for pre-semester grade point average. The findings revealed that students with a pre-semester grade point average of 2.5 or higher experienced lower attrition than students with a grade point average between 2.00 and 2.49. Byrd et al. (1999) found that grades for biological sciences courses were predictors of success. The authors concluded that a higher cumulative pre-nursing GPA was a predictor of graduation for students.

Financial Aid

The result of the Chi-square test of independence found a marginally significant difference between financial aid and completion of the nursing program. This finding suggests that students who received some form of financial aid were more likely to successfully complete the nursing program than were students who did not receive any financial assistance. This finding seems to be logical, since students who receive much needed financial assistance and support may tend to spend more time and effort on academic activities, thus positively impacting their academic performance. However, the result of the logistic regression analysis found no significant difference between financial aid and completion of the nursing program. This finding was surprising because it was inconsistent with other findings in the related literature. For example, Cabrera et al. (1993), in a longitudinal study, examined the role of finances on college persistence. Using linear structural equations for categorical data, the authors tested a quantitative model that incorporated constructs from the financial aid literature as well as the

persistence literature and found that financial aid is an important predictor of persistence in college. Through a series of logistic regression analyses, and after controlling for several confounders, St. John et al. (1991) found that for each of the year-to-year transitional periods, student financial aid had a positive impact on persistence. The findings also revealed that grants and student work program as well as loans were all predictors of persistence and successful completion of a degree. Similarly, Blanchfield (1971, 1972), investigating several potential variables predictive of college attrition based on case study and an economic analysis, found that, through discriminant function analysis, college tuition partially financed by grants was a significant predictor among students of who would persist and who would not.

Conclusions

Several conclusions can be drawn from this study. First and foremost, the attrition rate for the study was significantly high, and was a major concern for nursing education. A significantly high attrition rate negatively affects the supply of RNs needed in an already tight employment marketplace. Second, the factors predictive of success in nursing school are somewhat unclear and not easily identified. There is no absolute set of variables that determine whether a student graduates from a program or not. However, in this study, academic variables seem to be the most predictive characteristics of successful completion of the ADN program. There were significant differences in grades of biophysical science, psychology, and English courses among nursing students who successfully completed the ADN nursing program and those students who did not complete the program. Cumulative prerequisite grade point average seems to be most

important predictor of all variables. Nurse Entrance Examination also seems to be predictive of successful completion of nursing program. There were significant differences in both the math and reading component of the HESI exam.

Furthermore, non-academic factors such as race/ethnicity and financial aid tended to explain differences in the successful completion of the ADN program. Although marginal, a difference was observed in financial aid among nursing students who successfully completed the ADN nursing program and those students who did not complete the program. Regarding race/ethnicity, White non-Hispanic students tended to be more successful in graduation from the program than other racial groups.

Alternatively, demographic factors seem to play less of a role in the differences observed in the completion of the ADN program. There were no difference observed in characteristics of age and gender among nursing students who successfully completed the ADN nursing program and those students who did not complete the program. The average age of those students who graduated from the program was similar to those students who did not complete the program. Similarly, male students did not differ from female students in completion of the nursing program.

The entire population of students who had enrolled in the two-year ADN programs offered by the five colleges in the college system in 2004 was utilized in the study. Students enrolled at each college within the system mostly live in the city in which the college is situated and surrounding small towns in adjoining counties. Additionally, not only are ADN programs similar across the colleges that make up the Lone Star College System, but are also similar across the 37 community colleges and junior

colleges in Texas that offer ADN programs. The demographic make-up of the counties that are served by these institutions is almost similar. It can therefore be considered representative of both the student population and the ADN program in Texas.

Furthermore, the findings may be generalized to nursing students in consequent cohorts within Lone Star College System as well as other community colleges that offer the ADN program.

Recommendations for Practice

This study provided important institutional information to nursing program administrators and faculty that may aid them in developing a better understanding of the attrition problem within the culture of their institution. Based on the study results, administrators and faculty should work together to design and implement an institution-specific comprehensive retention plan with suitable interventions. One initiative might seek to conduct semesterly assessment of the nursing programs to establish how well the programs are doing and if goals and objectives are been met. This evaluation could include focus groups and surveys that gather information from the students' perspective. In addition, exist interviews would seem to offer a great deal of information on students' persistence behaviors and factors that contribute to withdrawal or dropout. Attrition rate should also be monitored within the program and establish institutional and program benchmarks.

Although, students who received financial aid and those who did not received any assistance overlap in successfully completing the nursing program, completing the nursing program appears to be financial aid specific. For students who are not eligible for

financial aid, one strategy might seek to establish a nursing program-specific scholarship fund to assist students who are classified as needy. Another strategy might seek to form collaborations and alignments with healthcare facilities within the community that will offer employment opportunities for students while they are in school.

The results from this study will also be very important in recruitment activities by enabling admissions to be less focused on specific student attributes as a single determinant of student persistence and more selective of individuals who are more compatible with the nursing profession, and therefore, more likely to succeed in the nursing program. One strategy might seek to identify those students who have some healthcare background, or have some personal experience in providing health support for a family member, including taking care of a sickly person and so on. Such a strategy might be achieved by conducting a pre-admission interview. In addition, the nursing program could create a public awareness program at preadmission or early in the curriculum that concerns with the rigors of the nursing program and the nurse profession itself. If students are presented with accurate information pertaining to the program and nursing profession, then they will be able to make informed decisions.

Strategies to increase the retention rate might also be aimed at minority and disadvantage students. Academic support programs such as remedial and enrichment programs could be implemented to assist these students academically where they fall short, and provide moral support, mentoring and counseling.

Recommendations for Future Research

There are numerous opportunities for further research in nursing research. The study results should lay the groundwork for additional studies designed to expand the knowledge base about predictive factors and consequences associated with the problem of attrition. The present study did not take into consideration several environmental factors such as family responsibilities, employment status, and social support. In addition, some potentially important academic variables such as academic advising, study habits, and study skills were excluded from the analysis. Further research could build on study findings by replicating this study as closely as possible in other nursing programs, and controlling for the many variables mentioned above. In addition to replicating the study with quantitative variables, the addition of qualitative variables would enhance the study findings, bringing into perspective and gaining an important understanding of the students' experiences.

This study could also be replicated using a longitudinal design to examine the long-term persistence outcomes. Although a study of this nature may be time-consuming and expensive, a study design in which data are collected at the beginning of a nursing program and following the students over time would yield more information on factors and trends in student persistence.

REFERENCES

- Abdur-Rahman, V., Femea, P. L., & Gaines, C. (1994). The nurse entrance test (NET): An early predictor of academic success. *The ABNF Journal*, 5(1), 10-14.
- Aday, L., & Cornelius, L. J. (2006). *Designing and conducting health surveys: A comprehensive guide* (3rd ed.). San Francisco: Jossey-Bass.
- Adib-Hajbaghery, M., & Dianati, M. (2005). Undergraduate nursing students' compatibility with the nursing profession. *BMC Medical Education*, 5, 25.
- American Association of Colleges of Nursing. (2002). *Nursing shortage fact sheet*. Retrieved October 1, 2005, from <http://www.aacn.nche.edu/Media/Backgrounders/shortagefacts.htm>.
- American Association of Colleges of Nursing. (2002). *Strategies to reverse the new nursing shortage*. Retrieved October 1, 2005, from <http://www.aacn.nche.edu/Publications/positions/tricshortage>.
- Astin, A.W. (1975). *Preventing students from dropping out*. San Francisco: Jossey-Bass.
- Astin, A.W., Korn, W., & Green, K. (1987). Retaining and satisfying students. *Educational Record*, 68(1), 36-42.
- Astin, A.W., Tsui, L., & Avalos, J. (1996). *Degree attainment at American colleges and universities: Effects of race, gender, and institutional type*. Washington, DC: American Council on Education.
- Barnes, J. D., & Keene, R. (1974). A comparison of the initial academic achievement of freshman award winners who work and those who do not work. *Journal of Student Financial Aid*, 4, 25-29.
- Bean, J.P., & Metzner, B.S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, 55, 485-540.
- Blanchfield, W. C. (1971). College drop out identification: A case study. *Journal of Experimental Education*, 40, 1-4.
- Blanchfield, W. C. (1972). College drop out identification: An economic analysis. *Journal of Human Resources*, 7, 540-544.

- Braithwaite, D.N. Elzueir, M., & Stark, S. (1994). Project 2000 student wastage: A case study. *Nurse Education Today*, *14*, 15-21.
- Byrd, G., Garza, C., & Nieswiadomy, R. (1999). Predictors of successful completion of a baccalaureate nursing program. *Nurse Educator*, *24*(6), 33-37.
- Cabrera, A. E, Nora, A., & Castaneda, M. A. (1993). College persistence: The testing of an integrated model. *Journal of Higher Education*, *64*(2), 123-139.
- Campbell, A. R., & Davis, S. M. (1996). Faculty commitment: Retaining minority nursing students in majority institutions. *Journal of Nursing Education*, *35*, 298-303.
- Campbell, A. R., & Dickson, C. J. (1996). Predicting student success: A 10-year review using integrative review and meta-analysis. *Journal of Professional Nursing*, *12*(1), 47-59.
- The Center for Student Success. (2002, June). *Associate Degree Nursing: Model prerequisites validation Study*. Retrieved April 20, 2008, from http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/c8/8b.pdf.
- Cleveland-Innes, M. (1994). Adult student drop-out at post-secondary institutions. *The Review of Higher Education*, *17*(4), 423-445.
- Daugherty, T. K., & Lane, E. J. (1999). A longitudinal study of academic and social predictors of college attrition. *Social Behavior and Personality*, *27*(4), 355-362.
- Davis, T.M. & Murrell, P.H. (1993). *Turning teaching into learning: The role of student responsibility in the collegiate experience* (ASHE-ERIC Higher Education Report No.8). Washington, DC: George Washington University.
- Dean, J. H. & Fischer, S. E. (1992). *Nursing predictors study: Phase one*. Technical Report, Office of Institutional Research, Saint Petersburg Junior College. ERIC Document Reproduction Service No.349 036.
- Farabaugh-Dorkins, C. (1991). Beginning to understand why older students drop out of college: A path analytic test of the Bean/Metzner model of nontraditional student attrition. *AIR Professional File*, *39*, 1-12.
- Gallagher, P., Bomba, C., & Crane, L. (2001). Using an admissions exam to predict student success in an ADN program. *Nurse Educator*, *26*(3), 132-135.

- Glossop, C. (2002). Student nurse attrition: Use of an exit-interview procedure to determine students' leaving reasons. *Nurse Education Today*, 22, 375-386.
- Health Resources and Services Administration. (2002). *Projected Supply, Demand, and Shortages of Registered Nurses: 2000-2020*. Washington, DC: U.S. Department of Health and Human Services.
- Higgins, B. (2005). Strategies for lowering attrition rates and raising NCLEX-RN® pass rates. *Journal of Nursing Education*, 44(12), 541-547.
- Jeffreys, M.R. (1998). Predicting nontraditional student retention and academic achievements. *Nurse Educator*, 23(1), 42-48.
- Jeffreys, M.R. (2004). *Nursing student retention: Understanding the process and making a difference*. New York: Spring Publishing Company.
- Jeffreys, M.R. (2007). Tracking students through program entry, progression, graduation, and licensure: Assessing undergraduate nursing student retention and success. *Nurse Education Today*, 27(5), 406-419.
- Johnson, G. M. (1994). Undergraduate student attrition: A comparison of the characteristics of students who withdraw and students who persist. *Alberta Journal of Educational Research*, 40, 337-353.
- Jordan, J. (1996). Rethinking race and attrition in nursing programs: A hermeneutic inquiry. *Journal of Professional Nursing*, 12, 382-390.
- Kevern, J., Ricketts, C., & Webb, C. (1999). Pre-registration diploma students: a quantitative study of entry characteristics and course outcomes. *Journal of Advanced Nursing*, 30(4), 785-795.
- Long, E.G. (1999). Attrition of Black nursing students. In S. Tucker-Allen & E.G. Long (Eds.), *Recruitment & retention of minority nursing students: Stories of success*. Lisle, IL: Tucker Publications.
- Manifold, C., & Rambur, B. (2001). Predictors of attrition in American Indian nursing students. *Journal of Nursing Education*, 40(6), 279-281.
- McGrath, M. M., & Braunstein, A. (1997). The prediction of freshmen attrition: An examination of the importance of certain demographic, academic, financial, and social factors. *College Student Journal*, 31(3), 396-408.

- Merrill, E.B. (1999). Culturally diverse students enrolled in nursing: Barriers influencing success. In S. Tucker-Allen & E.G. Long (Eds.), *Recruitment & retention of minority nursing students: Stories of success*. Lisle, IL: Tucker Publications.
- Munro, B.H. (1981). Dropouts from higher education: Path analysis of a national sample. *American Educational Research Journal*, 18(2), 133-141.
- Murtaugh, P. A., Burns, L. D., & Schuster, J. (1999). Predicting the retention of nursing students. *Research in Higher Education*, 40(3), 355-371.
- Nora, A., Carbrera, A., Hagedorn, L. S., & Pascarella, E. (1996). Differential impacts of academic and social experiences on college-related behavioral outcomes across different ethnic and gender groups at four-year institutions. *Research in Higher Education*, 37(4), 355-371.
- Pascarella, E.T. & Terenzini, P.T. (1983). Predicting voluntary freshman year persistence/withdrawal behavior in a residential university: A path analysis of Tinto's model. *Journal of Educational Psychology*, 75(2), 215-226.
- Peng, S., & Fetters, W. (1978). Variables involved in withdrawal during the first two years of college. *American Educational Journal*, 15, 361-372.
- Pitkethly, A., & Prosser, M. (2001). The first experience project: A model for university wide change. *Higher Education Research and Development*, 20, 185-198.
- The Psychological Corporation. (1996). *RNEE: Technical manual*. San Antonio: Author.
- Ryland, E., Riordan, R., & Brack, G. (1994). Selected characteristics of high risk students and their enrollment persistence. *Journal of College Student Development*, 35, 54-58.
- Sadler, J. (2003). Effectiveness of student admission essays in identifying attrition. *Nurse Education Today*, 23, 620-627.
- Sandiford, J.R., & Jackson, K.D. (2003). *Predictors of first semester attrition and their relation to retention of generic associate degree nursing students*. East Lansing, MI: National Center for Research on Teacher Learning. (ERIC Document Reproduction Service No. ED481947).
- Statewide Health Coordinating Council. (2005). *The case for health workforce planning in Texas*. Austin, TX: Texas Department of State Health Services.

- Stampen, J., & Cabrera, A. (1986). Exploring the effects of student aid on attrition. *Journal of Student Financial Aid, 16*, 28-40.
- St. John, E. P., Kirshstein, R. J., & Noell, J. (1991). The effects of student financial aid on persistence: A sequential analysis. *Review of Higher Education, 14*(3), 383-406.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125.
- United States Census Bureau. (n.d.). *Profiles of general demographic characteristics*. Retrieved April 20, 2008, from http://www2.census.gov/census_2000/datasets/demographic_profile/Texas/2kh48.pdf.
- Voorhees, R. (1985). Financial aid and persistence: Do federal campus-based aid programs make a difference? *Journal of Student Financial Aid, 15*, 21-30.

Appendix B

Stepwise Logistic Regression Output

Case Processing Summary

Unweighted Cases ^a		N	Percent
Selected Cases	Included in Analysis	212	100.0
	Missing Cases	0	.0
	Total	212	100.0
Unselected Cases		0	.0
Total		212	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non Completer	0
Completer	1

Categorical Variables Codings

		Frequency	Parameter coding			
			(1)	(2)	(3)	(4)
Race/Ethnicity	White-Non Hispanic	139	1.000	.000	.000	.000
	Black-Non Hispanic	17	.000	1.000	.000	.000
	Hispanic	20	.000	.000	1.000	.000
	Asian	14	.000	.000	.000	1.000
	Other	22	.000	.000	.000	.000
Financial Aid	No Financial Aid	77	.000			
	Financial Aid	135	1.000			

Block 0: Beginning Block

Classification Table^{a,b}

Observed			Predicted		
			Completion of Nurse Program		Percentage Correct
			Non Completer	Completer	
Step 0	Completion of Nurse Program	Non Completer Completer	0	78	.0
			0	134	100.0
	Overall Percentage				63.2

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	.541	.142	14.437	1	.000	1.718

Variables not in the Equation

	Score	df	Sig.
Step 0 Variables			
BIOL2402	25.949	1	.000
BIOL2420	24.742	1	.000
HESIREAD	21.784	1	.000
CUPREGPA	39.441	1	.000
FINAID(1)	3.901	1	.048
RACE	11.265	4	.024
RACE(1)	7.508	1	.006
RACE(2)	3.857	1	.050
RACE(3)	.640	1	.424
RACE(4)	4.872	1	.027
HESIMATH	11.749	1	.001
ENGL1301	14.166	1	.000
SPCH1318	9.950	1	.002
PSYC2314	10.358	1	.001
PSYC2301	9.774	1	.002
BIOL2401	22.747	1	.000
Overall Statistics	74.246	15	.000

Block 1: Method = Backward Stepwise (Wald)

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	87.464	15	.000
	Block	87.464	15	.000
	Model	87.464	15	.000
Step 2 ^a	Step	-.004	1	.951
	Block	87.460	14	.000
	Model	87.460	14	.000
Step 3 ^a	Step	-.430	1	.512
	Block	87.030	13	.000
	Model	87.030	13	.000
Step 4 ^a	Step	-.356	1	.551
	Block	86.674	12	.000
	Model	86.674	12	.000
Step 5 ^a	Step	-1.270	1	.260
	Block	85.404	11	.000
	Model	85.404	11	.000
Step 6 ^a	Step	-1.289	1	.256
	Block	84.115	10	.000
	Model	84.115	10	.000
Step 7 ^a	Step	-.975	1	.323
	Block	83.140	9	.000
	Model	83.140	9	.000
Step 8 ^a	Step	-1.537	1	.215
	Block	81.603	8	.000
	Model	81.603	8	.000
Step 9 ^a	Step	-7.106	4	.130
	Block	74.497	4	.000
	Model	74.497	4	.000

a. A negative Chi-squares value indicates that the Chi-squares value has decreased from the previous step.

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	191.461 ^a	.338	.462
2	191.465 ^a	.338	.462
3	191.895 ^a	.337	.460
4	192.251 ^a	.336	.459
5	193.521 ^b	.332	.453
6	194.810 ^b	.328	.448
7	195.785 ^b	.324	.443
8	197.322 ^b	.319	.437
9	204.428 ^b	.296	.405

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	7.942	8	.439
2	7.944	8	.439
3	8.053	8	.428
4	11.813	8	.160
5	7.007	8	.536
6	9.425	8	.308
7	11.857	8	.158
8	10.426	8	.236
9	14.525	8	.069

Contingency Table for Hosmer and Lemeshow Test

		Completion of Nurse Program = Non Completer		Completion of Nurse Program = Completer		Total
		Observed	Expected	Observed	Expected	
Step 1	1	20	19.313	1	1.687	21
	2	17	15.533	4	5.467	21

	3	12	13.013	9	7.987	21
	4	7	9.874	14	11.126	21
	5	8	7.451	13	13.549	21
	6	5	4.812	16	16.188	21
	7	2	3.511	19	17.489	21
	8	5	2.308	16	18.692	21
	9	2	1.473	19	19.527	21
	10	0	.713	23	22.287	23
Step 2	1	20	19.315	1	1.685	21
	2	17	15.526	4	5.474	21
	3	12	13.030	9	7.970	21
	4	7	9.861	14	11.139	21
	5	8	7.442	13	13.558	21
	6	5	4.813	16	16.187	21
	7	2	3.519	19	17.481	21
	8	5	2.310	16	18.690	21
	9	2	1.469	19	19.531	21
	10	0	.715	23	22.285	23
Step 3	1	19	19.243	2	1.757	21
	2	18	15.762	3	5.238	21
	3	12	13.027	9	7.973	21
	4	7	9.627	14	11.373	21
	5	8	7.257	13	13.743	21
	6	5	4.786	16	16.214	21
	7	2	3.701	19	17.299	21
	8	5	2.396	16	18.604	21
	9	2	1.483	19	19.517	21
	10	0	.717	23	22.283	23
Step 4	1	19	19.274	2	1.726	21
	2	18	15.745	3	5.255	21
	3	11	13.005	10	7.995	21
	4	8	9.529	13	11.471	21
	5	9	7.180	12	13.820	21
	6	3	4.869	18	16.131	21
	7	2	3.695	19	17.305	21
	8	6	2.471	15	18.529	21
	9	2	1.506	19	19.494	21
	10	0	.727	23	22.273	23
Step 5	1	19	19.120	2	1.880	21
	2	17	15.692	4	5.308	21
	3	13	13.052	8	7.948	21
	4	7	9.490	14	11.510	21
	5	7	7.149	14	13.851	21

	6	6	5.016	15	15.984	21
	7	2	3.795	19	17.205	21
	8	5	2.388	16	18.612	21
	9	2	1.583	19	19.417	21
	10	0	.716	23	22.284	23
Step 6	1	19	19.100	2	1.900	21
	2	18	15.575	3	5.425	21
	3	12	12.958	9	8.042	21
	4	6	9.708	15	11.292	21
	5	9	6.911	12	14.089	21
	6	4	5.059	17	15.941	21
	7	3	3.772	18	17.228	21
	8	5	2.517	16	18.483	21
	9	2	1.604	19	19.396	21
	10	0	.796	23	22.204	23
Step 7	1	19	19.061	2	1.939	21
	2	18	15.678	3	5.322	21
	3	13	12.596	8	8.404	21
	4	4	9.870	17	11.130	21
	5	8	6.813	13	14.187	21
	6	5	5.131	16	15.869	21
	7	4	3.861	17	17.139	21
	8	5	2.577	16	18.423	21
	9	2	1.593	19	19.407	21
	10	0	.821	23	22.179	23
Step 8	1	19	18.925	2	2.075	21
	2	18	15.777	3	5.223	21
	3	10	12.465	11	8.535	21
	4	8	9.703	13	11.297	21
	5	8	7.135	13	13.865	21
	6	3	4.929	18	16.071	21
	7	5	3.549	15	16.451	20
	8	6	2.807	15	18.193	21
	9	1	1.751	20	19.249	21
	10	0	.959	24	23.041	24
Step 9	1	20	18.367	1	2.633	21
	2	17	16.217	5	5.783	22
	3	11	12.220	10	8.780	21
	4	6	10.053	16	11.947	22
	5	8	6.756	13	14.244	21
	6	4	5.219	18	16.781	22
	7	3	3.744	18	17.256	21
	8	7	2.665	14	18.335	21

9	2	1.862	19	19.138	21
10	0	.898	20	19.102	20

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
								Lower	Upper
Step 1(a)	BIOL2402	.727	.325	5.014	1	.025	2.069	1.095	3.910
	BIOL2420	.464	.303	2.356	1	.125	1.591	.879	2.879
	HESIREAD	.080	.029	7.467	1	.006	1.083	1.023	1.147
	CUPREGPA	2.193	4.245	.267	1	.605	8.965	.002	36815.569
	FINAID(1)	-.478	.394	1.473	1	.225	.620	.286	1.342
	RACE			7.562	4	.109			
	RACE(1)	1.029	.636	2.623	1	.105	2.800	.805	9.732
	RACE(2)	.387	.883	.192	1	.661	1.473	.261	8.322
	RACE(3)	1.313	.881	2.224	1	.136	3.718	.662	20.883
	RACE(4)	-.747	.928	.648	1	.421	.474	.077	2.920
	HESIMATH	.036	.032	1.294	1	.255	1.037	.974	1.103
	ENGL1301	-.088	1.431	.004	1	.951	.916	.055	15.131
	SPCH1318	.416	.364	1.303	1	.254	1.515	.742	3.092
	PSYC2314	.182	.272	.447	1	.504	1.199	.704	2.043
	PSYC2301	-.373	1.410	.070	1	.791	.688	.043	10.918
	BIOL2401	.200	1.454	.019	1	.891	1.221	.071	21.110
	Constant	-22.698	4.121	30.334	1	.000	.000		
Step 2(a)	BIOL2402	.728	.324	5.034	1	.025	2.071	1.096	3.912
	BIOL2420	.465	.302	2.364	1	.124	1.592	.880	2.880
	HESIREAD	.080	.029	7.520	1	.006	1.083	1.023	1.147
	CUPREGPA	1.939	.955	4.126	1	.042	6.952	1.071	45.145
	FINAID(1)	-.478	.394	1.475	1	.225	.620	.286	1.341
	RACE			7.554	4	.109			
	RACE(1)	1.023	.628	2.652	1	.103	2.783	.812	9.537
	RACE(2)	.380	.875	.188	1	.664	1.462	.263	8.126
	RACE(3)	1.306	.873	2.236	1	.135	3.692	.667	20.448
	RACE(4)	-.756	.917	.678	1	.410	.470	.078	2.836
	HESIMATH	.036	.031	1.311	1	.252	1.036	.975	1.102
	SPCH1318	.415	.364	1.303	1	.254	1.515	.742	3.091
	PSYC2314	.182	.272	.449	1	.503	1.200	.704	2.043
	PSYC2301	-.291	.424	.470	1	.493	.748	.326	1.717
	BIOL2401	.285	.434	.431	1	.511	1.330	.568	3.117
	Constant	-22.682	4.111	30.439	1	.000	.000		
	Step 3(a)	BIOL2402	.765	.319	5.733	1	.017	2.149	1.149
BIOL2420		.490	.300	2.667	1	.102	1.633	.907	2.940
HESIREAD		.080	.029	7.522	1	.006	1.083	1.023	1.147

	CUPREGPA	2.382	.678	12.335	1	.000	10.832	2.866	40.938
	FINAID(1)	-.451	.392	1.320	1	.251	.637	.295	1.375
	RACE			7.229	4	.124			
	RACE(1)	.948	.619	2.350	1	.125	2.581	.768	8.678
	RACE(2)	.379	.874	.188	1	.664	1.461	.264	8.097
	RACE(3)	1.228	.856	2.056	1	.152	3.414	.637	18.291
	RACE(4)	-.797	.917	.756	1	.385	.451	.075	2.719
	HESIMATH	.035	.031	1.232	1	.267	1.035	.974	1.101
	SPCH1318	.384	.359	1.144	1	.285	1.468	.726	2.969
	PSYC2314	.161	.270	.358	1	.550	1.175	.693	1.994
	PSYC2301	-.443	.355	1.559	1	.212	.642	.320	1.287
	Constant	-22.573	4.096	30.373	1	.000	.000		
Step 4(a)	BIOL2402	.752	.319	5.555	1	.018	2.121	1.135	3.964
	BIOL2420	.519	.297	3.060	1	.080	1.681	.939	3.007
	HESIREAD	.081	.029	7.865	1	.005	1.084	1.025	1.148
	CUPREGPA	2.423	.675	12.871	1	.000	11.283	3.002	42.399
	FINAID(1)	-.451	.391	1.328	1	.249	.637	.296	1.371
	RACE			7.132	4	.129			
	RACE(1)	.980	.613	2.560	1	.110	2.665	.802	8.858
	RACE(2)	.408	.866	.222	1	.637	1.504	.276	8.202
	RACE(3)	1.190	.850	1.961	1	.161	3.287	.621	17.384
	RACE(4)	-.757	.916	.683	1	.408	.469	.078	2.824
	HESIMATH	.037	.031	1.457	1	.227	1.038	.977	1.103
	SPCH1318	.407	.357	1.294	1	.255	1.502	.745	3.026
	PSYC2301	-.442	.355	1.551	1	.213	.643	.321	1.288
	Constant	-22.688	4.120	30.328	1	.000	.000		
Step 5(a)	BIOL2402	.756	.318	5.668	1	.017	2.130	1.143	3.970
	BIOL2420	.558	.296	3.557	1	.059	1.748	.978	3.122
	HESIREAD	.079	.029	7.581	1	.006	1.082	1.023	1.145
	CUPREGPA	2.543	.666	14.590	1	.000	12.718	3.449	46.895
	FINAID(1)	-.442	.390	1.287	1	.257	.643	.299	1.380
	RACE			6.730	4	.151			
	RACE(1)	.908	.612	2.200	1	.138	2.479	.747	8.225
	RACE(2)	.307	.858	.128	1	.720	1.359	.253	7.305
	RACE(3)	1.095	.844	1.683	1	.195	2.989	.572	15.630
	RACE(4)	-.802	.915	.768	1	.381	.449	.075	2.695
	HESIMATH	.036	.031	1.406	1	.236	1.037	.977	1.101
	PSYC2301	-.431	.352	1.500	1	.221	.650	.326	1.295
	Constant	-21.457	3.901	30.257	1	.000	.000		
Step 6(a)	BIOL2402	.731	.315	5.403	1	.020	2.078	1.121	3.849
	BIOL2420	.565	.293	3.724	1	.054	1.760	.991	3.125
	HESIREAD	.077	.029	7.216	1	.007	1.080	1.021	1.142
	CUPREGPA	2.616	.658	15.793	1	.000	13.678	3.765	49.692
	RACE			7.806	4	.099			

Step 7(a)	RACE(1)	.872	.601	2.106	1	.147	2.392	.737	7.767
	RACE(2)	.195	.851	.052	1	.819	1.215	.229	6.438
	RACE(3)	.966	.824	1.375	1	.241	2.628	.523	13.207
	RACE(4)	-1.045	.885	1.393	1	.238	.352	.062	1.994
	HESIMATH	.030	.031	.973	1	.324	1.031	.971	1.094
	PSYC2301	-.429	.352	1.486	1	.223	.651	.327	1.298
	Constant	-20.997	3.840	29.894	1	.000	.000		
	BIOL2402	.719	.312	5.310	1	.021	2.052	1.113	3.781
	BIOL2420	.574	.293	3.839	1	.050	1.776	1.000	3.153
	HESIREAD	.085	.027	9.519	1	.002	1.088	1.031	1.148
	CUPREGPA	2.702	.653	17.098	1	.000	14.904	4.141	53.633
Step 8(a)	RACE			7.549	4	.110			
	RACE(1)	.813	.596	1.861	1	.172	2.254	.701	7.244
	RACE(2)	.147	.845	.030	1	.862	1.158	.221	6.065
	RACE(3)	.893	.814	1.202	1	.273	2.442	.495	12.046
	RACE(4)	-1.099	.885	1.543	1	.214	.333	.059	1.887
	PSYC2301	-.431	.349	1.521	1	.217	.650	.328	1.289
	Constant	-19.073	3.249	34.472	1	.000	.000		
	BIOL2402	.755	.310	5.949	1	.015	2.129	1.160	3.906
	BIOL2420	.565	.293	3.733	1	.053	1.760	.992	3.122
	HESIREAD	.082	.027	9.021	1	.003	1.085	1.029	1.145
	CUPREGPA	2.222	.514	18.682	1	.000	9.228	3.369	25.278
Step 9(a)	RACE			6.888	4	.142			
	RACE(1)	.750	.601	1.559	1	.212	2.117	.652	6.869
	RACE(2)	.130	.847	.024	1	.878	1.139	.217	5.987
	RACE(3)	.766	.810	.894	1	.345	2.151	.440	10.522
	RACE(4)	-1.064	.885	1.446	1	.229	.345	.061	1.955
	Constant	-18.712	3.212	33.942	1	.000	.000		
	BIOL2402	.644	.296	4.730	1	.030	1.904	1.066	3.402
	BIOL2420	.514	.280	3.386	1	.066	1.673	.967	2.893
	HESIREAD	.091	.025	13.559	1	.000	1.095	1.044	1.150
	CUPREGPA	2.115	.487	18.850	1	.000	8.288	3.190	21.533
	Constant	-18.098	2.895	39.067	1	.000	.000		

Classification Table^a

Observed			Predicted		
			Completion of Nurse Program		Percentage Correct
			Non Completer	Completer	
Step 1	Completion of Nurse Program	Non Completer	51	27	65.4
		Completer	18	116	86.6
	Overall Percentage				78.8
Step 2	Completion of Nurse Program	Non Completer	51	27	65.4
		Completer	18	116	86.6
	Overall Percentage				78.8
Step 3	Completion of Nurse Program	Non Completer	51	27	65.4
		Completer	17	117	87.3
	Overall Percentage				79.2
Step 4	Completion of Nurse Program	Non Completer	52	26	66.7
		Completer	17	117	87.3
	Overall Percentage				79.7
Step 5	Completion of Nurse Program	Non Completer	51	27	65.4
		Completer	15	119	88.8
	Overall Percentage				80.2
Step 6	Completion of Nurse Program	Non Completer	51	27	65.4
		Completer	17	117	87.3
	Overall Percentage				79.2
Step 7	Completion of Nurse Program	Non Completer	52	26	66.7
		Completer	17	117	87.3
	Overall Percentage				79.7
Step 8	Completion of Nurse Program	Non Completer	53	25	67.9
		Completer	17	117	87.3
	Overall Percentage				80.2
Step 9	Completion of Nurse Program	Non Completer	50	28	64.1
		Completer	18	116	86.6
	Overall Percentage				78.3

a. The cut value is .500

Variables in the Equation

a Variable(s) entered on step 1: BIOL2402, BIOL2420, HESIREAD, CUPREGPA, FINAID, RACE, HESIMATH, ENGL1301, SPCH1318, PSYC2314, PSYC2301, BIOL2401.

Variables not in the Equation

			Score	df	Sig.
Step 2 ^a	Variables	ENGL1301	.004	1	.951
	Overall Statistics		.004	1	.951
Step 3 ^b	Variables	ENGL1301	.417	1	.518
		BIOL2401	.432	1	.511
	Overall Statistics		.436	2	.804
Step 4 ^c	Variables	ENGL1301	.336	1	.562
		PSYC2314	.359	1	.549
		BIOL2401	.341	1	.559
	Overall Statistics		.799	3	.850
Step 5 ^d	Variables	ENGL1301	.184	1	.668
		SPCH1318	1.302	1	.254
		PSYC2314	.506	1	.477
		BIOL2401	.180	1	.671
	Overall Statistics		2.087	4	.720
Step 6 ^e	Variables	FINAID(1)	1.296	1	.255
		ENGL1301	.098	1	.754
		SPCH1318	1.262	1	.261
		PSYC2314	.517	1	.472
		BIOL2401	.091	1	.763
	Overall Statistics		3.366	5	.644
Step 7 ^f	Variables	FINAID(1)	.872	1	.351
		HESIMATH	.981	1	.322
		ENGL1301	.057	1	.811
		SPCH1318	1.218	1	.270
		PSYC2314	.740	1	.390
		BIOL2401	.065	1	.799
	Overall Statistics		4.360	6	.628
Step 8 ^g	Variables	FINAID(1)	.855	1	.355
		HESIMATH	1.023	1	.312
		ENGL1301	.121	1	.728
		SPCH1318	1.144	1	.285
		PSYC2314	.738	1	.390
		PSYC2301	1.536	1	.215
		BIOL2401	.783	1	.376
	Overall Statistics		5.870	7	.555
Step 9 ^h	Variables	FINAID(1)	1.913	1	.167
		RACE	7.230	4	.124
		RACE(1)	3.136	1	.077
		RACE(2)	.299	1	.585
		RACE(3)	.249	1	.617
		RACE(4)	5.156	1	.023
		HESIMATH	.678	1	.410
		ENGL1301	.258	1	.612
		SPCH1318	.828	1	.363
		PSYC2314	.511	1	.475
		PSYC2301	.793	1	.373
		BIOL2401	.152	1	.697
	Overall Statistics		13.106	11	.286

a. Variable(s) removed on step 2: ENGL1301.

b. Variable(s) removed on step 3: BIOL2401.

c. Variable(s) removed on step 4: PSYC2314.

d. Variable(s) removed on step 5: SPCH1318.

e. Variable(s) removed on step 6: FINAID.

f. Variable(s) removed on step 7: HESIMATH.

g. Variable(s) removed on step 8: PSYC2301.

h. Variable(s) removed on step 9: RACE.

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EHRD 405 Principles & Practices of Leadership in Human Resource Development

Fall semester 2008, College of Education and Human Development
Texas A&M University, College Station TX

Lecturer,

TRDE 4351 Instructional Strategies for Training and Development

Spring Semester 2008, University of Houston, Houston, TX.

Professional Experience

Program Manager for Continuing Education, Lone Star College, Kingwood TX, October 2006-August 2008.

- Responsible for program success through marketing and enrollment.
- Plan and develop appropriate courses, workshops, seminars and curriculum for programs.
- Maintain and implements long-range planning activities consistent with the College and District strategic plans.
- Data collection and evaluation of effectiveness workforce programs and makes recommendations for improvement.
- Work with appropriate community groups, division chairs and employers to ensure program is meeting needs in workforce.