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Grades in Prerequisite Courses as Predictors of Success in a Nursing Program

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ABSTRACT

GRADES IN PREREQUISITE COURSES
AS PREDICTORS OF SUCCESS
IN A NURSING PROGRAM

by

Elaine Zeilke Foster

Chair: Jimmy Kijai

ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

Andrews University

School of Education

Title: GRADES IN PREREQUISITE COURSES AS PREDICTORS OF SUCCESS IN A NURSING PROGRAM

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Problem

The U.S. Bureau of Labor Statistics forecast that by 2016 more than one million new and replacement nurses will be needed to fill jobs in the health care field . In order to meet the medical needs of a changing society, schools of nursing must continue to educate and graduate significant numbers of nurses. This may be done by increasing the success rates of those who are admitted in nursing programs. Success rate is thought to be related to admission criteria used to admit students which, in turn, may reduce attrition rate, which is between 20 to 40% in nursing programs.

The purpose of this study was to examine if success was related to grades in prerequisite courses among a group of nursing students at Southwestern Michigan College. The prerequisite courses analyzed were Chemistry, Anatomy and Physiology,

Algebra, Psychology, and Speech. Success was defined as having graduated from the associate degree nursing program at the college.

Method

This study was a quantitative study utilizing secondary data analysis of the five prerequisite courses that were taken prior to admission into the nursing program at Southwestern Michigan College. A comparative mode of inquiry was used to investigate whether there was a difference in prerequisite grades between those who graduated and those who did not graduate from the nursing program. The influence of gender on success was also examined.

Results

Mean grade point averages ranged from a low of 2.38 (SD=0.99) in Mathematics for non-graduates to a high of 3.21 (SD=0.84) in Speech for graduates. At α =0.01, t-tests for independent samples indicated that significant differences in grade point averages were found between graduates and non-graduates in Biology, Chemistry, and Psychology. A two-way analysis of variance indicated that no significant interaction effects were found between gender and success in all five prerequisite courses. A direct discriminant analysis showed that a linear combination of the five prerequisite courses significantly differentiated graduates from non-graduates (λ=0.95, χ^2=16.81, p=0.005). Most highly correlated with the discriminant function was Biology (0.959), followed by Mathematics (0.475), Chemistry (0.472) and Psychology (0.445).

Conclusion

Overall, grades in prerequisite courses can be utilized to a degree to help establish evidence-based criteria for admission into the nursing program.

The following recommendations are made based on the results of this research study.

1. Students seeking admission into the nursing program should demonstrate a minimum grade of a "B" (3.0) in the Biology course since that course appeared to be the strongest predictor for student success and graduation from the nursing program.

2. Students seeking admission into the nursing program should have a minimum cumulative GPA of a 2.8 and a prerequisite cumulative GPA average of 2.8 on the five prerequisite courses.

3. The nursing program should consider utilizing a weighted admission procedure or process, which would place a greater emphasis on the grades in Biology, Chemistry, and Math. This would allow for the courses that have a greater impact on success to have a greater influence when prerequisite courses are considered for admission criteria.

4. The information from this study may be used to identify potential high-risk students so that appropriate support mechanisms can be developed to increase their odds of successfully completing the nursing program.

5. Further studies on the influence of repeating prerequisite courses on success should be conducted. In this study, only about 50% of those who repeated one or more prerequisite course graduated from the nursing program.

6. This study examined the influence of five prerequisite courses on success in a nursing program. The influence of non-cognitive factors on success in nursing programs should be investigated in future studies.

Andrews University

School of Education

GRADES IN PREREQUISITE COURSES
AS PREDICTORS OF SUCCESS
IN A NURSING PROGRAM

A Dissertation

Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Elaine Zeilke Foster

April 2010

GRADES IN PREREQUISITE COURSES
AS PREDICTORS OF SUCCESS
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APPROVAL BY THE COMMITTEE:

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External: Henrietta Hanna   Date approved

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ACKNOWLEDGMENTS

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CHAPTER ONE

INTRODUCTION AND STATEMENT OF THE PROBLEM

Introduction

Colleges are consistently challenged to identify students who have a chance of successfully completing their program of study and graduating (Bauchmoyer, Carr, Clutter, & Hoberty, 2004; Brennan, Best, & Small, 1996). Nursing schools are not exempt from this challenge. Many of the nursing programs in the country are faced with the difficult task of admitting qualified individuals who will have the greatest chance of successfully completing the course of study and becoming a registered nurse (Byrd, Garza, & Nieswiadomy, 1999). The ability to identify students who will be successful has become even more important because of the limited number of spaces in the nursing programs and the critical shortage that currently exists within the profession (Gilmore, 2008). As a result of the nursing shortage, many schools of nursing are beginning to pay more attention to causes of attrition and factors that increase success in school (Lewis & Lewis, 2000).

Schools of nursing must focus on the retention of students who are being admitted into the programs. It is the retention of these students that will help increase the number of graduates and meet the increasing need for registered nurses which will help resolve the shortage (Byrd et al., 1999; Gilmore, 2008; Higgins, 2005; Sayles, Shelton, 2003; Wells, 2003).

One way to influence retention rates in nursing programs is through identification of factors associated with student success by using evidence-based criteria (Gilmore, 2008). Identification of these factors would help colleges identify the students most capable of successfully completing the nursing curriculum.

The nursing profession is currently suffering from a critical shortage of registered nurses, which is anticipated to worsen over the next 10 to 20 years (American Association of Colleges of Nursing [AACN], 2009; Buerhaus, Needleman, & Steward, 2002; Buerhaus & Staiger, 1999; Coffey-Love, 2001; Costello, 2002; Jackson, Mannix, & Daly, 2001; U.S. Department of Health and Human Services, 2002). Numerous factors have contributed to this shortage, such as demographic changes in the general population, an increase in the general population, a decrease in people seeking nursing as a career, and changing nursing demographics (U.S. Department of Health and Human Services, 2002). This shortage is not unique to the United States, but has become an international concern (Jackson et al., 2001; Kevern, Ricketts, & Webb, 1999; Kingma, 2001).

According to the U.S. Department of Health and Human Services (2002), the general population is expected to increase by 18% between 2000 and 2020. This accounts for an increase of approximately 50 million additional people who will require health care during their lifetime. There is also an assumption that life expectancy rates will increase in the general population. The population of individuals who are 65 years and older is projected to grow 54% between 2000 and 2020, leading to 19 million people over the age of 65 (U.S. Department of Health and Human Services, 2002). Between the years from 2011–2030, the elderly population will increase from 40 to 70 million. With an aging population comes more health problems and increased health care needs, which

leads to more health care services such as nursing. With the current documented shortage in the nursing profession, there are serious concerns about the ability to meet the health care needs of the aging population (Buerhaus, 2001).

The inability to meet patient care needs is one problem. A study by the Joint Commission on Accreditation of Health Care Organizations indicated that the shortage of nurses is also putting patients in danger. Hospital reports indicate that out of 1,609 patient deaths and injuries, low nursing staff levels were a contributing factor in 24% of the cases (AACN, 2009).

Along with demographic changes to the general population, the nursing profession is also experiencing significant changes. Statistics by the U.S. Department of Health and Human Services (2002) identified that the shortage of nurses that was predicted to start in 2007 was evident in 2000. The number of registered nurses was estimated to be approximately 1.89 million in 2000, but the projected need was around 2 million, a shortage of 110,000 or 6%. By the year 2015, the shortage is expected to be around 20% and by 2020, it will be at 29% if the current trends do not change. These statistics indicate a 40% increase in demand over 20 years (2000–2020) compared to only a 6% growth in the supply of qualified nurses (U.S. Department of Health and Human Services, 2002).

The latest research by the American Health Care Association in July 2008 indicates that the shortage is expected to grow to 260,000 registered nurses by 2025. Current demographics indicate a vacancy of more than 19,400 registered nurses in long-term care and 116,000 open positions in hospitals in July 2007, bringing the total vacancies to more than 135,000 or a vacancy range of approximately 8% (AACN, 2009).

The latest projections by the U.S. Bureau of Labor Statistics published in November 2007 estimate that more than 1 million new and replacement nurses will be needed by 2016 (AACN, 2009).

The recession has had a slight impact in reducing the effects of the current nursing shortage. The amount of this effect varies regionally. Hospitals have closed floors and reduced staffing. In addition, older nurses have postponed their retirement. However, regardless of this temporary reprieve, the shortage is real and unless the health care system acts now, we are heading for a catastrophe that will impact health care for millions of people across the country (Lavizzo-Mourey & Verplanck, 2009).

One major factor that has contributed to the nursing shortage was the decreased number of people in the 1990s who went into nursing as a career (Buerhaus, 2001; Louden & Post, 1997; Staiger, Auerbach, & Buerhaus, 2001). That decrease in people entering the profession in combination with a 20% decline in high-school graduates from 1983-1993 decreased the number of students entering college and ultimately the nursing profession (Tanner & Bellack, 2001). Young women who had traditionally chosen nursing as a viable career became aware of the plethora of career opportunities available to them and chose alternate career opportunities (Tanner & Bellack, 2001).

The decrease in young people entering the nursing profession during the 1990s has driven the average age of the employed nurse to around 43.3 years of age. Associate degree graduates are approximately 5 years older than graduates of baccalaureate programs and the overall trend toward older graduates is occurring among all programs (Auerbach, Buerhaus, & Staiger, 2000). This aging population will have an impact on the shortage over the next two decades as these nurses age out and retire from the profession

(U.S. Department of Health and Human Services, 2002). This average age is estimated to further increase to 44.5 years of age by 2012 as nurses in their 50s become the largest segment of the nursing population (AACN, 2009).

Nursing school demographics indicate that the number of graduates from nursing schools declined from 96,610 to 71,475 (decrease of 25,135) and the number of associate degree graduates went from 59,908 to 42,665 (decrease of 17,243) between 1995 to 2000 (Mahaffey, 2002). Additionally, the number of graduates who passed the national exam declined during this time from 91% to 83.8% (NCSBN, 1995, 2000), which further reduced the number of practicing registered nurses.

According to the AACN (2002), the enrollments for baccalaureate programs showed a slight increase in the fall of 2001, the first time in a 6-year period, ending a steady decline. Even though there has been an increase in the numbers of students applying to the programs and entering into nursing school, it still is not enough to meet the demand of a million new nurses within the next 10 years.

> Since 1998, nursing leaders and key nursing organizations have warned us of a nursing shortage unlike any we've seen before. In the past, nursing shortages have been cyclic. As demand increased, nursing education responded by increasing enrollment through aggressive recruitment efforts, employers provided improved compensation packages and the shortage abated. However, it is likely that such efforts to increase the supply of nurses in the work force may be neither possible nor effective this time around. (Tanner & Bellack, 2001, p. 99)

Numerous initiatives are being instituted to help address the nursing shortage. Various grants have been developed to help schools expand their capacity and provide scholarships for students. There are other state and federal initiatives addressing the faculty shortage, since that is one of the major deterrents for increasing capacity (AACN, 2009).

An article published in *Health Affairs* (May, Bazzoli, & Gerland, 2006) identified that 97% of the hospitals surveyed were using some type of educational strategy to address the nursing shortage. This involves partnering with nursing schools, scholarships subsidizing nursing faculty salaries, and providing flexibility in scheduling to allow staff to attend classes.

The nursing profession and nursing programs need to continue to develop aggressive strategies to help reduce and alleviate this shortage. Nurses and educators can help in this initiative by retaining nurses in the profession, recruiting more people into the nursing profession, and retaining students admitted into programs (Stickney, 2008). Recruitment and retention are how nursing programs can have an impact on the shortage.

Increasing the number of students admitted into programs is a partial solution to the shortage, but there are issues in many programs with increasing seat counts. The Board of Nursing governs the number of students who can be admitted into a school's program. Schools must be able to demonstrate to the State Board of Nursing the ability to admit and adequately educate additional students. Increasing seat counts within these programs may be difficult for many schools because of the decreased availability of eligible nursing faculty. Currently there is a shortage of qualified nursing faculty, and it is anticipated that this shortage of faculty will continue to worsen (AACN, 2009; Higgins, 2005).

Schools might not be able to increase the number of students admitted, but they can focus on increasing retention and reducing attrition. Retaining students must become a high priority for nursing programs (Stickney, 2008). One way to reduce attrition numbers and increase retention is through identification and utilization of reliable

admission criteria so the appropriate students are admitted and when necessary, support mechanisms put in place for high-risk students (Byrd et al., 1999; Gilmore, 2008).

Early identification of those individuals who are academically at risk is critical to help ensure student success. A study by Petty and Todd (1985) found that pre-screening individuals entering into the college and seeking admission into the nursing program decreases institutional costs and helps to strengthen the program. It costs approximately half as much money to educate a qualified candidate versus a less capable student (Capoor, 1983). Admitting students who have a poor chance of successfully completing the program is unfair, especially if support mechanisms are not in place to help them be successful. Early identification of students who might be at risk provides time for early intervention processes to be established (Glynn, Sauer, & Miller, 2003; Horns, O'Sullivan, & Goodman, 1991; McSherry & Marland, 1999). Colleges that are able to identify students at risk for failure can create support programs that will help students to be successful (Harter & Szurminski, 2001; Johnson & Kreuzer, 2001; Sayles et al., 2003; Schwartz & Washington, 2002; Wells, 2003).

Community college students come from a variety of demographic and socioeconomic backgrounds. Many of these students may have weak academic backgrounds and lack the skills and academic abilities that are needed to successfully complete school (Capoor, 1983; Foster, Zimmerman, & Condon, 1991; Grubbs, 1989). The National Center for Educational Statistics (2001) indicated that many students who attend community colleges are in the lower half of the high-school academic and socioeconomic status. The SAT composite scores for community college students averaged 839, whereas their counterpart at 4-year institutions averaged 961. Because of

these factors, attrition rates within community colleges have the potential to escalate as a result of these academic deficiencies (Lewis & Lewis, 2000). Access to education requires more than being able to enter a building; it also encompasses the idea that the individual has a reasonable chance of being successful (Vaughan, 1985).

Nursing programs are one of the more academically challenging programs in a community college. These programs must maintain high standards because of the skills and extensive knowledge that nurses require in order to be safe and effective practitioners; yet in many schools, nursing programs utilize inconsistent and subjective criteria for admission (Land, 1993). Selective admissions help to ensure that the most qualified applicants are admitted into the program. This type of admission process is especially important when the number of applicants outnumber the seats available (Capoor, 1983). Nursing programs need to ensure that the students capable of completing the program will get admitted into the program.

> As nurse educators, we are the "gatekeepers" to nursing. Admission committees strive to select the best candidates with one purpose being to more successfully respond to the nursing shortage. Selection of those applicants who are predicted to perform better optimizes the success rate of limited enrollment as well as the utilization of the shortage of nursing faculty. Admission committees have responsibility to the applicants so that those selected are more likely to yield positive results from their educational and financial commitment. Using predictive criteria better serves society by graduating nurses who are deemed to be more likely to enter nursing sooner in order to fill the void. (Yin & Burger, 2003, p. 232)

High attrition poses a problem for programs with limited capacity such as nursing (Gilmore, 2008). This is a greater concern when there are more applicants than positions available. Schools that use an open admission process allow students who are potentially less qualified academically to take a seat in the nursing program, thereby decreasing the number of qualified applicants into the program (Gilmore, 2008).

Studies have shown that schools such as Harvard that use a selective admission process have approximately a 5% attrition rate with a 95% student retention rate where some inner-city community colleges have under a 20% student retention rate (Erickson & Strommer, 1991). Attrition averages in nursing programs range from 20–40% (Seago & Spetz, 2003). High attrition decreases the number of nurses entering the work force, thus increasing the critical shortage (Oliver, 1985; Stickney, 2008).

Statement of the Problem

The U.S. Bureau of Labor Statistics forecast that by 2016, more than 1 million new and replacement nurses will be needed to fill jobs in the health care field (AACN, 2009). In order to meet the medical needs of a changing society, schools of nursing must continue to educate and graduate significant numbers of nurses. The Council on Physician and Nurse Supply made up of health care leaders has identified that 30,000 additional nurses will need to graduate yearly in order to meet the nation's health care needs (AACN, 2009).

Since associate degree nursing programs graduate more then 60% of the new registered nurses (U.S. Department of Health and Human Services, 2002), it is important that student retention and attrition factors be identified. Part of the student success factors include admission criteria for these programs, yet in many cases nursing programs utilize inconsistent and subjective criteria for admission (Land, 1993; Stronck, 1979). Identifying factors that affect student nurse retention and success is critical (Jeffreys, 2004).

With the publicity the nursing shortage has received over the past few years, nursing programs are bombarded with more applicants then they can admit. Many of

these students are not academically prepared for the rigors of nursing school (Jeffreys, 2004). These students are admitted into nursing programs lacking appropriate academic preparation and experiencing academic deficiencies (Foster et al., 1991; Gilmore, 2008; Jeffreys, 2004). The lack of evidence-based admission criteria contributes to attrition rates that fall between 20 to 40% (Seago & Spetz, 2003).

It is difficult to identify absolute causes of attrition because there are so many factors that can lead to student dropout and failures. Students drop out of nursing school for a variety of academic and non-academic reasons. Even when studies review the same variables, there are still inconsistencies that exist because of the variations that occur between programs and admission requirements (Garcia, 1987). "The most persistent trend in student persistence research is that student attrition persists" (Jeffreys, 2004, p. 4).

Purpose of the Study

The purpose of this study was to examine if any of the prerequisite courses taken prior to admission into the nursing program could be correlated to successful completion of the nursing program at Southwestern Michigan College (SMC). In this study, successful completion was identified as graduation from the program. The results from this study could be used to establish admission criteria for the nursing program and develop academic plans for students identified as high risk.

Conceptual Framework

Many factors may affect student success in nursing school. The nursing profession has attempted to study causes of attrition, but because of the myriad of variables that can affect a student's progress in nursing school, this can be complicated (Jeffreys, 2004). Attrition in nursing school has been reported in the literature as a

multifaceted problem composed of a variety of academic and non-academic variables (Barkley, Rhodes, & Dufour, 1998). Faculty and administrators of nursing programs are in a position to help control attrition rates by determining appropriate admission criteria for the program and by developing interventions that could help students to be successful (Lewis & Lewis, 2000; Jeffreys, 2004).

> The acceptance by colleges of larger numbers of students with academic deficiencies has created the need to accurately identify those students at-risk for not succeeding academically. . . . Early identification of predictors of academic success and failure assists faculty and administration in providing efficient academic support. Identifying students shortly following admission enables colleges to enhance the students' potential for academic success by providing educational assistance. (Lewis & Lewis, 2000, p. 234)

Attrition is very costly to all involved, not just financially, but also psychologically. The psychological aspect can have the greatest impact (Rowser, 1997; Tinto, 1993). Attrition is also costly to society and the individual institution and program (Griffiths, Bevil, O'Connor, & Weiland, 1995; Higgins, 2005; Nora, Cabrera, Hagedorn, & Pascarella, 1996; Rowser, 1997; Tinto, 1993).

Student demographics have been changing in the nursing schools over the past years, creating a more diverse population in nursing schools. These variations create even more challenges when trying to identify the causes of attrition (Jeffreys, 2004; Kelly, 1997). There are more non-traditional students in nursing schools these days who attempt to balance multiple roles (Barbee & Gibson, 2001; Bean & Metzner, 1985; Jeffreys, 1998, 2001, 2003; Tucker-Allen & Long, 1999; Yoder, 2001). Associate degree nursing programs typically attract more of the non-traditional students in their mid-30s with an average age approximately 5 years older than baccalaureate graduates (Auerbach et al., 2000).

Attrition theories can be utilized to identify students who may be at risk and who might benefit from early intervention to reduce the occurrence (Stickney, 2008). There were many studies done between 1984 and 1990 that focused on causes of attrition in nursing. Campbell and Dickson (1996) indicated these studies might have been conducted due to declining numbers of students who entered nursing during that time period. Declining numbers may have been linked to the high attrition percentages that were seen in nursing programs during this time frame and in prior years.

There are various causes linked to attrition. Stickney (2008) identified three groupings for causes of attrition: personal, environmental, and academic. Personal variables include factors such as motivation, stress, perceptions of nursing, and life changes. These also include demographic factors such as age, gender, and race. The number of hours worked, child care arrangements, and support services available are examples of environmental variables (Stickney, 2008).

Academic factors include, but are not limited to, study skills, study hours, attendance, class schedule, and academic support services. Study skills include things such as reading, writing, note-taking, in-class involvement, or activities (Jeffreys, 2004). Students need help identifying their study skills and areas of weaknesses.

Nursing programs usually have more academic hours than most college programs. This may influence retention in a negative way because of the increased time demands. Many use a 3:1 ratio for class hours, which means a traditional credit hour equates to 3 hours a week, especially in the clinical setting. Lecture courses typically following the 1:1 ratio at most college courses.

Attendance plays a factor in a student's success, especially in students who are academically weak as evidenced by a lower GPA (Bean, 1986). If a student is unable to attend class on a regular basis due to reasons such as working, family responsibilities, and others, that could impact their successful completion of the program.

Non-traditional student retention rates are typically lower than traditional students, primarily because of the many non-academic factors that can impact the student's academic ability (Barbee & Gibson, 2001; Bessent, 1997; Manifold & Rambur, 2001; Tucker-Allen & Long, 1999; Yurkovich, 2001). Students who have academic risk factors compounded by non-academic factors may have a greater chance of failing or withdrawing from the program (Jeffreys, 2004).

Figure 1 showing the conceptual framework reflects the two major categories of factors identified as influencing a student's academic outcomes. These two major categories are broken down into academic factors and non-academic factors. As the diagram illustrates, within each of the two branches, numerous variables are categorized within each branch.

The dotted line with the arrow between the two major branches indicates an assumed influence of the non-academic variables upon the academic factors. As indicated in the literature review, the non-academic variables can have an impact on the academic success of a person. That being said, I believe that a student who is borderline in academic abilities has a greater chance of failing as a result of non-academic influences.
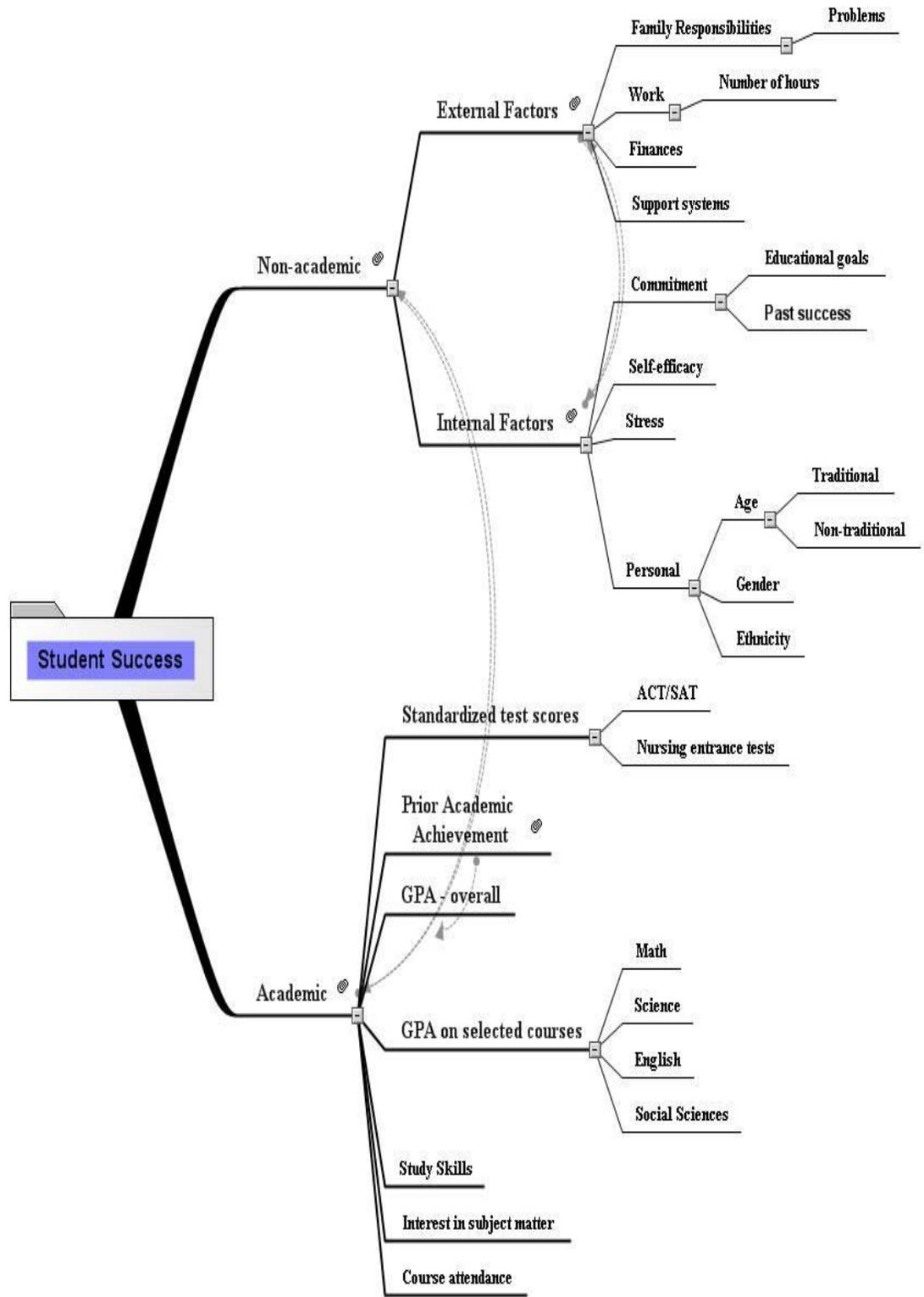
Figure 1. Factors affecting student retention

Research Questions

This study explored the following questions:

1. Are there differences between the graduate population and the non-graduate population in regard to grades in the prerequisite courses?

2. Are there interactions between gender and graduation status in grades for prerequisite courses?

3. To what extent does the set of the prerequisite courses reliably discriminate between graduates and non-graduates?

Significance of the Study

The information from this study could help to identify if any of the prerequisite courses might be linked to successful completion of the nursing program. This information has a two-fold purpose. If the study indicates that the grades in prerequisite courses have an influence on graduation, then this information could be used to develop admission standards and criteria for the nursing program. Second, the results from the study could help to identify students who might be academically at risk so that appropriate advising and academic plans could be established for these students to help with retention.

For example, if the study reveals that a minimum of a "B" in Anatomy and Physiology is strongly linked to the successful completion of the nursing program, then the admission criteria could be changed to a minimum of a "B" in Anatomy and Physiology for admission into the nursing program. This information could also be used to identify students at risk so that appropriate support and academic interventions could be instituted to reduce the risk of the student failing. It is easier for students to be

successful if they are given the support and help they need before they get into academic difficulties.

In conclusion, the results of this study could be used to help the faculty identify appropriate admission criteria and develop support systems for students who might be identified as academically "at risk."

Definition of Terms

To facilitate the understanding of this research study, the following terms have been defined.

Associate degree nursing program: Are conducted in community colleges and are accredited by the State Board of Nursing. The person upon graduation is awarded an Associate in Applied Science. Graduates are eligible to take the licensure exam for registered nurses.

Student attrition: Students who do not complete and graduate from the nursing program. The two types of attrition are voluntary, which is withdrawal due to personal reasons, and involuntary, which is due to academic reasons. Students who withdraw or fail out of the nursing program are no longer in the program and are counted as an attrition statistic (Jeffreys, 2004).

Open-door policy/open admissions: A non-selective student admissions process. In an open-door policy, students typically are not denied admission. Community colleges typically subscribe to the notion of an open-door admission policy so students in the community have access to higher education.

Seat count: The number of students who can be admitted into a nursing program. In the state of Michigan, seat counts are approved by the Board of Nursing.

National Council Licensing Examination for Registered Nurses (NCLEX-RN): The national exam that is taken by all graduates from registered nursing programs. Graduates must pass this exam in order to be eligible for their registered nursing license.

Boards of Nursing: The licensing and regulating agencies for the nursing profession. The Board not only regulates the professional practice of nursing, but also is actively involved in the regulations for schools of nursing.

Competitive admissions process: A method whereby a school utilizes particular criteria to rank individuals. The student receives points based on established criteria. The students are then "ranked" utilizing the selected criteria and the top "x" number of applicants are then admitted.

Burnout: A term used by the nursing profession for years. Burnout is a psychological process in which the nurse can no longer deal with the stressors that accompany the profession. The individual will typically leave the profession as a result of significant burnout.

Non-traditional student: A student who is enrolled in an entry-level nursing program (associate degree, diploma program, or generic baccalaureate degree) that meets at least one of the following criteria: age 25 years or older, enrolled part-time, male, belonging to an ethnic or racial minority, speaks English as a second language, children, achieved a GED versus high-school diploma (Jeffreys, 2004).

NURS model: An organizing framework for reviewing all the factors that may affect undergraduate nursing student retention and success to identify at-risk students in order to develop effective strategies to help with student retention (Jeffreys, 2004).

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Traditional student: A student who is enrolled into an entry-level nursing program. This student meets the following criteria: age 24 or younger, resides in campus housing or off-campus housing, full-time student, female, White and not a member of an ethnic minority group, speaks English as a first language, no children, high-school diploma, no remedial classes (Jeffreys, 2004).

Program success: A student who completes the program's graduation requirements, passes the NCLEX-RN exam, and obtains a job as an RN (Jeffreys, 2004).

Withdrawal: A student officially stops attending a class and withdraws from the course or courses for personal and/or academic reasons (Jeffreys, 2004).

Delimitation of the Study

It is noted that this research study has some delimitations which limit the external validity of the research findings.

1. This study utilized data from one nursing program.

2. Only students enrolled in the AAS program were utilized for this study.

3. Students in the practical nursing program were not included.

Organization of the Study

The organization of the study includes the abstract which is an overview of the research study. Chapter 1 contains the introduction to the research study and the statement of the problem, purpose of the research, significance of the study, conceptual framework, definition of terms, and the delimitations of the study. Chapter 2 presents a review of the literature. Chapter 3 outlines the research methodology, including the limitations of the study. Chapter 4 presents the findings of the research study and chapter 5 summarizes the study, including the conclusions drawn from the study and

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recommendations for further research. The appendices and reference list are at the end of

the study.

CHAPTER TWO

OVERVIEW

For years, nursing schools have been trying to admit individuals into their

programs who have the greatest chance of successfully completing the nursing program

(Byrd et al., 1999). This is of particular importance because of the limited number of

seats available in most nursing programs and the current shortage of qualified nurses in

the work force. The individuals who are admitted into the program will hopefully

graduate from nursing school and go on to successfully pass the NCLEX-RN exam and

practice as a registered nurse (Byrd et al., 1999; Gilmore, 2008; Sayles et al., 2003;

Wells, 2003).

The purpose of this study was to identify if there is a particular prerequisite course

or group of prerequisite courses that may predict success in an associate degree nursing

program at a small rural community college. Through identification of the grades

necessary in prerequisite courses, accurate and appropriate admission criteria can be

established for the nursing program at Southwestern Michigan College. This information

could also be used to identify students who may be considered academically at risk and

individual academic plans could be established if those students are admitted into the

program.

Utilizing these data for admission criteria and academic plans could potentially

decrease attrition of students in the program and increase the number of graduates

(Gilmore, 2008). The information from this study could be shared with other associate degree nursing programs to help them to establish appropriate admission criteria.

Current Status of the Nursing Profession

Currently the nursing profession is suffering from a critical shortage of registered nurses in the work force (Buerhaus, 2001). This shortage is anticipated to continue for the next 10 to 20 years (U.S. Department of Health and Human Services, 2002). Statistics by the U.S. Department of Health and Human Services (2002) identified that the shortage of nurses that was predicted to start in 2007 actually started in 2000.

Nursing numbers were estimated at 1.89 million in 2000, but the projected need was around 2 million, a shortage of approximately 6%. By 2020, the shortage is expected to be somewhere around 29% if the current trends do not change (U.S. Department of Health and Human Services, 2002). These statistics indicate a 40% increase in demand over 20 years (2000–2020) compared to only a 6% growth in the supply of qualified nurses graduating from nursing programs.

Nursing school demographics indicate the number of nursing graduates declined from 96,610 to 71,475, a decrease of 25,135, from 1995 to 2000. In addition to seeing a reduction in graduates, the number of those graduates who passed the national exam declined during this timeframe from 91% to 83.8% (NCSBN, 1995, 2000), further reducing the number of practicing registered nurses.

According to the American Association of Colleges of Nursing (AACN, 2002), the enrollments for baccalaureate programs showed a slight increase in the fall of 2001, the first time in a 6-year period. Even though enrollments have increased over the past years, it is still not enough to meet the projected demand of a million new nurses within

the next 10 years (U.S. Department of Health and Human Services, 2002). Attrition numbers also continue to remain high in nursing schools, ranging from 20 to 40% nationally. That is a significant loss of people who should have completed the program and entered the profession (Seago & Spetz, 2003).

As reviewed earlier in chapter 1, a variety of factors have contributed to the nursing shortage. Changes in the demographics of the general population and nursing along with a decrease in the number of people entering the nursing profession in the 1990s have helped to contribute to this shortage (Auerbach et al., 2000; U.S. Department of Health and Human Services, 2002).

The nursing profession experienced a decrease in the number of people who entered the profession over the past few decades. Young women who had traditionally chosen nursing as a viable career became aware of the plethora of career opportunities available to them and, as a result, chose alternate career opportunities (Payne & Duffy, 1986). Because of the decrease in the number of young people entering the nursing profession in the 1980s and 1990s, the average age of the employed nurse has risen to around 43.3 years of age and is anticipated to climb higher (U.S. Department of Health and Human Services, 2002). Currently approximately 25% of the practicing nurses are over the age of 50 and constitute the largest segment of the nursing work force (AACN, 2009).

Nursing Program Challenges

Academic qualifications and abilities of candidates applying to nursing programs have changed in the past decades (Lewis & Lewis, 2000). Research has indicated that students over the past years applying to colleges and nursing schools have struggled with

increasing academic deficiencies and lack appropriate academic preparation (Foster et al., 1991; Jeffreys, 2004; Lewis & Lewis, 2000). Nursing programs have been known to be academically rigorous as evidenced by attrition rates that range from 20 to 40% (Seago & Spetz, 2003). The academic difficulty of nursing programs combined with the academic deficiencies noted in students contributes to this high attrition rate.

In addition to the attrition rates in nursing programs, the average national passing rate on the NCLEX-RN exam ranges between 83–85%. This means that 15–17% of the students who graduate from a nursing program will fail the NCLEX-RN the first time they take the exam (NCSBN, 2004). Combine the NCLEX failure rate with the average nursing program attrition rate between 20 to 40% and the critical shortage worsens (NCSBN, 2004; Oliver, 1985).

Students who appear to be academically strong may not be prepared for the challenges of nursing school. Some students who have performed well in other subjects still may struggle with the academic requirements of nursing school. The question then arises as to what factors can be used to identify which students have better chances at successfully completing nursing school?

There are also non-academic factors which may influence the success or failure of a student. Some of these factors were presented in the conceptual framework section of chapter 1. For the purpose of this study, non-academic variables were not analyzed.

Demographics in community colleges are particularly diverse in areas such as age, socioeconomic status, and past educational preparation (Linares, 1999). An increasing amount of older students are entering community colleges and are attempting

to enroll in nursing programs. For many of these students, it has been a long time since they attended school and some may have never attended college (Linares, 1999).

At Southwestern Michigan College, the students who enter into the nursing program are a mix of traditional and non-traditional students. Demographics fluctuate from year to year, and many times the number of non-traditional students exceeds the number of traditional students. Non-traditional students deal with different issues than do traditional students. Older students deal with numerous outside demands such as work and family responsibilities more than traditional students do and many lack the study skills necessary in order to be successful in school (Jeffreys, 2004).

Many of the students at Southwestern Michigan College are also first-generation college students. This means they are the first in their family to attend college. That factor may create additional issues for them such as a limited support system because their family members and friends cannot relate to the expectations of what is required in college.

Nursing Program Admissions

Despite the various studies that have been done, the characteristics that identify the most qualified candidates for nursing school still remain somewhat vague. Nursing programs must continue to try to identify the characteristics of students who have the greatest chance of being successful in their programs (Gilmore, 2008). If nursing programs in community colleges continue to accept high-risk students, then retention programs need to be developed to help reduce attrition. It is unfair to admit students who have a poor chance of successfully completing the program without having support systems in place (Gilmore, 2008; Jeffreys, 2004).

The use of an open-door policy by many community colleges can further complicate all of the factors listed earlier. An open-door policy provides for a non-selective student admission process and allows a student to be admitted if they meet the minimal admission criteria (Lewis & Lewis, 2000; Stronck, 1979). This process allows students who may be high risk academically to take a seat in a program, thus preventing or delaying a student who is academically stronger from gaining admission.

Pre-screening individuals who are admitted into the nursing program can help to decrease institutional costs and strengthen the program. Academically weak students require more resources and time, which decreases the support to other students (Petty & Todd, 1985). Selective admission utilizing appropriate evidence-based criteria helps to increase the odds that the most qualified applicants will be admitted into the program. This type of admission process is especially important when the number of applicants outnumbers the seats available (Capoor, 1983; Gilmore, 2008).

Schools such as Harvard that use a selective admissions process have approximately a 5% attrition rate with a 95% student retention rate. In contrast, some inner-city community colleges have under a 20% student retention rate (Erickson & Strommer, 1991). Attrition creates an economic and emotional hardship for the student and the family. From an economic standpoint, it costs approximately half as much money to educate a qualified candidate versus a less capable student (Capoor, 1983).

> The current nursing shortage magnifies the need for decreasing attrition from the profession. A number of potential graduates are lost from the profession during their education, or their entry into practice is delayed because of NCLEX failure. This failure comes after a significant investment of time and money on the part of the students, the schools of nursing, and employers. Thus, implementing programs to significantly decrease this risk is of value to all involved. (Jenks, Selekman, Bross, & Paquet, 1989, p. 117)

Associate degree nursing programs supply the work force with 60% of the registered nurses (Auerbach et al., 2000). Because associate degree nursing programs provide the health care work force with more than half of the nursing professionals, it is critical that those programs admit the most qualified applicants to meet the increasing needs for registered nurses. Baccalaureate programs have historically utilized a competitive admission process in an attempt to admit the most qualified and academically prepared applicants. Associate degree programs have not typically utilized that type of admission process.

From the literature review conducted for this study, it appears that more research has been done on baccalaureate nursing programs than associate degree programs. While this information can be useful and applicable, associate degree programs can vary significantly from baccalaureate programs. One of the major differences between the two types of programs is in the admission process. Most associate degree nursing programs are located in community colleges, which typically utilize an open-door admission policy for students who wish to attend their institution. The nursing programs in these institutions use a modified open admission policy, requiring that the students must complete the prerequisite courses prior to admission and achieve a minimum GPA, which in some programs may be as low as a 2.0 cumulative.

At a meeting of the Michigan Council of Nursing Education Administrators (MCNEA, 2007), an informal inquiry was made regarding admission criteria and qualifications for associate degree nursing programs across the state. Only about one-third of the nursing programs in the state of Michigan utilize a competitive or selective admission process. Approximately two-thirds of the programs require only a student to

meet minimum requirements. Once the student meets the minimum requirements, they are put on a waiting list. When their name comes up on the waiting list, they are admitted. Students who have a 2.0 GPA are treated the same as a student who has a GPA of 4.0. Utilizing a wait list allows students who may be academically weak to be admitted. If there are significant numbers of these students, attrition losses could be significant.

At a time when nursing is experiencing a significant shortage in the work force, all nursing programs need to ensure that the most qualified applicants are admitted into their nursing programs. Baccalaureate programs have utilized competitive admission criteria for years. Associate degree nursing programs should consider establishing appropriate admission criteria and utilizing this type of process to admit the most qualified applicants.

Based on verbal comments from the Michigan Council for Nursing Education Administrators (MCNEA, personal communication, June 9, 2007), there exists some hesitation among some community college administrators and presidents to use competitive admissions. Community college administrators should be made aware of the rationale for utilizing a competitive or selective admission process. This would allow more schools to admit qualified applicants, thus reducing the long waiting lists and leading to an increase in more qualified applicants.

Student Attrition and Retention

Student attrition is defined as students who do not complete or graduate from the nursing program (Jeffreys, 2004). Attrition has a negative impact for numerous reasons. Students undergo a tremendous amount of emotional grief due to attrition (Jeffreys, 2004; Rowser, 1997; Tinto, 1993). The cost is not only emotional, but also financial. Additional

costs are incurred for the students when they do not succeed because of the need to pay additional tuition for repeated courses. Failure also delays the student's graduation, resulting in lost work time and lower earning potential (Stickney, 2008).

From a programmatic standpoint, students who fail or drop out of a nursing program have taken a seat in a program where there are limited numbers of admissions to begin with; thus decreasing the number of students who can graduate and become productive nurses (Gilmore, 2008; Shelton, 2003; Stickney, 2008). This loss of potential graduates will further enhance an already critical shortage in the nursing work force. Therefore it is critical that schools identify factors which lead to student attrition and focus on solutions to help retain students in the programs.

Nursing programs are academically very rigorous and attrition rates range from 20 to 40% (Seago & Spetz, 2003). Besides losses from attrition, the average national passing rate on the NCLEX-RN exam ranges between 83–85% (NCSBN, 2006). If attrition numbers and NCLEX failures are added together, anywhere from approximately 30% up to 60% of the students who enter nursing school have the potential of being unsuccessful, either during the educational program or after graduation when they take the NCLEX-RN (Sayles et al., 2003).

> It may not be possible to entirely eliminate attrition from schools of nursing, but every effort should be made to reduce it to the lowest level possible. Attrition is costly. It can cost students who withdraw a year or two of subsequent earning power and it can have a devastating effect on their sense of self-worth. It costs schools of nursing faculty effort and resources that do not result in a student who graduates, and for every student who does not complete a program, one fewer nurse is available to the health care system. It is worth trying to eliminate. (Pringle, 2004, p. 4)

Retention studies and causes of attrition have been reviewed in the nursing literature (Braxton, 2001; Tinto, 1998). The majority of the studies reviewed have

focused on traditional students in baccalaureate programs (Jeffreys, 2004). The studies included in this literature review include both associate degree nursing programs and baccalaureate degree nursing programs. There are slight variances between the two types of programs, which may decrease the reliability of the comparison. Studies utilizing factors that are linked with the NCLEX-RN success will also be discussed in the literature review.

<div align="center">**Success Factors**</div>

Various studies have reviewed factors associated with success of nursing students and graduates from nursing programs. Graduating from nursing school is critical; however, ultimate success is defined by passing the National Council Licensing Exam–Registered Nurse (NCLEX-RN). The NCLEX-RN is the final step necessary in order for a graduate to assume their role as a registered nurse. This exam is taken after students have graduated from an accredited nursing program.

Many of the studies conducted on success factors in nursing education have focused on successful completion of the NCLEX-RN exam. Determining the factors that may affect NCLEX-RN success is valuable information, and some comparisons can be made between the NCLEX and success in nursing school.

As identified in the conceptual framework of this study, various factors can impact student outcomes in nursing school. These factors have been categorized into academic and non-academic factors, and the literature review for this study has been organized utilizing these two categories. These factors can be used to identify students who might have a greater chance at being unsuccessful in nursing school. Some of those factors have been identified by Dr. Marianne Jeffreys in the NURS model.

The NURS model provides a framework to identify students who may be at risk and helps with the development of an educational plan that will help them to be successful (Jeffreys, 2004). While this information is very valuable in helping to reduce attrition and increase student success, the focus of this study is to identify if any of the courses taken prior to admission into nursing school may be used as a predictor variable for success.

As identified in the conceptual framework of chapter 1, the information in the literature review will be categorized as academic variables and non-academic variables. Academic factors identified within the literature review and the conceptual framework include, but are not limited to, variables such as standardized test scores, prior academic achievement, cumulative grade point average (GPA), grades in selected courses, study skills, interest in subject matter, and course attendance (Jeffreys, 2004).

There are a number of non-academic factors found in the literature that may influence a student's ability to be successful in school. For this research study, I have categorized the various non-academic factors as internal and external factors. Included in the internal category are factors such as commitment, self-efficacy, stress, and other personal factors. Within the external category, I have included such things as life crises, family responsibilities, work, finances, and support systems.

Within the literature review, a summary will be given on the various academic and non-academic variables that may influence a student's progress in nursing school.

Academic Factors

The literature review reflected that the majority of the studies done on predictors of success in nursing school have focused on the successful completion of the NCLEX-

RN. The success rates for the exam appear to be the most common dependent variable noted in the majority of the studies because of the close correlation between passing the NCLEX-RN and success in nursing school. Because of the close correlation, the studies utilizing NCLEX-RN have been used in the literature review for this study.

Academic factors have been one of the most widely studied independent variables when it comes to looking at potential predictors of success in nursing school and the NCLEX-RN. Cognitive measures of grades, college admission scores, nursing achievement tests, and college GPA were found to be fairly good predictors of success on the NCLEX-RN exam. Grades in the nursing courses along with entry and exit GPA have been found to be the most constant predictive variable identified by numerous studies as influencing NCLEX-RN success rates (Del & Halpin, 1984; Jenks et al., 1989; McKinney, Small, O'Dell, & Coonrod, 1988; Payne & Duffy, 1986; Quick, Krupa, & Whitley, 1985).

Higher cumulative grade point averages were consistently noted in students who were successful on the National exam (Allen, Higgs, & Holloway, 1988; Griffiths et al., 1995; McClelland, Yang, & Glick, 1992; McKinney et al., 1988; Waterhouse & Beeman, 2003; Waterhouse & Beeman, 2001). A study by Horns et al. (1991) discovered that 67% of the variance on the NCLEX-RN score was accounted for by the pre-nursing admission grade point average. Bauwens and Gerhard (1987) found that NCLEX scores correlated significantly with entry grade point average, graduating grade point average, and baccalaureate nursing cumulative grade point average. These various studies indicate that using grade point average may be very useful admission criteria for nursing programs.

To further validate using GPA as admission criteria, Whitley and Chadwick (1986) identified that students with low cumulative and science GPA, low SAT scores, and scores below their class mean on nursing exams had a significant chance at failing the NCLEX-RN. Felts (1986) found that grades in college courses predicted pass or fail on the NCLEX-RN, more than high-school GPA, in particular, the grades that a person received in the biological science courses, social sciences, and humanities.

Jenks et al. (1989) discovered that nursing theory courses in the junior and senior year and the Mosby Assess test strongly correlated ($p < .0001$) with successful NCLEX performance. Discriminant analysis enabled successful classification of 62% of the sample at pre-matriculation, 81% at the end of the junior year, and 86% at the end of the senior year. The study indicates that students at high risk can be identified at the end of the junior year so that enrichment and support programs can be introduced at that time (Jenks et al., 1989). While this is valuable information when studying factors that affect NCLEX success, it has minimal bearing on identifying pre-admission academic factors.

High-school grades and grade point average have traditionally been used as admission criteria into colleges (Schwirian & Gortner, 1979; Talley, 1989). Students who did well in high school typically tend to do well in the college and university setting (Brennan et al., 1996). Community colleges have utilized high school GPA to a lesser degree than have 4-year institutions. Community colleges typically admit more non-traditional students than 4-year institutions. Because of the potential increase in length of time between completion of high-school and starting college, high-school GPA has less predictive value and influence on this group of students (Felts, 1986; Griffiths et al., 1995).

In some cases, high-school grades and high-school GPA have been noted to be poor predictors of success in nursing school. The various ages of students entering college, in particular, community colleges, along with the time span since these students were in school may make utilization of high-school predictors very inaccurate. However, in a study of associate degree students, it was found that high-school ranking, Biology grades, and English scores were significantly related to success (Fearing, 1996).

Using only academic indicators may not be the best measure of a student's ability since these tests have been thought to inaccurately assess certain cultural groups (Astone & Nunez-Wormack, 1991; Stronck, 1979). Grades and standardized test scores provide quantitative data regarding a student's abilities, but those indicators do not take into account motivation, determination, and other factors (Jeffreys, 2004).

In a study sponsored by the U.S. Department of Health, Education and Welfare, 398 studies published between 1965 and 1975 were reviewed. These studies looked at numerous variables such as demographics, student attitudes, achievement, and intelligence indicators. The conclusion in this study was that causes of attrition remain unresolved. The study concluded that the best predictors were based on prior academic achievement, which is measured by theory grades and grade point average (Schwirian & Gortner, 1979).

The conclusions that could be drawn from these studies are that previous academic success could be considered a fairly good predictor of success in nursing school; however, high-school GPA might not be as useful as grades from college. One might conclude that grade point average could be considered a significant predictor variable in addition to utilizing grades in the biological and social sciences as potential

predictors of success in nursing programs. What is considered a high enough grade in each of these courses that is linked to success (Arathuzik & Aber, 1998)?

Standardized Tests

There have been a plethora of standardized exams studied to identify if a relationship exists between the various exams and success in nursing school. The majority of the research studies have focused on the potential predictive ability of these tests on the NCLEX-RN exam. For this study, the major tests that were reviewed were the American College Testing (ACT), Scholastic Aptitude Test (SAT), National League of Nursing (NLN) exam, Mosby exam, and the Nursing Entrance Test (NET). These are the most common exams taken by students applying to college or nursing school.

Scores on the SAT, especially the verbal component, have been linked to NCLEX success (Del & Halpin, 1984; McKinney et al., 1988; Quick et al., 1985; Woodham & Taube, 1986). Verbal ability and reading comprehension are essential for success in nursing school due to the large amount of reading required. Both the ACT and SAT exams assess verbal ability and reading comprehension. Caution must be taken, however, when using ACT and SAT scores in populations where there is significant academic diversity since predictability appears to be less accurate in these groups with these exams (Aldag & Rose, 1983; Sharp, 1984).

Nursing entrance exams have also been studied for predictability on student success. The majority of these studies have focused on success after graduation from nursing school using the NCLEX-RN as the dependent variable. Three of the most common nursing entrance exams are the National League of Nursing (NLN), Mosby exam, and the Nursing Entrance Test (NET). The Mosby Assess Test has been found to

be a moderate to strong predictor of success on the NCLEX-RN exam (Beeson &

Kissling, 2001; Jenks et al., 1989; McKinney et al., 1988). The National League for

Nursing (NLN) achievement exam was found to have a moderate predictability on the

state board exam results (Henderson & Orr, 1989; Washburn, 1980). Sayles et al. (2003)

identified higher math and reading scores with NCLEX-RN success. Because of the

results of these various studies and their moderate predictability on success, nursing

programs might want to consider utilizing some type of standardized nursing exam as

part of the admission process for acceptance into a nursing program.

A study by Foti and DeYoung (1991) conducted a comparison of various

predictors. The Mosby Assess Test was found to have a correlation of .66 to the

successful passage of the NCLEX-RN exam versus the NLN Achievement exam, which

had a .51. The next highest correlation associated with passage of the NCLEX-RN was

the overall GPA which was a .59, and the verbal score on the SAT was third at a .46

correlation.

A multiple regression analysis within this same study showed that the most useful

combination of these factors as a potential predictor was the Mosby Assess Test, SAT

verbal, and overall GPA with an R2 of .49. Based on these data, it would appear that

utilization of the Mosby exam in combination with the grade point average and verbal

assessment may prove beneficial as potential predictors of success in the nursing

program.

According to the studies identified in this literature review, the Mosby test may be

one of the most reliable indicators based on its predictability on the NCLEX-RN.

Even though standardized tests have the ability to measure cognitive domain, they have not been proven to be satisfactory predictors of a student's clinical performance. The skills and knowledge needed to be successful in the clinical area are more in the realm of affective and psychomotor domain (Schwirian & Gortner, 1979).

In another study by Fowles (1992), grade point average at the end of Level I, ACT composite and social science, Anatomy and Physiology grade, and Mosby Assess Test scores were the best predictors of success on the final college grade point average. In addition, the best NCLEX-RN predictors were the Mosby Assess Test, nursing prerequisite GPA, and ACT social science or composite score. The Glick et al. study (1986) looked at the relationship between admission variables such as high-school grade point average and rank, college admission test scores, and pre-nursing grade point average and found that pre-nursing grade point averages and Biology grades were the best predictors of nursing course work.

In a study by Allen et al. (1988), a sample of 296 generic baccalaureate nursing students was analyzed looking at the relationships between 40 potentially predictive variables and the outcome on the NCLEX exam, whether the student failed or passed. The variables that were identified as having a potential influence on the NCLEX-RN exam were: (a) cumulative nursing grade point average, (b) completion of the program, (c) receipt of a D in a nursing course, and (d) receipt of an F in a nursing course. A Chi-square test, *t* test, analysis of variance (ANOVA) Pearson correlation, and multiple regression were used to analyze the data.

Within the study, 16 variables were identified as predictive in relation to one or more of the four outcomes. Pre-admission cumulative GPA and prerequisite GPA were

the strongest and most consistently predictive variables for all outcomes. In addition, a cluster of variables in student backgrounds was identified that should assist in selecting those at-risk students most likely to succeed (Allen et al., 1988).

A study by McClelland et al. (1992) was done to validate findings from two previous smaller studies that investigated the relationships between admission selection variables and subsequent achievement in baccalaureate nursing programs. This was then compared to performance on the NCLEX-RN. There were 1,069 subjects in this study who were graduates from nine Iowa basic baccalaureate nursing programs. The analyses included three major components. The first addressed the relationship between admission selection variables and subsequent achievement in the nursing programs and performance on a standardized nursing achievement test and the NCLEX-RN. The second component investigated the extent to which achievement in nursing courses predicted performance on the NCLEX-RN. In the third component a path analysis was used to formulate a causal model describing the relationships among the variables in the study.

The results of the study suggest that students' pre-nursing grade point average and American College Testing scores predict their performance on the NCLEX-RN. Knowledge of performance predictors can both facilitate admission selection and the use of educational resources to develop nursing competence and promote success in obtaining licensure to practice (McClelland et al., 1992).

Previous academic ability has been identified as the best and most reliable predictor of potential performance or academic aptitude in college-level course work. High-school GPA and class rank are used frequently as measures (Seither, 1980). However, tests which measure language skills tend to be linked with an increase in

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academic performance (Gallagher, Bomba, & Crane, 2001; Taraban, Rynearson, & Kerr, 2000). This may be explained because of the reading difficulty which accompanies most nursing courses.

Other studies have shown low correlations of grade point average with performance in the first 2 years of medical school with even lower correlations in clinical performance. Even though there were low correlations, grade point average still proved to be the best single predictor of success in medical school. MCAT scores were noted to have a lower correlation to success in the program than grade point average. The greatest value of the MCAT was to screen out those individuals who would have the greatest risk of academic difficulty versus identifying the most qualified applicant (Murden, Galloway, Reid, & Colwill, 1978).

A screening process that is based on both cognitive and personal traits might enhance the qualifications of those who are considered for admission. Grade point average, without consideration of personal traits of the person, will not necessarily increase the quality of those who are admitted (Rhoads, 1974).

In conclusion, it would appear that previous academic experience, measured by the students' GPA, has highest predictive value on NCLEX success. It would be assumed that this could translate to success in nursing school. As a result of this analysis, it may be worthwhile for nursing schools to consider using grade point average as part of their criteria for admission into their programs.

Non-Academic Factors

Non-academic factors are those variables that are not related to a student's academic abilities or previous measures of academic achievement. Non-academic factors

can include a myriad of variables that can affect a student's performance in school. As indicated in the conceptual framework for this study, the non-academic variables have been categorized as external and internal factors. External factors include environmental things such as family responsibilities, work and financial responsibilities, and emotional support. Internal factors include things such as commitment to school, stress, and self-efficacy. These factors are just a few of the non-academic variables that can influence a student's educational outcome.

External environmental factors are factors that are external to the academic process, but may influence a student's academic performance (Bean & Metzner, 1985). According to Bean and Metzner (1985), environmental factors include variables such as finances, hours of work, and family responsibilities and were typically thought to affect non-traditional students more than traditional students. Bean and Metzner were some of the original researchers to provide a conceptual framework whereby other studies were conducted (Jeffreys, 2004). One of the major researchers who utilized their studies and developed this further was Dr. Marianne Jeffreys with her NURS model.

The NURS model, developed by Jeffreys (2004), stands for Nursing Undergraduate Retention and Success. This includes various factors that affect both traditional and nontraditional student groups. According to Jeffreys, the various factors can affect both traditional and nontraditional students; however, the way they affect retention and attrition in the different groups may vary.

Financial support and financial status should be considered when looking at non-academic factors that might influence attrition (Eaton & Bean, 1995; Jeffreys, 2004). This not only refers to the ability of the student to meet the fiscal responsibilities for

school, but also the financial obligations to the family. Even if the student is not financially responsible, they may feel a strong obligation because the family is paying for the education.

Family responsibilities can also play a significant role in student attrition. Family responsibilities are the daily tasks, expectations, values, and behaviors needed to perform the expected role within the family (Jeffreys, 2004). These responsibilities have been noted to be a specific obstacle for nontraditional nursing student success (Aber & Arathuzik, 1996; Burris, 2001; Griffiths & Tagliareni, 1999; Tucker-Allen & Long, 1999). This can be caused from the conflicts that occur between the family responsibilities and school responsibilities. The demand of family responsibilities leads to a decreased ability to concentrate on school, which can lead to a greater risk of attrition.

In a study of non-traditional associate degree nursing students, 51% perceived that family responsibilities were moderately restrictive and 6% perceived them as severely restrictive (Jeffreys, 1998). As a result of these significant demands and the emotional stress that is put on students in the nursing programs, support systems should be put in place early to meet the increased demands (Jeffreys, 2004). If the student is already at risk for attrition because of academic factors, these nonacademic factors will increase the risk even more.

Responsibilities associated with employment can have a significant impact on a student's success in school. Various studies have looked at employment in various areas and the impact that different jobs might have on a student's ultimate success or failure. The overall conclusion that has been identified in the literature is no matter where the student was employed, the responsibilities associated with employment were found to

have a negative impact on academic outcomes (Aber & Arathuzik, 1996; Merrill, 1998; Tucker-Allen & Long, 1999).

A multiple regression analysis by Hayes (1981) attempted to look at 13 cognitive and non-cognitive variables using the California Psychological Inventory (CPI) and the Survey of Interpersonal Values (SIV). The study indicated that the cognitive variables are the strongest predictors of academic success. The non-cognitive variables were not found to be significant in this study; however, this result may be caused from a small sample size.

Aber and Arathuzik (1996) found some significant correlations between students who were successful in the nursing program and a number of factors. Success was identified utilizing the overall GPA. This study identified that self-efficacy seemed to be a key factor in a student's successful completion of the program.

Self-efficacy was a central construct in Bandura's (1977, 1986) social learning theory. If a person has a high self-efficacy for a subject or task, they are most likely to be successful at that task. Self-efficacy is a motivating factor for students and seems to be linked back to previous task performance.

Additional non-academic factors have been studies that have looked at student success factors, especially as they pertain to student performance. Family responsibilities and financial difficulties are just a few of these factors that students face (Aber & Arathuzik, 1996; Burris, 2001; Griffiths & Tagliareni, 1999; Tucker-Allen & Long, 1999). In addition, students who typically do poorly in college (GPA below 2.0) have been noted to have poor study habits and many times were not goal oriented. They were also noted to have an external locus of control, blaming others and other things and not

themselves (Griffin, 1980). Age has been found to be positively correlated to success: Students who are older seem to have a greater chance at better academic performance (Petty & Todd, 1985).

Summary

The purpose of the literature review was to identify whether there are significant factors that can predict the success of nursing students within schools of nursing. If this type of correlational information can be determined, appropriate admission criteria for nursing programs can be established. As a result, applicants admitted into nursing programs will have a better chance at successfully completing the nursing program.

As schools of nursing are faced with an excess of student applicants to their programs, accurate admission criteria are critical. If appropriate admission criteria are developed, attrition rates will hopefully decrease and more students will graduate from nursing school.

The major conclusions which can be drawn from this literature review is that there are no absolutes when it comes to predicting success in nursing school. It does appear however that previous academic accomplishments are one of the strongest indicators of success in nursing school.

CHAPTER THREE

METHODOLOGY

The purpose of this study was to identify whether a relationship exists between grades in prerequisite courses for the nursing program and successful completion of the program. The five prerequisite courses that were used for this study were: Fundamentals of Chemistry (CHEM 100), Anatomy and Physiology (BIOL 201), General Psychology (PSYC 101), Introduction to Human Communication (SPEE 104), and Elementary Algebra (MATH 101). The research design is discussed in this chapter along with the sample population and variables, the research question, and the procedure, along with the method of statistical analysis utilized for each research question.

Research Design

This study was a quantitative study utilizing secondary data analysis of the five prerequisite courses that are taken prior to admission into the nursing program at Southwestern Michigan College. A comparative model of inquiry was used to investigate whether there was a difference in prerequisite grades and gender between the graduate group and the non-graduate group (McMillan & Schumacher, 2001).

This method was chosen in order to compare the grades achieved in prerequisite courses to identify if there was a difference between the graduate group and the non-graduate group. A comparison was also made on the influence of gender between the two groups.

Population and Sample

The sample population for this study was made up of students admitted into the associate degree nursing program at Southwestern Michigan College, a community college with a student population of around 3,000 students per year.

The School of Nursing at Southwestern Michigan College received approval for the practical nursing program in January of 1971 and the associate degree nursing program received full approval in June 1977 (*State Board of Nursing Report*, 2006). The current structure of the program is a laddered curricular structure. A laddered curriculum allows the student to take one of two paths after admission into the nursing program. One path is the Practical Nursing program, which can be completed in 1 year after admission into the nursing program. The other option is the associate degree Registered Nursing program, which takes four semesters of nursing courses to complete.

Both the Practical Nursing program and associate degree nursing program use the same admission criteria. The ladder allows the students the option to exit after the first year of nursing courses for the practical nursing program or complete the four semesters for the associate degree. The ladder program also allows licensed practical nurses the opportunity to return to school and complete their Registered Nursing degree without starting the program at the beginning.

The nursing program at Southwestern Michigan College is allowed by the Michigan State Board of Nursing to admit 40 students twice a year into the program. The School of Nursing attempts to fill all 40 seats every semester. The students can be admitted into the program only after they have successfully completed all of the five prerequisite courses. Successful completion is defined as a minimum grade of a "C" in all

prerequisite courses and an overall minimum GPA of 2.5 for all coursework. This type of procedure is referred to as a selective admission policy utilizing minimum criteria for admittance into the program.

For this study, the sample population consisted of students who were admitted into the nursing program at Southwestern Michigan College between 1991–2001 due to the consistency of the admission criteria during this time period. After 2001, there were slight changes to the admission criteria for the nursing program which could affect the internal validity of the study. The sample population included 923 students from the associate degree nursing program. The NCLEX-RN percentages for the college from 1991–2001 ranged from 73%-100% for first attempt.

Variables

The independent variables for this study are the five prerequisite courses that must be taken and successfully passed with a minimum grade of a "C" prior to admission into the nursing program. The five prerequisite courses are CHEM 100, Fundamentals of Chemistry, 4 credits; BIOL 201, Anatomy & Physiology, 5 credits; MATH 101, Elementary Algebra, 4 credits; PSYC 101, General Psychology, 3 credits; and SPEE 104, Introduction to Human Communication, 3 credits. Students can complete the courses in any order except for Chemistry, which must be taken before Anatomy and Physiology. Students must achieve a minimum grade of a "C" on all prerequisite courses and a minimum cumulative GPA of 2.5 in order to qualify for admission into the nursing program. A grade of a "D" is not acceptable for admission, nor is it allowed for students at any time while they are in the School of Nursing.

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Following is a course description for each of the prerequisite courses taken from the Southwestern Michigan College catalog. Included with the course description is the rationale why the course is significant to help prepare students for the nursing program.

CHEM 100, Fundamentals of Chemistry (4 credits): Provides a basic overview of chemical principles for students with little or no background in Chemistry. Includes Fundamentals of General Chemistry, Organic Chemistry, and Biochemistry.

Rationale: In order to understand physiological principles and how they relate to the body, students must have a basic understanding of chemical components and properties within the human body. This provides them with a baseline when it comes to understanding lab values and how various medications react in the body.

BIOL 201, Anatomy and Physiology (5 credits): Provides an introduction to basic principles of human anatomy and physiology. Includes aspects of gross anatomy, body function, and the relationship of organ systems to each other. Dissection of preserved specimens is a lab requirement.

Rationale: Understanding of the structure of the human body and how the various organ systems operate is crucial for nurses to understand. In order to understand disease process and how it affects the body, one must first understand how the human body functions. Besides understanding disease process, this knowledge is also critical for understanding how drugs function in the body and the significance of lab values.

MATH 101, Elementary Algebra (4 credits): Includes some review of arithmetic, algebraic expressions, graphing with the rectangular coordinate system, polynomial operations, and factoring. Linear equations and inequalities as well as rational, radical, and quadratic equation solving are taught from numeric, visual, and

symbolic approaches. Strong emphasis on vocabulary, problem-solving, making connections among tabular, graphical, and symbolic information and understanding versus memorizing.

Rationale: Math skills are critical for nurses in the day-to-day performance of their job. They must consistently calculate drug dosages, intravenous solution rates, and so on. Accuracy is essential, for a mistake could cost someone their life. Students must be able to solve a variety of different types of equations. Once students are admitted into the nursing program, they will take a course that specifically focuses on medical Math concepts. The Math 101 course is a prerequisite to this course and the concepts must be understood in order for a student to be successful in the medical Math.

PSYC 101, General Psychology (3 credits): This is the first course in the study of individual human behavior. Subjects addressed include: learning, development, the scientific method, personality, mental health, perception, emotion, and motivation.

Rationale: Nursing is a very humanistic-oriented profession. In order to work with people in all stages of development undergoing various types of stressors, one must understand basic human development and Psychology. This course provides a basic structure whereby the nursing program can build upon and further develop the skills necessary to understand human behavior. The students utilize all the information that they learn in Psychology in the day-to-day experiences in clinical. They are also asked to problem solve within their theory courses utilizing many of these concepts. During the course of the nursing program, students complete a Psychiatric nursing clinical rotation. This clinical heavily relies on integration of the material that was learned in the general Psychology course.

SPEE 104, Introduction to Human Communication (3 credits): Surveys and examines the communication process in interpersonal, small-group, and organization settings. The course includes listening and interviewing skills, as well as nonverbal, gender, and inter-cultural communication. Students utilize principles learned in classroom exercises.

Rationale: Effective communication is essential in the day-to-day job responsibilities of nurses. Communication may vary from basic instruction on medications for a patient, to consoling a grieving family. As a result, nursing students need to be prepared with basic communication skills prior to entry into the program so those skills can be further developed and enhanced. Within their nursing courses, students are continuously assessed regarding their knowledge of appropriate communication techniques that should be used. They are also expected to be able to utilize these various techniques in the clinical environment and identify what techniques they are using.

In addition to the prerequisite courses that must be completed prior to admission, the remainder of the admission criteria must be met. The admission criteria for the School of Nursing includes:

1. Completion of all the prerequisite courses with a minimum cumulative grade point average on all five of the prerequisite courses of 2.5

2. Minimum grade of "C" on each prerequisite course

3. Overall cumulative grade point average of 2.0 or above

4. Three personal references

5. Health record: physical exam and immunizations.

The dependent variable for this research study is the successful completion and graduation from the associate degree Registered Nursing program. Students who either failed out of the program or withdrew from the program are classified as non-completers.

Procedure

This research study is a secondary data analysis of the academic records of students enrolled in the nursing program from 1991–2001, utilizing a comparative mode of inquiry. The data were pulled from the college's database, utilizing the Classification of Instructional Programs (CIP) code assigned to the associate degree nursing program. The CIP code is a coding scheme for secondary and postsecondary instructional programs that is used to help with the collection of data for the programs. The CIP code is used by the federal government as a statistical standard whereby instructional programs are classified and used in a variety of educational surveys and databases (nces.data/cip 2000).

After the data were collected from the college's database, it was organized into an Excel spreadsheet and categorized by student identification numbers. Additional data extrapolated from the college database were the student's grade point average (GPA), gender, age, graduation status, and grades achieved in all courses that were taken while in attendance at the college, along with the number of times the courses were taken. If the students transferred in courses from another college or university, the grades for those courses were unattainable for this study due to the unavailability of paper copies of transcripts. The policy for transcript evaluation allows credit to be granted without a grade recorded on the SMC transcript. Evaluated transcripts are shredded within a year after evaluation.

The data were then sorted and reorganized into another Excel spreadsheet to sort the appropriate prerequisite courses and eliminate general education courses that were not pertinent to this study. During this data cleaning and sorting process, there were some variations noted to the prerequisite courses that required slight adjustments for data analysis to occur.

The adjustments made for each prerequisite course are listed below along with information specific to each course.

Fundamentals of Chemistry (CHEM 100) was a single course. There were no other courses that the grades were utilized for acceptance into the nursing program. The major variation with the Chemistry course was the students who transferred this course in from another educational institution. Students who transferred in the Chemistry courses were given credit for the course, but the course grade was not applied to the transcript. For the purpose of this study, the credit for the course was coded as a "C" grade for the course.

General Psychology (PSYC 101) was a single course such as Chemistry. There were no additional courses that could be taken and substituted in place of this course. The major variation with the Psychology course was the students who transferred this course in from another educational institution. Students who transferred in the Psychology course were given credit for the course, but the grade for the course was not applied to the SMC transcript. For the purpose of this study, the credit for the course was coded as a grade of "C" for the course.

Anatomy and Physiology (BIOL 201) had different variations of courses that the student population had taken. The course listed for the recommended prerequisite from

1991–2001 was Anatomy and Physiology (BIOL 201).

There were different combinations of the Biology course noted in the data (see Table 1). Some of the students took the BIOL 201. Others took different combinations of the courses such as BIOL 201 with BIOL 214, BIOL 201 with BIOL 215 and BIOL 214 with BIOL 215. For the purpose of this study, whatever Biology course had the highest grade was utilized for the study.

The fourth prerequisite course was the Elementary Algebra (MATH 101) course. The Math prerequisite course had a couple of different variations identified during the review of the data (see Table 2). Just as with the other prerequisite courses, some students had transferred in a Math course. These students were given credit for the course and the grade coded for the transfer credit was a "C" for the purpose of this study.

The other variation experienced with the Math course was students who tested out of the Math course. This was evidenced in the data by lack of a course grade and indication of test out status.

The Speech prerequisite had a couple of options. The Speech course prerequisite could be met with two courses. The course that is listed as the official prerequisite for the nursing program is Introduction to Human Communication (SPEE 104). This is the preferred course and recommended for the students to take. In some cases, however, some students had taken Public Speaking (SPEE 102). If students had taken that course, they were allowed to use this course to meet the Speech prerequisite. For the purpose of the study, the two courses, SPEE 102 and SPEE 104, were merged together to form one

Table 1

Variations for the Biology Course

Course listing on transcript	Excel spreadsheet	SPSS coding
BIOL 201	BIOL 201	Grade entered as indicated
BIOL 214 & BIOL 215	Treated as BIOL 201	Highest grade entered for evaluation
BIOL 201 & BIOL 215	BIOL 201 entered	Grade from BIOL 201 entered
BIOL 201 & BIOL 214	BIOL 201 entered	Grade from BIOL 201 entered
BIOL 201, BIOL 214, or BIOL 215 transfer	Coded into data as BIOL 201	Assigned a grade of "C"

Table 2

Variations for the Math Course

Course listing on transcript	Excel spreadsheet	SPSS coding
Math 101	Math 101	Grade entered as indicated
Math 105	Treated as a test-out	No grade assigned
Math 101 transfer	Coded into data as Math 101	Assign grade of "C"
Math 101 test-out	Treated as a test-out	No grade assigned

Speech course (see Table 3). The grade that was achieved in the particular course was used for the data analysis for the study. Some students may have transferred the Speech course in from another educational institution, just like the Psychology and Chemistry courses. Just like the previous courses, the student was given credit for the course, but the course grade was not applied to the SMC transcript.

Some students were missing prerequisite courses as a result of testing out of certain prerequisite courses. Test scores were not used in this study. The main course that the students tested out of was the Elementary Algebra (MATH 101) course. For this study, students who tested out of MATH 101 were used and the MATH 101 portion was factored out of the statistical calculations for these students.

After the data were reorganized and sorted, it was entered into the SPSS software, where the data were organized and coded. SPSS is the statistical software that was chosen for the analysis of these data.

Table 3

Variations for the Speech Course

Course listing on transcript	Excel spreadsheet	SPSS coding
Speech 104	Speech 104	Grade entered as indicated
Speech 102	Treated as Speech 104	Grade of Speech 102 entered into the data
Speech 102 transferred	Coded as Speech 104	Assigned a grade of "C"
Speech 104 transferred	Coded as Speech 104	Assigned a grade of "C"

In order to use these data and conduct this study, permission was obtained from the Executive Vice President and Chief Operating Officer of the college. The letter supporting approval for this study is included for reference in Appendix A. The dissertation proposal was submitted to the Institutional Review Board at Andrews University and approval was received to conduct the study.

Research Questions

As indicated earlier in the chapter, the purpose of this study was to identify whether there are any correlations between grades in the prerequisite courses taken prior to admission into the nursing program and the student's outcome in relationship to the nursing program completion. In this case, success is defined as graduation from the nursing program and withdrawal or failure out of the program is classified as unsuccessful.

The following research questions were addressed in the study:

1. Are there differences between the graduate population and the non-graduate population in regard to grades in the prerequisite courses?

2. Are there interactions between gender and graduation status in grades for prerequisite courses?

3. To what extent does the set of the prerequisite courses reliably discriminate between graduates and non-graduates?

Analysis of Data

This is a comparative study between the graduate and non-graduate population to identify whether there is a relationship between the grades achieved in prerequisite courses for the nursing program and graduation status.

The purpose of comparative studies is to investigate the relationship of one variable to another by examining if the dependent variable in one group is different from the dependent variable in the other group (McMillan & Schumacher, 2001). This study compared whether there are significant differences between the graduate group and the non-graduate group in the grades received in the five prerequisite courses. The data from this study can be used to help identify and implement the appropriate academic criteria required for admission into the nursing program.

Listed are the three research questions for this study and the statistical tests that were utilized for each question.

Research Question 1: Are there differences between the graduate population and the non-graduate population in regard to grades in prerequisite courses?

This research question is answered using an independent samples *t*-test to identify if there are significant differences in the mean GPAs of graduates and non-graduates on the five prerequisite courses. This is a univariate analysis that reviews grades in each individual course.

Research Question 2: Are there interactions between gender and graduation status in grades for prerequisite courses?

This research question can be answered by using two-way analyses of variance to identify if there are interactions between gender and graduation status.

Research Question 3: To what extent does the set of prerequisite courses reliably discriminate between graduates and non-graduates?

Direct discriminant analysis was chosen as the method of analysis for this question to identify if the group of prerequisite courses together can identify membership in the graduate group versus non-graduate group. Gender was also evaluated as part of this question. This question is a multi-variant analysis that analyzes all five prerequisite courses as a whole. Univariate data for each prerequisite course are also included in this analysis.

Limitations of the Study

It is recognized that the current study has some limitations which may threaten the validity of the study. It will not be possible to automatically generalize to other programs, which will limit the study's external validity.

Summary

This comparative study used descriptive statistics, including independent samples *t*-test, two-way ANOVA, and direct discriminant analysis to compare the graduate and non-graduate groups.

CHAPTER FOUR

RESULTS

Introduction

Currently, the nursing profession is suffering from a critical shortage of registered nurses in the work force (Buerhaus, 2001). This shortage is anticipated to continue for the next 10 to 20 years (U.S. Department of Health and Human Services, 2002). Nursing programs play a critical role in helping to alleviate this shortage by graduating students from their programs who will go on and successfully complete the NCLEX-RN exam. One way that nursing programs can meet this goal is by admitting the most qualified applicants and by reducing attrition in their programs.

The purpose of this study was to examine if any of the prerequisite courses taken prior to admission into the nursing program at Southwestern Michigan College could be correlated to successful completion of the program. The intention of this study was to utilize the information obtained from the data analysis to develop appropriate admission criteria for the nursing program at Southwestern Michigan College. Utilizing objective, quantifiable admission criteria should help to reduce attrition in the nursing program, resulting in an increased number of graduates who could go on to take the NCLEX-RN and become registered nurses.

The study explored the following questions:

1.   Are there differences between graduates and non-graduates in

regard to grades in the prerequisite courses?

2.   Are there interactions between gender and graduation status in

grades for

prerequisite courses?

3.   To what extent does the set of the prerequisite courses reliably

discriminate

between graduates and non-graduates?

Demographic Statistics

The sample population for this study consisted of students admitted into the

nursing program at Southwestern Michigan College from 1991–2001. There were a total

of 923 students in the sample population with 822 females (89.1%) and 101 males

(10.9%). The mean GPA was 2.94 with a standard deviation of .41. Females had a mean

GPA of 2.95 with a standard deviation of 0.14 and males had a mean GPA of 2.82 with a

standard deviation of .042. There was a fairly wide range in the ages of students with a

mean age of 38.8 years and a standard deviation of 9.54.

Table 4 shows the percentages of graduates and non-graduates by gender. Out of

the 923 students admitted into the program, there were 613 students (66.4%) who

graduated from the program and 310 students (33.6%) who did not graduate from the

program. The mean GPA of graduates was 3.03 with a standard deviation of .318 and the

mean GPA of non-graduates was 2.76 with a standard deviation of .508. Compared to

male graduates, there was a significantly larger proportion of females who were admitted who graduated (χ^2=8.53, *df*=1, *p*=0.004). Only 53.5% of males who were admitted into the nursing program graduated, whereas 68% of females graduated.

Table 4

Graduation Rate Comparisons Between Genders

	Female		Male	
	N	%	*N*	%
Graduate	559	68	54	53.5
Non-graduate	263	32	47	46.5
Total	822	100	101	100

Note. χ^2=8.53, *df*=1*, p*=0.004.

Descriptive Statistics

The mean grade point average (GPA) by gender for the five prerequisite courses is illustrated in Table 5. For the total population, the mean GPA ranged from a high of 3.17 (*SD*=0.81) in Speech, to a low of 2.81 (*SD*=1.01) for Mathematics. Females have a slightly higher mean GPA in all the prerequisite courses except for Chemistry, which was only minimally higher for males. No statistically significant differences were detected between males and females for Biology, Chemistry, Mathematics, and Psychology. In Speech, females (*M*=3.19, *SD*=0.83) had a significantly (*t*=2.19, *df*=915, *p*=0.029) higher GPA than males (*M*=3.00, *SD*=0.85).

Table 5

GPA by Gender for Prerequisite Courses

Course	Group	*N*	*M*	*SD*
Biology	Female	723	2.81	0.81
	Male	86	2.80	0.81
	Total	809	2.81	0.81
Chemistry	Female	729	2.89	0.81
	Male	83	2.95	0.82
	Total	812	2.91	0.81
Mathematics	Female	380	2.51	1.02
	Male	44	2.41	0.90
	Total	424	2.50	1.01
Psychology	Female	811	3.05	0.88
	Male	99	2.93	0.91
	Total	910	3.04	0.88
Speech	Female	819	3.19	0.83
	Male	98	3.00	0.85
	Total	917	3.17	0.84

The nursing program requires a minimum grade of "C" in all prerequisite courses. Sometimes, students need to repeat prerequisite courses in order to improve grades for admission requirements or achieve the minimum grade of "C." When a course is repeated, the highest grade received by the student in the prerequisite course is used for admission into the nursing program. For this study, the highest grade that the student received in the course was used for data analysis.

Course-repeat data for the prerequisite courses are summarized in Table 6. The table illustrates the number of students who repeated each prerequisite course at least once and compares the mean grade point averages for repeaters the first time the course was taken versus the mean GPA for the second time the course was taken. The percentage of course repeats also varied. The lowest repeat percentage for a course was seen in Speech (4%), followed by Chemistry (8%), Psychology (10%), Biology (11.5%), and Math (16%).

As illustrated in Table 6, the mean GPA for each of the prerequisite courses was significantly lower the first time the students took each of the courses. The mean GPA for the student's first attempt ranged from 0.5–1.09. The second attempt for the repeated courses showed significant improvement in the mean grade point averages, ranging between 1.67 in Mathematics, to 3.32 in Speech 104.

A cross tabulation was conducted on students who repeated the prerequisite courses to analyze how many of the students who repeated prerequisite courses went on to graduate from the nursing program. The results for the cross tabulation are seen in Table 7. This table indicates that, except for Chemistry, only about half of those who

repeated went on to graduate from the nursing program. For Chemistry, only 27% of the

repeaters graduated.

Table 6

Prerequisite Course-Repeat Grade Point Averages

_____

Subject	*N*	1st attempt		2nd attempt	
		Mean	*SD*	Mean	*SD*
Biology	89	.61	.79	2.70	1.00
Chemistry	62	.53	.78	2.14	1.14
Math	69	.15	.50	1.67	1.32
Psychology	94	1.09	1.23	2.73	1.32
Speech 102	12	.58	1.16	2.17	1.27
Speech 104	22	.77	.92	3.32	0.72
Biol 214	4	.50	.58	1.75	1.26

Table 7

Graduation Rates for Students Repeating Prerequisite Courses

Subject	*N*	Grad	%	Non-grad	%
Biology	93	50	54	43	46.0
Chemistry	62	17	27	45	73.0
Math	69	35	51	34	49.0
Psychology	94	48	51	46	49.0
Speech	34	16	47	18	53.0

Research Question 1

The first research question analyzed whether there were differences in the grades received in the five prerequisite courses between the students who graduated versus students who did not graduate from the program.

The mean and standard deviation for each prerequisite course by graduation status are reported in Table 8. This table also includes the results of the independent samples *t*-test and Effect Size (Cohen's *d*). For graduates, GPAs range from a low of 2.58 (*SD*=1.02) in Mathematics, to a high of 3.21 (*SD*=0.84) in Speech. For the non-graduates, their GPAs range from a low of 2.38 (*SD*=0.99) in Mathematics, to a high of 3.09 (*SD*=0.82) in Speech. In general, it appears graduates had slightly higher GPAs in the prerequisite courses than the non-graduates.

An independent samples *t*-test was conducted to test for significant differences in the mean GPAs of graduates and non-graduates on the five prerequisite courses. Using the Bonferroni Procedure to control for Type I error inflation, the level of significance was set at 0.01. The homogeneity of variance assumption was met for Biology, Chemistry, and Mathematics, but not for Psychology and Speech. The results of the independent samples *t*-test are shown in Table 8.

As the table indicates, at α=0.01, significant group differences were found for Biology, Chemistry, and Psychology. No significant differences were found between graduates and non-graduates in Mathematics and Speech. Graduates had significantly

(*t*=3.04*, df*=810*, p*=0.002) higher mean GPA (*M*=2.97, *SD*=0.82) in Chemistry than non-

graduates (*M*=2.78, *SD*=0.79) with an ES(d) of 0.22. Biology showed a significant

Table 8

Course Mean and Standard Deviation by Graduation Status

Subject	Group	*N*	*M*	*SD*	*t*	*df*	*P*	ES(d)
Biology	Graduate	528	2.91	0.80	4.767	807	0.000	0.35
	Non-Grad	281	2.62	0.81				
Chemistry	Graduate	532	2.97	0.82	3.043	810	0.002	0.22
	Non-Grad	280	2.78	0.79				
Mathematics	Graduate	250	2.58	1.02	2.055	422	0.041	0.20
	Non-Grad	174	2.38	0.99				
Psychology	Graduate	606	3.11	0.89	3.459	633.6	0.001	0.24
	Non-Grad	304	2.90	0.85				
Speech	Graduate	612	3.21	0.84	2.139	623.5	0.033	0.15
	Non-Grad	305	3.09	0.82				

difference (*t* = 4.767, *df* = 807, *p* = 0.00) with graduates having a higher mean GPA (*M* = 2.91, *SD* = 0.80) than non-graduates (*M* = 2.62, *SD* = 0.81) with an ES(d) of 0.35.

Psychology also showed a significant difference (*t* = 3.459, *df* = 633.6, *p* = 0.001) for graduates with a higher mean GPA (*M* = 3.11, *SD* = 0.89) than non-graduates (*M* = 2.90, *SD* = 0.85) with an ES(d) of 0.24.

In summary, graduates demonstrated a significantly higher ($\alpha = 0.01$) mean GPA in Biology, Chemistry, and Psychology which accounts for three out of the five prerequisite courses.

Research Question 2

The second research question analyzed whether there is an interaction between gender and graduation status in grades for prerequisite courses?

In Research Question 1, I wanted to determine if there were differences between graduates' and non-graduates' GPA in each of the five prerequisite courses. However, I also wanted to determine if such differences were a function of gender. Thus, several two-way analyses of variance were conducted to determine if there were interactions between gender and graduation status. Using the Bonferroni procedure, the level of significance was set at 0.01 in order to control for Type I error inflation.

Means and standard deviations by gender and graduation status for each prerequisite course are shown in Table 9. The results of the two-way analyses of variance are shown in Appendix B. No significant gender-graduation status interaction was found at the 0.01 level. This suggests that differences between graduates and non-graduates were not a function of gender for the five prerequisite courses.

Research Question 3

The third research question focused on the extent that grades in the prerequisite courses taken prior to admission into the nursing program discriminate the graduate population from the non-graduate population.

Table 9

Prerequisite Course GPA by Gender and Graduation Status

Course	Gender	Group	*N*	Mean	*SD*
Biology	Male	Graduate	43	2.91	0.84
		Non-Graduate	43	2.70	0.77
	Female	Graduate	485	2.91	0.80
		Non-Graduate	238	2.62	0.81
Chemistry	Male	Graduate	45	3.09	0.85
		Non-Graduate	38	2.79	0.78
	Female	Graduate	487	2.96	0.82
		Non-Graduate	242	2.78	0.80
Mathematics	Male	Graduate	21	2.33	0.86
		Non-Graduate	23	2.48	0.95
	Female	Graduate	229	2.61	1.03
		Non-Graduate	151	2.36	1.00
Psychology	Male	Graduate	54	3.01	0.92
		Non-Graduate	45	2.82	0.89
	Female	Graduate	552	3.11	0.89
		Non-Graduate	259	2.91	0.84
Speech	Male	Graduate	53	3.08	0.87
		Non-Graduate	45	2.91	0.82
	Female	Graduate	559	3.23	0.84
		Non-Graduate	260	3.12	0.82

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A direct discriminant analysis was performed using the five variables as predictors of membership in two groups. Predictors were the five prerequisite courses required for admission into the nursing program: Biology, Chemistry, Psychology, Speech, and Algebra. The groups were classified as graduates and non-graduates from the nursing program. The assumption for the homogeneity of the covariance matrices was met (Box's M=18.31, $F_{(15, 434843.5)}$=1.202, p=0.261).

Of the original 923 cases, only 363 cases were used in this analysis. This represents 39% of the total population of this study. Almost 61% (560) of the cases were excluded because they were missing one or more of the discriminating variables in the study. These variables were missing from the various cases because the students may have tested out of the courses, taken higher level courses, or transferred the courses in from another institution and there was no grade available to insert into the data analysis

Table 10 shows means and standard deviations of the univariate results in the discriminant analysis. As indicated, statistically significant ($p \leq 0.05$) differences between graduates and non-graduates were observed only for Biology, Chemistry, and Mathematics. In these courses, graduates had significantly higher GPAs than non-graduates.

With two groups, one discriminant function was calculated. The overall Wilks Lambda was significant ($\lambda = .95$, $\chi2 = 16.81$, $p = .005$), indicating that overall, the linear combination of the five predictors was able to significantly discriminate between the graduate and non-graduate groups. Canonical R^2=0.046 indicated that 4.6% of the group differences can be accounted for by the linear combination of the five prerequisite courses. Group centroids were -0.255 for non-graduates and 0.188 for graduates.

Table 10

Univariate Analysis of Variance Result

Subject	Group	*N*	*M*	*SD*	*F*	*Df*	*p*
Biology	Graduate	209	3.01	0.82	15.92	1	0.000
	Non-Grad	154	2.66	0.82			
Chemistry	Graduate	209	2.97	0.79	3.85	1	0.050
	Non-Grad	154	2.81	0.78			
Mathematics	Graduate	209	2.61	1.02	3.91	1	0.049
	Non-Grad	154	2.40	1.02			
Psychology	Graduate	209	3.10	0.92	3.43	1	0.065
	Non-Grad	154	2.92	0.82			
Speech	Graduate	209	3.22	0.85	0.877	1	0.350
	Non-Grad	154	3.13	0.82			

Standardized function coefficients and the structure matrix of correlation between predictors and discriminant function are shown in Table 11. Using a cut-off loading of 0.3 (Tabachnick & Fidell, 2007), the result suggests that the best predictors for distinguishing between graduates and non-graduates are Biology, Mathematics, Chemistry, and Psychology. Compared to non-graduates, graduates had significantly higher GPAs in Biology (*M*=3.00, *SD*=0.83), Mathematics (*M*=2.62, *SD*=1.02), Chemistry (*M*=2.98, *SD*=0.79), and Psychology (*M*=3.10, *SD*=0.91). Grade point averages for non-graduates were 2.66 (*SD*=0.81) in Biology, 2.4 (*SD*=1.02) in

Mathematics, 2.81 (*SD*=0.78) in Chemistry and 2.93 (*SD*=0.82) in Psychology. The

overall effect size (partial η^2) for the entire analysis was $1 - \Lambda^{\frac{1}{3}} = 1 - .954\ ^{\frac{1}{3}} = .016$.

According to Cohen (1988), this is considered a small effect size.

Table 11

Results of Discriminant Analysis of Prerequisite Courses

Course	Correlations between variables and discriminant function	Standardized Function Coefficients
Biology	.959	.866
Math	.475	.172
Chemistry	.472	-.015
Psychology	.445	.216
Speech	.225	-.004

The overall classification results correctly predicted 125 graduates (60%) and 91

non-graduates (59%) for an overall predictability average of 59.5%.

Gender was factored into graduation status such that four groups were formed:

male graduates, male non-graduates, female graduates, and female non-graduates. A

direct discriminant analysis was then performed in order to determine if the linear

combination of the five prerequisite courses can reliably discriminate among the four

groups. The assumption for equal population covariances was met (Box's *M*=48.79,

$F_{(45,\ 8496)}$=0.994, *p*=0.483).

Group means, standard deviations, and results of the univariate analysis of variance are shown in Table 12. As shown, group differences appear to be statistically significant for Biology with female non-graduates having lower GPAs than the other three groups (male graduates, male non-graduates, and female graduates).

With four groups, three discriminant functions were calculated. However, none were statistically significant. The first function has a Wilks's lambda of 0.935 (χ^2=24.07, df=15, p=0.064). The second function has a Wilks's lambda of 0.983 (χ^2=6.03, df=8, p=0.644). And the third function had a Wilks's lambda of 0.993 (χ^2=2.49, df=3, p=0.478). This suggests that the set of five prerequisite courses cannot reliably discriminate graduates from non-graduates once gender is factored in.

Summary

In summary, there are some conclusions that can be drawn from this study. It was noted in all the statistical analyses that grade point average does make a difference in distinguishing the difference between graduates and non-graduates from the nursing program. In fact, the mean GPA between the graduate population averaged around 3.0 for all the courses except for Math, which averaged between 2.6–2.7.

Biology consistently was noted to be the most significant ($p = 0.000$) of the five prerequisite courses across all the statistical analyses that were run. This was evident in both the independent samples t-test and the direct discriminant analysis. That being said, it would appear that Biology should be considered when identifying students for admission into the nursing program.

Table 12

Group Means, Standard Deviations, and Univariate ANOVA Results

Subject	Group	*N*	*M*	*SD*	*F*	*df*	*p*
Biology	Male/Graduate	17	2.94	0.89	5.86	3	0.001
	Male/Non-grad	18	2.88	0.90			
	Female/Graduate	192	3.01	0.82			
	Female/Non-grad	136	2.63	0.79			
Chemistry	Male/Graduate	17	2.76	0.90	1.73	3	0.160
	Male/Non-Grad	18	2.83	0.78			
	Female/Graduate	192	2.99	0.78			
	Female/Non-grad	136	2.81	0.78			
Mathematics	Male/Graduate	17	2.41	0.94	1.61	3	0.186
	Male/Non-grad	18	2.50	0.98			
	Female/Graduate	192	2.63	1.03			
	Female/Non-grad	136	2.39	1.03			
Psychology	Male/Graduate	17	3.06	0.97	1.54	3	0.205
	Male/Non-grad	18	2.72	0.82			
	Female/Graduate	192	3.10	0.91			
	Female/Non-grad	136	2.95	0.81			
Speech	Male/Graduate	17	3.41	0.79	0.616	3	0.605
	Male/Non-grad	18	3.11	0.90			
	Female/Graduate	192	3.20	0.86			
	Female/Non-grad	136	3.14	0.82			

Chemistry was also found to be a significant predictor ($p = 0.002$) amongst the five prerequisite courses. Both the independent t-test and the discriminant analysis indicated that Chemistry was a significant predictor between the graduate and non-graduate group. It should also be noted that less than 30% of the students who repeated Chemistry went on to graduate from the program. The other four courses, when repeated, had a graduation rate around 50%.

The Speech course was not found to be significant for any of the statistical tests that were run on the data. While this is an important class for pre-nursing students, it might not be a reliable academic predictor for determining outcomes for the nursing program.

The Psychology course was found to be significant ($p = 0.001$) for question 1, which analyzed if there were grade differences between the graduate population versus non-graduates. However, this course was not found to be significant for question 3, which indicated that Psychology was not a good predictor on its own out of the set of five prerequisite courses. This discrepancy might have occurred because of the difference in the total numbers of the sample populations for each question.

When evaluating the group of five prerequisites together utilizing a direct discriminant analysis, the cannonical correlation value indicates that only about 4.5% of the variability between the two groups is accounted for by the differences among the grades of the prerequisite courses. It did indicate that Biology is the strongest discriminator of the five prerequisite courses when evaluated on its own. This being said, consideration of using all five prerequisite courses as an admission predictor warrants further analysis.

Repeating prerequisite courses should be taken into consideration when evaluating success and failure rates. It appears from the data collected that only approximately 50% of the students who repeat courses go on to graduate. This is fairly consistent across four of the five prerequisite courses. Students who fail Chemistry showed an even lower success rate than the other courses with a 30% graduation rate. These factors should be considered when determining admission criteria and student success plans.

CHAPTER FIVE

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Purpose of the Study

The purpose of this study was to identify if any of the prerequisite courses taken

prior to admission into the nursing program at Southwestern Michigan College were

reliable academic predictors for successful completion of the nursing program. The study

also reviewed if there were specific grades in the prerequisite courses that were

associated with increased graduation rates and the impact of repeating courses on success

in the nursing program. Gender was also evaluated regarding its relationship to

graduation status.

Theoretical Basis for the Study

Colleges are consistently challenged with identifying students who have the

greatest chance of successfully completing their degree and graduating (Bauchmoyer et

al., 2004; Brennan et al., 1996). Schools of nursing are not exempt from this problem,

averaging between 20 to 40% attrition in their programs (Seago & Spetz, 2003). Because

of the high attrition rates, identifying the ways that may help to decrease attrition and

increase student success is critical. The nursing program at Southwestern Michigan

College has identified an attrition rate of approximately 30%. Actions must be taken to

reduce attrition and increase student success rates. One way this can be accomplished is

by establishing and implementing appropriate evidence-based admission criteria.

Associate degree nursing programs graduate more then 60% of the registered nurses in the United States (U.S. Department of Health and Human Services, 2002). However, based on the literature review, it appears that fewer studies have been done on attrition and retention in associate degree programs compared to baccalaureate programs.

There are significant differences between baccalaureate programs and associate degree programs. Among those variations are the criteria utilized for admission into the nursing programs. Baccalaureate programs have been more aggressive at identifying and utilizing appropriate admission criteria that are objectively based as identified by the various studies in the literature. These programs have also typically utilized a competitive admission process with substantial admission criteria. This is a common practice for admissions within 4-year institutions across all programs. Associate degree programs have not been as aggressive at utilizing this type of information, and many of the programs utilize minimal criteria for admissions. Many of the programs also utilize inconsistent and subjective criteria for admission (Jeffreys, 2004; Land, 1993). Utilizing reliable, consistent admission criteria that are evidence-based may help in reducing attrition (Byrd et al., 1999; Gilmore, 2008).

There are many factors which may affect student success in nursing school. The nursing profession has attempted to study causes of attrition, but because of the myriad of variables that can affect a student's progress in nursing school, this can be complicated (Jeffreys, 2004). Attrition in nursing school has been reported in the literature as a multifaceted problem composed of a variety of academic and non-academic variables (Barkley et al., 1998). Faculty and administrators of nursing programs are in a position to impact attrition rates by determining appropriate admission criteria for the program and

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by developing interventions that could help students to be successful (Grzegorczyk, 1995; Jeffreys, 2004).

Pre-screening individuals admitted into the nursing program can help to decrease costs and strengthen the program (Petty & Todd, 1985). It is more beneficial for schools to retain students already admitted into the program versus increasing admission numbers to balance attrition losses. Selective admission helps to increase the odds that the most qualified applicant will be admitted into the program. Schools such as Harvard that use a selective admission process have approximately a 5% attrition rate with a 95% student retention rate versus schools with an open admission process which might have only 5 to 10% retention.

Academic qualifications and abilities of candidates applying to nursing programs have changed in the past decades (Lewis & Lewis, 2000). Research has indicated that students over the past years applying to colleges and nursing schools have struggled with increasing academic deficiencies and lack appropriate academic preparation (Foster et al., 1991; Jeffreys, 2004; Lewis & Lewis, 2000). The academic difficulty of nursing programs combined with the academic deficiencies noted in students contributes to this high attrition rate.

This study focused on prerequisite course grades and GPA as academic variables that could be used to identify student success. Other academic factors that may impact student success were not addressed in this study. Non-academic variables were not addressed in this study either.

Methodology

A comparative method of inquiry was chosen for this study using a secondary data analysis of the academic records of students enrolled in the nursing program at Southwestern Michigan College from 1991–2001. The data were pulled from the college's database, utilizing the Classification of Instructional Programs (CIP) codes that are assigned to the nursing program. The data were organized into an Excel spreadsheet and categorized by student identification numbers. SPSS was used for the statistical analysis portion of the study.

In order to answer the various questions for the study, a variety of statistical analyses were conducted on the data. Question 1 of the study utilized an independent samples t-test to analyze if there was a noticeable difference between the graduates and the non-graduate population. Question 2 was addressed by using a two-way analysis of variance to identify the interaction between gender and graduation status. Question 3 utilized direct discriminant analysis to determine what extent the set of prerequisite courses discriminated between graduates and non-graduates.

Results

The study reviewed grades in prerequisite courses to see if there was a correlation between grades in those courses and success in the nursing program.

The study focused on the following three questions:

1.   Are there differences between graduates and non-graduates in

regard to grades

in the prerequisite courses?

2.	Are there interactions between gender and graduation status in grades for prerequisite courses?

3.	To what extent does the set of the prerequisite courses reliably discriminate between graduates and non-graduates?

Question 1 addressed whether there were differences between graduates and non-graduates in the grades that were received in prerequisite courses. An independent samples *t*-test was conducted to test for significant differences in the mean GPAs of graduates and non-graduates on the five prerequisite courses.

Significant group differences were found for Biology, Chemistry, and Psychology with graduates demonstrating a significantly higher ($\alpha = 0.01$) mean GPA in all three courses. No significant differences were found between the two groups for Math and Speech. As indicated in the literature review, science GPA has been noted as a factor in student success rates in nursing schools and on the NCLEX-RN (Beeson & Kissling, 2001; Felts, 1986; Whitley & Chadwick, 1986; Yin & Burger, 2003).

Question 2 addressed whether there was an interaction between gender and graduation status in grades for prerequisite courses. No significant interaction was found for gender and graduation.

Question 3 focused on the extent that grades in prerequisite courses taken prior to admission into the nursing program discriminate between graduates and non-graduates. For the five prerequisite courses, Biology demonstrated the strongest maximum discrimination between the groups, followed by Psychology and Math. The canonical correlation indicates that only 4.6% of the variability between the graduates versus the non-graduates is accounted for by the difference among the grades of the prerequisite

courses. While this is a small effect size, the fact that Biology was found to be significant in the other statistical analyses for this study should suggest that this course could have a strong correlation to students who go on to graduate and should be considered significant for admission criteria.

Discussion

The goal of this study was to identify if there was a relationship between grades in prerequisite courses and graduation status from the nursing program. In addition to looking at grades in prerequisite courses, gender was also examined during the study.

One of the major factors identified in this study was that the mean GPA was consistently higher for students who graduated from the nursing program versus those who did not graduate. This information was consistent with studies in the literature that indicate a higher cumulative grade point average as one of the most consistent variables identified with student success (Allen et al., 1988; Del & Halpin, 1984; Jenks et al., 1989; Payne & Duffy, 1986). The majority of these studies utilized the NCLEX-RN as the dependent variable and passing or failure of the exam as the outcome.

A study by Horns et al. (1991) discovered that 67% of the variance on the NCLEX-RN score was accounted for by the pre-nursing admission grade point average. The information in these studies, along with the statistical information from this study, suggests that using grade point average as part of the admission criteria may be very useful and appropriate for nursing program selections.

Haas, Nugent, and Rule (2004) identified that the cumulative GPA for students who were successful on the NCLEX-RN was approximately 0.3 points higher prior to admission into the program than those of students who were not successful. This is fairly

consistent with the results from this study, which indicated that the cumulative GPA of graduates was 0.27 higher than the non-graduate population.

Academic outcomes are just as critical at a community college as 4-year institutions, yet many community college nursing programs require only minimum standards, such as a 2.0 cumulative grade point average and completion of a prerequisite course with a "C" average.

A higher mean GPA was identified in three out of the five prerequisite courses: Biology, Chemistry, and Psychology. Previous studies have indicated a correlation between grades in science courses and success on the NCLEX-RN. In order to understand disease process and treatment protocols, one must have a good understanding of Biology. Biology was noted to be the most significant in this study ($p = 0.000$). The importance of this course has been validated in numerous other studies to be one of the most accurate predictors of student success. The majority of these studies have focused on successful NCLEX-RN completion as the outcome (Beeman & Waterhouse, 2001; Beeson & Kissling, 2001; Buttry, 2003; Yin & Burger, 2003).

This study also attempted to identify if gender was a factor in determining graduation status. Nothing significant was found in the study indicating that gender influences graduation rates. The literature review did not indicate any significant studies that demonstrated that gender had an influence on graduation status or NCLEX-RN outcomes.

One factor that was discovered during this study, even though it wasn't one of the major questions, had to do with repeating prerequisite courses and how this impacted graduation rates. As noted earlier, only around 50% of the students who repeated courses

went on to graduate from the nursing program. Chemistry only had a 30% completion rate. I did not find any studies in particular that focused on repeating prerequisite courses and success rates in the nursing programs. This is a significant find, however, and warrants consideration for additional research.

Recommendations for Practice

The goal of this study was to identify if there was a correlation between grades in prerequisite courses and graduation status from the nursing program. Gender was also studied to see if it had an influence on student success.

Pre-screening individuals admitted into the nursing program can help to reduce attrition (Petty & Todd, 1985). A selective admission process utilizing objective, quantifiable admission criteria helps to increase the odds that the most qualified applicant will be admitted into the program. This type of admission process is even more important when the number of applicants to the program outnumbers the seats available (Capoor, 1983; Gilmore, 2008).

An excess in applicants has become the standard in most nursing programs around the United States. At Southwestern Michigan College, approximately 80 students apply for the 40 seats available at each admission. Admissions are conducted twice a year for the nursing program for a total of 80 students admitted per year. Those numbers indicate that less than 50% of the students who apply to the program will be admitted.

Community college students typically have additional obstacles that can interfere with their ability to concentrate on school. Many of these students are independent or non-traditional students with families, some with limited support systems in place. These factors can impact their ability to focus on school and concentrate on their studies.

Combine those factors with a student who has academic risk factors and that increases the chances for the student to fail out of school. That is why it is even more important to admit academically strong students who have a chance at completing the program.

There are some recommendations that could be made regarding admission criteria into the nursing program as Southwestern Michigan College, based on the results of this research study. As evidenced by the cumulative mean GPA of 2.94 for the sample population and the mean GPAs for the individual courses (average 2.96 prerequisite cumulative GPA), graduates on the average scored around a 2.9 or higher, excluding Math which was a 2.58.

Based on the information in this study, a recommendation could be made for students seeking admission into the nursing program to have a minimum cumulative GPA of a 2.8 and a prerequisite cumulative GPA average of 2.8 on the five prerequisite courses. As previously discussed in the literature review, higher cumulative grade point averages were consistently noted in students who were successful on the national exam (Allen et al., 1988; Foti & DeYoung, 1991; Glick et al., 1986; McClelland et al., 1992; McKinney et al., 1988; Waterhouse & Beeman, 2003).

It is also recommended that students seeking admission into the nursing program receive a minimum grade of a "B" (3.0) in the Biology course since that course seemed to be the strongest predictor for student success and graduation from the nursing program. The importance of the Biology course was demonstrated by various articles throughout the literature review that indicated a strong correlation between Biology grades and success, in particular on the NCLEX-RN.

Other courses that could be considered for admission criteria would be the Chemistry and the Math courses, since those two courses were indicated by some studies to be potential predictors of success and the Chemistry was significant within this study. The two weakest indicators of the prerequisite courses were the General Psychology course and the Speech course. While they have not been found to be significant in other studies and were not found to be significant across all the statistical evaluations in this study, additional research might be warranted to see if those two courses could have a slight influence on a student's progress.

The nursing program should consider utilizing a weighted admission procedure or process. This would allow for the courses that have a greater impact on success as illustrated by this research and the literature to have a greater influence on the type of students who are admitted into the program. For example, the cumulative GPA would be assigned a point system, perhaps 2.8 to 4.0 points assigned, based on the student's cumulative GPA. As stated earlier, students would need a minimum of a 2.8 to even be considered for admission. The higher the grade point average, the better the points would be for admission.

The second area for consideration would be the prerequisite GPA. This could be assigned a point value also, perhaps 2.8–4.0 points, based on the student's overall prerequisite GPA. In addition, some consideration should be given to the courses that seem to be correlated to student success per the results of this study and supported by the literature review. I would recommend an additional factor that would be calculated based on the grades achieved in the Biology, Chemistry, and Math courses. This would "weight" the points based on the courses that were identified as significant in this study.

This could be used in addition to the prerequisite GPA and cumulative GPA or could possibly replace the prerequisite GPA.

If the nursing program decides not to utilize these recommendations for admission criteria into the program, the information from this study should at least be used to identify potential high-risk students. The students identified at high risk should be given support structures to help increase their odds of successfully completing the nursing program.

I would recommend for these students a holistic approach reviewing academic needs and non-academic risk factors. Jeffrey's (2004) NURS model could provide some basic structure for helping these students.

Recommendations for Further Research

The goal of this study was to identify if any of the courses or grades in these courses could be used to predict success in nursing school. Chapter 2 of this study identified some of the major factors that could affect a student's success in college.

Community colleges and associate degree nursing programs must continue to analyze causes of attrition since many of these institutions still utilize minimal admission criteria or an open admission policy for acceptance into their nursing programs. Replicating this study at other community colleges that have similar prerequisite courses and similar admission criteria would help to validate the findings of this study.

Additional studies on the impact of repeating courses on graduation rates could provide very valuable information, especially considering only around 50% of the people in this study who repeated prerequisite courses went on to graduate from the nursing program. Students who repeated Chemistry were even less successful, graduating at a rate

around 30%. I did not find a lot of information during the literature review regarding repeating courses and the effects on graduation status. I think this factor is very important to prevent students from spending excess time in courses to end up failing out of the program.

From this study, it appears that repeating prerequisite courses could have a significant impact on graduation rates. Students who repeated the prerequisite courses had significantly lower mean GPAs for the first attempts. Even when the students repeated the course for the second time, the mean GPA was below the population mean GPA for each prerequisite course.

If the recommended changes to the admission criteria for the nursing program are implemented, a follow-up study replicating this research should be conducted in 3 to 5 years after the new admission criteria are implemented. The follow-up study could validate whether the changes made to the admission criteria utilizing information from this research really made a difference in reducing the attrition rate in the nursing program at Southwestern Michigan College. If attrition is reduced consistently in this time frame, it would confirm that grades in prerequisite courses are a significant predictor in nursing student success.

To help further corroborate the information, the study should be repeated at other schools that have similar prerequisite courses for their nursing program as Southwestern Michigan College. This would help to validate the study across other schools and populations. This study should also be replicated at other community colleges that vary in size and geographic location.

This study focused on a small portion of academic factors that may influence student outcomes. In addition to the various academic factors, non-academic factors can have a significant impact on a student's success. These were not addressed in this study, but should be considered in future studies. Quite a few studies have been done that have looked at non-academic factors and how those variables can impact student success. This research needs to be expanded, especially considering the diversity of the community college population.

This study did a small amount of work reviewing gender and its effect on graduation status, but ethnicity was not considered. This might be considered as an added variable in future studies, especially if this study is repeated in the future.

Closing

The current nursing shortage magnifies the need for decreasing attrition from the profession. A number of potential graduates are lost from the profession during their education, or their entry into practice is delayed because of NCLEX failure. This failure comes after a significant investment of time and money on the part of the students, the schools of nursing, and employers. Thus, implementing programs to significantly decrease this risk is of value to all involved. (Jenks et al., 1989, p. 117)

This quote, while referring to the failure of NCLEX, illustrates the issues and concerns associated with failure and high attrition rates. The nursing profession must continue to address ways to help resolve nursing program loss and failure. This is especially important considering the current critical nursing shortage. Nursing schools can play a key role in addressing this shortage through reducing the attrition that occurs in nursing programs. This can be done in a variety of ways, but one of the most effective ways is through appropriate admissions utilizing evidence-based admission criteria (Gilmore, 2008).

This study helped to identify grades in prerequisite courses that could be used to identify students who may be at risk for failure. It is hoped that this information could be shared with other community colleges to help them identify potential criteria they might utilize for admission. There have been some helpful studies conducted that have tried to isolate causes of attrition and retention factors. More of these studies need to be conducted, and nursing programs within community colleges need to review some of the recommendations and contemplate implementing some of these changes. With the critical shortage in front of us, it is even more important to take the future of the profession into our hands. Nursing educators have an opportunity to influence the future of nursing and identify methods for alleviating the shortage.

APPENDIX A

LETTER

Southwestern
Michigan College

Dr. Diane R. Chaddock
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June 23, 2008

Dr. Jimmy Kijai
Andrews University
Berrien Springs, Michigan 49104-0001

Dear Dr. Kijai:

I am sending this letter as documentation of approval from the administration of Southwestern Michigan College for Mrs. Elaine Foster to conduct a study of nursing program success rates relative to pre-requisite course grades over a ten year period commencing in the 1990s as a part of her doctoral dissertation study at Andrews University. This study will be conducted according to FERPA guidelines, and no confidential student information will be given out.

If you are in need of further information, do not hesitate to contact me at 269.782.1376 or email me at www.dchaddock@swmich.edu.

Sincerely,

Diane Chaddock, Ed.D.
Executive Vice President/C.O.O.

Pc: Mrs. Elaine Foster

APPENDIX B

TESTS OF BETWEEN-SUBJECTS EFFECTS

Dependent Variable: Biology GPA

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	4.833	1	4.833	7.464	.006	.009
GENDER	.103	1	.103	.159	.691	.000
Group * GENDER	.142	1	.142	.219	.640	.000
Error	521.266	805	.648			
Total	536.188	808				

a. R Squared = .028 (Adjusted R Squared = .024)
b. Computed using alpha = .05

Dependent Variable: Chemistry GPA

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	4.057	1	4.057	6.151	.013	.008
GENDER	.340	1	.340	.515	.473	.001
Group * GENDER	.298	1	.298	.452	.502	.001
Error	532.881	808	.660			
Total	539.698	811				

a. R Squared = .013 (Adjusted R Squared = .009)
b. Computed using alpha = .05

Dependent Variable: Psychology

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	3.461	1	3.461	4.520	.034	.005
GENDER	.810	1	.810	1.058	.304	.001
Group * GENDER	.001	1	.001	.002	.965	.000
Error	693.799	906	.766			
Total	703.496	909				

a. R Squared = .014 (Adjusted R Squared = .011)
b. Computed using alpha = .05

Dependent Variable: Speech GPA

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	1.563	1	1.563	2.251	.134	.002
GENDER	2.859	1	2.859	4.116	.043	.004
Group * GENDER	.073	1	.073	.105	.746	.000
Error	634.095	913	.695			
Total	640.083	916				

a. *R* Squared = .009 (Adjusted *R* Squared = .006)
b. Computed using alpha = .05

Dependent Variable: Math GPA

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	.094	1	.094	.092	.762	.000
GENDER	.250	1	.250	.245	.621	.001
Group * GENDER	1.472	1	1.472	1.445	.230	.003
Error	428.002	420	1.019			
Total	434.000	423				

a. *R* Squared = .014 (Adjusted *R* Squared = .007)
b. Computed using alpha = .05

REFERENCE LIST

REFERENCE LIST

American Association of Colleges of Nursing (AACN). (2002). *Nursing shortage*. Retrieved from http://www.aacn.nche.edu/Media/FactSheets/NursingShortage.htm

American Association of Colleges of Nursing (AACN). (2009). *Student enrollment expands at U.S. nursing colleges and universities for the ninth year despite financial challenges and capacity restraints.* Retrieved from http://www.aacn.nche.edu/Media/NewsReleases/2009/StudentEnrollment.html

Aber, C.S., & Arathuzik, D. (1996). Factors associated with student success in a baccalaureate nursing program within an urban public university. *Journal of Nursing Education, 35*(6), 285-288.

Aldag, J., & Rose, S. (1983). Relationship of age, American college testing scores, grade point average, and state board examination scores. *Research in Nursing and Health, 6*(2), 69-73.

Allen, C., Higgs, Z., & Holloway, J. (1988). Identifying students at risk for academic difficulty. *Journal of Professional Nursing*, *4*(2), 113-118.

Arathuzik, D., & Aber, C. (1998, March/April). Factors associated with national council licensure examination–registered nurse success. *Journal of Professional Nursing, 14*(2), 119-126.

Astone, B., & Nunez-Wormack, E. (1991). Pursuing diversity: Recruiting college minority students. *Association for the Study of Higher Education.* Retrieved from http://eric.ed.gov/

Auerbach, D., Buerhaus, P., & Staiger, D. (2000). Associate degree graduates and the rapidly aging RN workforce. *Nursing Economics*, *18*(4), 178-184.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.

Barbee E., & Gibson, S. (2001). Our dismal progress: The recruitment of non-Whites into nursing. *Journal of Nursing Education*, *40*, 243-244.

Barkley, T.J., Rhodes, R.S., & Dufour, C. (1998). Predictors of success on the NCLEX-RN among baccalaureate nursing students. *Nursing and Health Care Perspectives, 19*, 132-137.

Bauchmoyer, S., Carr, M., Clutter, J., & Hoberty, P. (2004). Predicting academic and national board dental hygiene examination performance based on academic factors. *Journal of Dental Hygiene*, *78*(1), 39-45.

Bauwens, E., & Gerhard, G. (1987). The use of the Watson-Glaser critical thinking appraisal to predict success in a baccalaureate nursing program. *Journal of Nursing Education, 26*(7), 278-281.

Bean J. (1986). Assessing and reducing attrition. In D. Hossler (Ed.), *Managing college enrollments* (pp. 47-61). New Directions for Higher Education, 53. San Francisco: Jossey-Bass.

Bean, J., & Metzner, B. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, *55*(4), 485-540.

Beeman, P., & Waterhouse, J. (2001). NCLEX-RN performance: Predicting success on the computerized examination. *Journal of Professional Nursing, 17*, 157-165.

Beeson, S., & Kissling, G. (2001). Predicting success for baccalaureate graduates on the NCLEX-RN. *Journal of Professional Nursing, 17(*3), 121-127.

Bessent, H. (1997). *Strategies for recruitment, retention and graduation of minority nurses in colleges of nursing.* Washington, DC: American Nurses Publishing.

Braxton, J. (2001). Introduction to special issue: Using theory and research to improve college student retention. *Journal of College Student Retention: Research, Theory & Practice, 3*(1), 1-2.

Brennan, A., Best, D., & Small, S. (1996). Tracking student progress in a baccalaureate nursing program: Academic indicators. *Canadian Journal of Nursing Research, 28*(2), 85-97.

Buerhaus, P. (2001). Aging nurses in an aging society: Long-term implications. *Leadership, 27*(1), 35-36.

Buerhaus, P., Needleman, J., & Steward, M. (2002). Strengthening hospital nursing. *Health Affairs, 21*, 123-132.

Buerhaus, P., & Staiger, D. (1999). Trouble in the nurse labor market? Recent trends and future outlook. *Health Affairs, 18*(1), 214-222.

Burris, R. (2001). Teaching student parents. *Nurse Educator*, *26*(2), 64-65.

Buttry, T. (2003). *Relationships among selected variables as a measure of success in an associate degree registered nurse program* (Unpublished doctoral dissertation). Southern Illinois University, Carbondale, IL.

Byrd, G., Garza, C., & Nieswiadomy, R. (1999). Predictors of successful completion of a baccalaureate nursing program. *Nurse Educator, 24*(6), 33-37.

Campbell, A., & Dickson, C. (1996). Predicting student success: A 10-year review using integrative review and meta-analysis. *Journal of Professional Nursing, 12*(1), 47-59.

Capoor, M. (1983). *Evaluation of open access versus selected admission to the nursing program in a community college.* Retrieved from http://eric.ed.gov/

Coffey-Love, M., (2001). Said another way: The nursing shortage: What is your role? *Nursing Forum, 36*(2), 29-35.

Costello, M.A. (2002). Thompson, Education secretary launch program to promote health careers. *AHA News, 38*(7), 1-2.

Del, M., & Halpin, G. (1984). Predictors of success in nursing school and on State Board Examinations in a predominantly Black baccalaureate nursing program. *Journal of Nursing Education, 23*(4), 147-150.

Eaton, S., & Bean, J. (1995). An approach/avoidance behavioral model of college student attrition. *Research in Higher Education*, *36*, 617-645.

Erickson, B., & Strommer, D. (1991). *Teaching college freshmen*. San Francisco: Jossey-Bass.

Fearing, A. (1996). *Literature update on academic performance of minority baccalaureate nursing students.* Retrieved from http://eric.ed.gov/

Felts, J. (1986). Performance predictors for nursing courses and NCLEX-RN. *Journal of Nursing Education, 25*(9), 372-377.

Foster, P., Zimmerman, G., & Condon, V. (1991). Assessing student outcomes in a nursing learning assistance program. *Journal of Nursing Education, 30*(8), 352-359.

Foti, I., & DeYoung, S. (1991, March/April). Predicting success on the national council licensure examination-registered nurse: Another piece of the puzzle. *Journal of Professional Nursing*, *7*(2), 99-104.

Fowles, E. (1992). Predictors of success on NCLEX-RN and within the nursing curriculum: Implications for early intervention. *Journal of Nursing Education, 31*(2), 53-57.

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.

Garcia, M. (1987). *Community college persistence: A field application of the Tinto model* (Unpublished doctoral dissertation). Teachers College, Columbia University, New York.

Gilmore, M. (2008). Predictors of success in associate degree nursing programs. *Teaching & Learning in Nursing, 3*(4), 121-124.

Glick, O., McClelland, E., & Yang, J. (1986). NCLEX-RN: Predicting the performance of graduates of an integrated baccalaureate nursing program. *Journal of Professional Nursing, 2*(2), 98-103.

Glynn, J., Sauer, P., & Miller, T. (2003). Signaling student retention with prematriculation data. *NASPA Journal*, *4*(1), 41-67.

Griffiths, M., Bevil, C., O'Connor, P., & Wieland, D. (1995). Anatomy and physiology as a predictor of success in baccalaureate nursing students. *Journal of Nursing Education, 34*(2), 61-66.

Griffiths, M., & Tagliareni, M. (1999). Self-efficacy: A means of identifying problems in nursing education and career progress. *International Journal of Nursing Studies*, *31*, 471-485.

Griffin, J. (1980). Underachieving students in community colleges: Common personality and biographical characteristics. *Community College Review, 8*(1), 15-19.

Grubbs, L. (1989). The response of higher education to the shortage of nursing school applicants. *Journal of Nursing Education, 28*, 295-297.

Grzegorczyk, P. (1995). Entrance requirements and program characteristics as predictors of the success of licensed practical nurses in associate degree nursing programs. *Michigan Community College Journal,* 7-21.

Harter, J., & Szurminski, M. (2001). *P.A.S.S. program.* Toledo, OH: Mercy College of Northwest Ohio. Retrieved from http://eric.ed.gov/

Haas, R., Nugent, K., & Rule, R. (2004). The use of discriminant function analysis to predict student success on the NCLEX-RN. *Journal of Nursing Education*, *43*(10), 440-446.

Hayes, E. (1981). Prediction of academic success in a baccalaureate nursing education program. *Journal of Nursing Education, 20*(6), 4-8.

Henderson, S., & Orr, S. (1989). *Identifying students at risk for failure on the licensing examination for registered nurses.* Retrieved from http://eric.ed.gov/

Higgins, B. (2005). Strategies for lower attrition rates and raising NCLEX-RN pass rates. *Journal of Nursing Education, 44*(12), 541-547.

Horns, P., O'Sullivan, P., & Goodman, R. (1991). The use of progressive indicators as predictors of NCLEX-RN success and performance of BSN graduates. *Journal of Nursing Education, 30*(1), 9-14.

Jackson, D., Mannix, J., & Daly, J. (2001). Retaining a viable workforce: A critical challenge for nursing. *Contemporary Nurse: A Journal for the Australian Nursing Profession, 11*(2-3), 163-172.

Jeffreys, M. (1998). Predicting nontraditional student retention and academic achievement. *Nurse Educator, 23*(1), 42-48.

Jeffreys, M. (2001). Evaluating enrichment program study groups: Academic outcomes, psychological outcomes, and variables influencing retention. *Nurse Educator*, *26*(3), 142-149.

Jeffreys, M. (2003). Strategies for promoting nontraditional student retention and success. In M. Oermann & K. Heinrich (Eds.), *Annual review of nursing education* (Vol. 1, pp. 61-90). New York: Springer.

Jeffreys, M. (2004). *Nursing student retention: Understanding the process and making a difference.* New York: Springer.

Jenks, J., Selekman, J., Bross, T., & Paquet, M. (1989). Success in NCLEX-RN: Identifying predictors and optimal timing for intervention. *Journal of Nursing Education, 28*(3), 112-118.

Johnson, A., & Kreuzer, P. (2001). *Improving retention through a comprehensive student development model*. Seattle, WA: American Educational Research Association.

Kelly, E. (1997). Development of strategies to identify the learning needs of baccalaureate nursing students. *Journal of Nursing Education*, *36*, 156-162.

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.

Kingma, M. (2001). Nursing migration: Global treasure hunt or disaster-in-the making? *Nursing Inquiry, 8*(4), 205-212.

Land, L. (1993). Selecting potential nurses: A review of the methods. *Nurse Education Today*, *13*, 30-39.

Lavizzo-Mourey, R., & Verplanck, J. (2009). *Recession making the nursing shortage worse.* Retrieved February 28, 2010 from

www.emfp.org/MainMenuCategory/InTheNews/Recession-making-the-Nursing-Shortage-Worse

Lewis, C., & Lewis, J. (2000). Predicting academic success of transfer nursing students. *Journal of Nursing Education, 39*(5), 234-236.

Linares, A. (1999). Learning styles of students and faculty in selected health care professions. *Journal of Nursing Education*, *38*(9), 407-414.

Louden, D., & Post, D. (1997). Decline in nursing school enrollment continues according to latest NLN study. *NLN Update, 3*(1), 4.

Mahaffey, E. (2002). The relevance of associate degree nursing education: Past, present, future. *Online Journal of Issues in Nursing, 7*(2).

Manifold, C., & Rambur, B. (2001). Predictors of attrition in American Indian nursing students. *Journal of Nursing Education*, *40*(6), 279-281.

May, J., Bazzoli, G., & Gerland, A. (2006). Hospital responses to nurse staffing shortages. *Health Affairs, 25*(4), 316-323.

McClelland, E., Yang, J., & Glick, O. (1992). A statewide study of academic variables affecting performance of baccalaureate nursing graduates on licensure examination. *Journal of Professional Nursing, 8*(6), 342-350.

McKinney, J., Small, S., O'Dell, N., & Coonrod, B. (1988). Identification of predictors of success for the NCLEX and students at risk for NCLEX failure in a baccalaureate nursing program. *Journal of Professional Nursing*, *4*, 55-59.

McMillan, J., & Schumacher, S. (2001). *Research in education: A conceptual introduction.* New York: Longman.

McSherry, W., & Marland, G. (1999). Student discontinuations: Is the system failing? *Nurse Education Today*, *19*(7), 578-585.

Merrill, E. (1998). Culturally diverse students enrolled in nursing: Barriers influencing success. *Journal of Cultural Diversity*, *5*(2), 58-67.

Murden, R., Galloway, G., Reid, J., & Colwill, J. (1978). Academic and personal predictors of clinical success in medical school. *Journal of Medical Education, 53*, 711-719.

National Center for Educational Statistics. (2001). *Digest of education statistics*. Retrieved October 3, 2009, from http://nces.ed.gov/programs/digest/2001menu_table.asp

National Council of State Boards of Nursing (NCSBN). (1995). *NCLEX® results page: Number of candidates taking NCLEX-RN® examination and percent passing* [online]. Retrieved from http://www.ncsbn.org/research_stats/nclex.asp

National Council of State Boards of Nursing (NCSBN). (2000). *NCLEX® results page: Number of candidates taking NCLEX-RN® examination and percent passing* [online]. Retrieved from http://www.ncsbn.org/research_stats/nclex.asp

National Council of State Boards of Nursing (NCSBN). (2004). *NCLEX® results page: Number of candidates taking NCLEX-RN® examination and percent passing* [online]. Retrieved from http://www.ncsbn.org/research_stats/nclex.asp

National Council of State Boards of Nursing (NCSBN). (2006). *NCLEX® results page: Number of candidates taking NCLEX-RN® examination and percent passing* [online]. Retrieved from http://www.ncsbn.org/research_stats/nclex.asp

Nora, A., Cabrera, A., Hagedorn, L., & 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), 427-451.

Oliver, D. (1985). The relationship of selected admission criteria to the academic success of associate degree nursing students. *Journal of Nursing Education*, *24*(5), 197-206.

Payne, M., & Duffy, M. (1986). An investigation of the predictability of NCLEX scores of BSN graduates using academic predictors. *Journal of Professional Nursing*, *2*, 326-332.

Petty, N., & Todd, A. (1985*). A model to improve the success rate of students in selected health career programs in the North Carolina Community College system: Final report.* Retrieved from http://eric.ed.gov/

Pringle, D. (2004). *Examining the causes of attrition from schools of nursing in Canada; Where we've been, where we're going: Six commissioned papers on nursing health human resource issues.* Retrieved from http://www.hc-sc.gc.ca/hsc-sss/pubs/hhrhs/2004-hhr-rhs-pap/attrition-eng.php

Quick, M., Krupa, K., & Whitley, T. (1985). Using admission data to predict success on the NCLEX-RN in a baccalaureate program. *Journal of Professional Nursing*, *1*, 364-368.

Rhoads, J. (1974). Motivation, medical school admissions, and student performance. *Journal of Medical Education*, *49*(12), 1119-1127.

Rowser, J. (1997). Do African American students' perceptions of their needs have implication for retention? *Journal of Black Studies*, *27*(5), 718-725.

Sayles, S., Shelton, D., & Powell, H. (2003). Predictors of success in nursing education. *The ABNF Journal, 14(6),* 116-120.

Schwartz, R., & Washington, C. (2002). Predicting academic performance and retention among African American freshman men. *NASPA Journal*, *39*(4), 354-370.

Schwirian, P., & Gortner, S. (1979). How nursing schools predict their successful graduates. *Nursing Outlook, 27*, 352-358.

Seago, J., & Spetz, J. (2003). *Admission policies and attrition rates in California community college nursing programs.* San Francisco: University of California.

Seither, F. (1980). Prediction of achievement in baccalaureate nursing education. *Journal of Nursing Education, 19*(3), 28-36.

Sharp, T. (1984). An analysis of the relationship of seven selected variables to State Board Test Pool Examination performance of the University of Tennessee, Knoxville, College of Nursing. *The Journal of Nursing Education*, *23*(2), 57-63.

Shelton, E. (2003). Faculty support and student retention. *Journal of Nursing Education*, *42*(2), 68-76.

Staiger, D., Auerbach, D., & Buerhaus, P. (2001). Expanding career opportunities for women and the declining interest in nursing as a career. *Urologic Nursing, 21*(3). 185-195.

State Board of Nursing report. (2006). Southwestern Michigan College, Dowagiac, MI.

Stickney, M. (2008). Factors affecting practical nursing student attrition. *Journal of Nursing Education*, *47*(9), 422-425.

Stronck, D. (1979, September). Predicting student performance from college admission criteria. *Nursing Outlook*, 604-607.

Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics*. Boston: Pearson/Allyn & Bacon.

Talley, N. (1989). Weighted averages and college admission. *Journal of College Admissions*, *125*, 19-21.

Tanner, C., & Bellack, J. (2001). Resolving the nursing shortage: Replacement plus one! *Journal of Nursing Education*, *40*(3), 99-100.

Taraban, R., Rynearson, K., & Kerr, M. (2000). College students' academic performance and self-reports of comprehension use. *Reading Psychology, 21*, 283-308.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.

Tinto, V. (1998). College as communities: Taking research on student persistence seriously. *Review of Higher Education*, *21*, 167-177.

Tucker-Allen, S., & Long, E. (1999). *Recruitment and retention of minority students: Stories of success.* Lisle, IL: Tucker.

U.S. Department of Health and Human Services. (2002). *Projected supply, demand and shortages of registered nurses: 2000-2020* [on-line]. Retrieved from http://bhpr.hrsa.gov/healthworkforce/reports/rnproject/report

Vaughan, G. (1985). Maintaining open access and comprehensiveness. *New Directions for Community Colleges*, *52*, 17-28.

Washburn, G. (1980). *Relationship of achievement test scores and state board performance in a Diploma nursing program*. Retrieved from http://eric.ed.gov/

Waterhouse, J., & Beeman, P. (2001). NCLEX-RN Performance: Predicting success on the computerized examination. *Journal of Professional Nursing*, *17*(4), 158-165.

Waterhouse, J., & Beeman, P. (2003). Predicting NCLEX-RN success: Can it be simplified? *Nursing Education Perspectives*, *24*(1), 35-39.

Wells, M. (2003). An epidemiologic approach to addressing student attrition in nursing programs. *Journal of Professional Nursing*, *19*(3), 230-236.

Whitley, M., & Chadwick, P. (1986). Baccalaureate education and NCLEX: The causes of success. *Journal of Nursing Education*, *25*, 94-101.

Woodham, R., & Taube, K. (1986). Relationship of nursing program predictors and success on the NCLEX-RN examination for licensure in a selected associate degree program. *Journal of Nursing Education*, *25*, 112-117.

Yin, T., & Burger, C. (2003). Predictors of NCLEX-RN success of associate degree nursing graduates. *Nurse Educator, 28*(5), 232-236.

Yoder, M. (2001). The bridging approach: Effective strategies for teaching ethnically diverse nursing students. *Journal of Transcultural Nursing*, *12*, 319-325.

Yurkovich, E. (2001). Working with American Indians toward educational success. *Journal of Nursing Education*, *40*, 259-269.

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Dean of Academic Studies, Southwestern Michigan College, 2008 – present
Dean of Academic Studies, School of Nursing and Human Services, Southwestern
        Michigan College, 2005-2008
Dean, School of Nursing and Human Services, Southwestern Michigan College,
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Chair and Director, School of Nursing and Allied Health, Southwestern Michigan
        College, 1999-2002
Instructor, School of Nursing, Southwestern Michigan College, 1984-2000
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PROFESSIONAL MEMBERSHIP

Michigan Liberal Arts Deans Organization (MLAD), 2005 – present
National Organization of Associate Degree Nursing (N-OADN), 2005 – present
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Michigan Council of Nursing Education Administrator (MCNEA), 1999 – 2008
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CIVIC AFFILIATIONS

Member, Board of Trustees, Borgess-Lee Memorial Hospital, 2008
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