2006

Admission Variables and Academic Success in a Doctor of Physical Therapy Program

Gerald Ruscingno
Seton Hall University

ADMISSION VARIABLES AND ACADEMIC SUCCESS IN A DOCTOR OF PHYSICAL THERAPY PROGRAM

BY

Gerald Ruscingno

DISSERTATION COMMITTEE

Dr. Genevieve Pinto-Zipp
Dr. Valerie Olson
Dr. Brian B. Shulman

Approved by Dissertation Committee:

Genevieve A. Pinto-Zipp PT, PhD DATE 3/30/06

Brian Shulman DATE 3/30/06

Valerie Olson DATE 3/30/06

Submitted in Fulfillment of the
Requirement for the degree of Doctor of Philosophy in Health Sciences
Seton Hall University, 2006

ACKNOWLEDGEMENTS

I would like to take this opportunity to acknowledge the following individuals for either their support, mentorship or friendship during my years as a student in the Ph.D program in the Department of Graduate Programs in Health Sciences at Seton Hall University:

First, I would like to extend my most sincere appreciation to my committee members, (Dr. Genevieve Pinto-Zipp, Committee Chairperson, Dr. Valerie Olson and Dr. Brian Shulman), for their excellent mentorship and unending support during the dissertation process.

There have been several people who have been a source of encouragement and support during my tenure as a Doctoral student. However, one person in particular deserves special recognition, for directing and guiding me to reach my academic and professional goals.

That individual is Dr. Genevieve Pinto-Zipp.

Dr. Genevieve Pinto-Zipp is not only one of the most knowledgeable individuals I have ever had the pleasure of meeting in higher education, but she is also noted for her unending commitment to her students and her profession.

Dr Genevieve Pinto Zipp was not only the Chairperson of my Committee, Genevieve was also my advisor and had spent endless hours with me as a mentor, instructor, advisor, and in the last six years has become a life long friend. Genevieve, without your encouragement and knowledge, this document would not exist.

Dr. Valerie Olson for the endless hours she has spent in reviewing my work in the three classes that I was enrolled in as a student. Thank you Valerie for encouraging me to develop my presentation style and technique. Without your classes, I would have never developed my presentation skills to where they are today. You have indeed become a special friend, as well as an inspiration to all your students.

Dr. Brian Shulman who has spent endless hours editing my work and always challenging me to structure my document so that the tables, figures, and graphs help present the material in a form that is clear and concise to the reader. I appreciate your expertise in that area. I am looking forward to working with you in the future and you also have become a special friend.

I would also like to acknowledge some of the following instructors, colleagues and friends.

Dr. Lee Cabell for reviewing the statistics of this study.

Dr. Mary Ann Clark for her support and encouragement

Dr. Doreen Stiskal for the endless hours she spent sharing her expertise in both research methods and statistics. More importantly, I thank Doreen for her gift of friendship and for being the kind and caring individual she is.

Drs. Timothy Eustace and Anthony Gencarrelli for their support and friendship, both before and during the dissertation process.

The Department of Biology at Seton Hall University, with a special acknowledgement to Dr. Roberta Moldow.

Dr. Roberta Moldow hired me in the Department of Biology at SHU in 1993. Without Roberta's confidence in me, I would never have had the privilege of not only teaching at Seton Hall University, but enrolling in the Ph.D Program at Graduate Medical Education. Thank you Roberta.

To all my Seton Hall University friends, with a special thank you to Ms. Maribel Roman.

Maribel has been a friend of mine since I first entered the Department of Biology at SHU. I thank her always for supporting me in my studies and for her gift of friendship.

To all the Seton Hall students whom I have had the pleasure of advising and /or teaching in the last twelve and a half years, especially the Teaching and Graduate Assistants listed below who I have worked closely with in their tenure at SHU

Mr. Mike Alfonzo
Ms. Kari Belin
Mr. Peter Economou
Ms. Kerry Ferrara
Ms. Janelle Finelli
Dr. Angela Maresca
Dr. Paul Mathew
Mr. Rick Mazza
Mr. Matt Sung
Ms. Frances Mae West

Lastly, a Special Thank you to Father Paul Holmes whose faith and belief in me has made today possible.

God bless you all

DEDICATIONS

I would like to dedicate my dissertation document to my following family members:

My parents, Constance and Gerald Ruscingno, who have dedicated their lives to both my sister and my happiness. I thank you both for raising us in an environment that was filled with love and joy. They have always encouraged us to work toward out goals and have helped us to realize that hard work and determination is necessary to achieve what we wish to accomplish in life.

My sister and brother-in-law, Cheryl and Walter Ford, who have always supported me, and been their for me throughout the years, in all that I have done, with regard to both my academic and non-academic accomplishments.

My grandparents, Grace and Louis Della Pia, who found happiness in giving to both their children and grand-children.

In Alphabetical order the following special relatives have always supported me throughout the years, as well as acknowledged all my accomplishments.

My Aunt, Anna Burkhardt

My Aunt and Uncle, Rae De Lapia and John De Lapia

My Uncle, Ronald Della Pia

My Aunt and Uncle, Elsie Riccio and Louis Riccio

My cousins: Joan and Richie, Linda and Louis, Terri and John

Lastly, I would like to acknowledge, a very special family, that is my brother-in-laws parents and siblings.

Stella and Walter Ford and their daughters and their spouses:

Gerri and Richard Cooper and

Janice and Tom Reilly

God Bless all of you

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

ADMISSION VARIABLES AND ACADEMIC SUCCESS IN A DOCTOR OF PHYSICAL THERAPY PROGRAM

Gerald Ruscingno

Seton Hall University
May, 2006
Dissertation Chairperson: Dr. Genevieve Pinto-Zipp

Problem: To date there are no standard sets of admission criteria/variables identifying an applicant's ability to succeed in an entry-level doctoral PT program. As physical therapy programs are moving rapidly toward the entry-level doctorate, it is imperative for admissions committee to be able to select applicants with the greatest potential to achieve academic success.
Purpose: The purpose of this study was to determine if a relationship existed between physical therapy preadmission variables in a DPT program and academic success, as measured by the PTGPA in the basic sciences after the first professional year (1PY).
Methods: The sample consisted of 63 students from 3 consecutive physical therapy classes admitted to the entry-level Doctoral Program at Seton Hall University (SHU) from the Fall 2002 through Fall 2005. The following preadmission variables/criteria (independent variables) included: age on admission, gender, degree status, pre-cumulative GPA, and prerequisite course GPA. The preadmission factors were correlated with the dependent variable of PTGPA (1PY). In a second analysis, the resulting significant correlations ($p < .05$) were then entered into a forward multiple regression analysis, to determine the best predictors.
Results: Inferential statistics indicated that the pre-admission variable, pre-cumulative GPA correlates positively to the PTGPA (1PY) in the basic sciences ($r=0.441$, $p<.01$). This was based on the Spearman rho Correlation Coefficient. Results of multiple regression analysis noted that the predictors, pre-cumulative GPA and age, accounted for 16.7% and 3.9% respectively, of the total variance (20.6%) in PTGPA in the basic sciences after 1PY.
Conclusion: This study provided both descriptive, as well as quantitative data regarding admission variables/ criteria essential for the selection process for the entry level DPT program at SHU.

Chapter I

INTRODUCTION

Background of the Problem

The profession of Physical Therapy (PT) has continually grown in its popularity to the extent that the number of applicants applying to PT programs far exceeds the number of applicants that can be accepted (McGinnis, 1984). Stringent admission criteria are utilized by admissions committee to ensure that the most competitive applicants are accepted. Currently, there are two types of admission criteria cited in the literature; academic and non-academic. Academic criteria consist of students' previous scholastic records, such as their overall grade point average (pre-cumulative GPA) and their overall score on the Graduate Record Examination (GRE). Non-academic criteria consist of interviews, personal statements, and letters of recommendation (Hayes, Fiebert, Carroll & Magill, 1997).

Although the literature acknowledges the existence of the two types of admission criteria, academic criteria have been suggested to be the stronger predictor of academic success in a PT program (McGinnis 1984; Balogun, Karacoloff & Farina, 1986; Rheault & Shafernich-Coulson, 1988; Dockter,

2001; Kirchner, Holm, Ekes & Williams, 1994; Day, 1986; and Thieman, Weddle, & Moore, 2003). However, several researchers suggest that academic criteria such as pre-cumulative GPA alone, is not the main predictor of academic success (Templeton, Burcham & Franck, 1994; Byl, 1988; and Dockter, 2001). Templeton et al. (1994) suggest that pre-cumulative science GPA, which includes pre-cumulative chemistry and pre-cumulative physics GPA, is a more accurate predictor of a students' potential for academic success.

Conversely, Balogun et al. (1986) suggest from their research that the overall pre-cumulative GPA and personal essay are the two main criteria that are indicative of potential academic success. While controversy exists in the literature regarding the relationship of applicants' pre-cumulative science GPA, overall pre-cumulative GPA, and the quality of the personal interview as indicators of academic success, other academic criteria have not been investigated. Interestingly, as long as applicants possess the prerequisite coursework required by the academic program to which they apply, their applications can be reviewed.

Reviewing the applications of potential candidates to PT programs has become more difficult today than it has been in the past. This is currently due to the different modes of entry to these programs PT programs are designed as dual degree (i.e., undergraduate-to-graduate) programs of study. Within these programs, applicants are accepted prior to completing the baccalaureate degree, with the understanding that they must maintain a

certain overall GPA in order to be eligible to continue in the professional phase of the PT program. To date, there have been no studies exploring the relationship, if any, between an applicant's degree (BS/BA) and future academic success (Dockter, 2001). At the present time, no standard admission criteria have been adopted by PT admissions committee nationally or by The Commission on Accreditation in Physical Therapy Education, (CAPTE). Due to the lack of a standard set of admission criteria, the decision- making process for admissions committee is difficult.

Since there are no standard criteria supported by the literature to aid in the selection of the most successful applicants for PT programs, many qualified applicants may not be selected. The creation of definitive admission guidelines based on statistical analysis of data may positively influence the selection process and, ultimately, allow admissions committee to be more effective and consistent in managing the admissions process. Providing admissions committee with sound admission guidelines may ensure that those students who are more likely to succeed academically would be admitted. The focus of this study addresses this issue by determining which admission criteria correlate positively with academic success.

Statement of the Problem (Purpose of the Study)

Presently, the Doctor of Physical Therapy (DPT) program at Seton Hall University (SHU) offers two routes of admission for an applicant. The first route requires that students complete an undergraduate degree prior to applying, while the second route accepts applicants who do not possess an

undergraduate degree, but who are enrolled in a dual degree '3 plus' program of study. The SHU program has designed its admission criteria to ensure that students meet the academic requirements for the DPT, regardless of the mode of entry. However, the question arises as to whether or not this set of admission criteria are the most effective in determining an applicant's potential for academic success in the program. Furthermore, are applicants who possess an undergraduate degree more successful than their cohorts that do not possess an undergraduate degree, at the time they enter the professional phase of the program? Second, for those applicants possessing an undergraduate degree, are they academically stronger?

The purpose of this study is to analyze the predictors of academic success as measured by the GPA in the basic sciences after the first professional year (1PY) in the DPT program at SHU. This study analyzes the correlation between the following five admission criteria/variables: (1) age on admission, (2) gender, (3) degree status, (4) pre-cumulative GPA, and (5) prerequisite coursework GPA, as measured by the PTGPA in the basic sciences after 1PY.

Hypothesis

Pre-cumulative overall GPA, prerequisite course GPA, and the degree status of an applicant are significant predictors of PTGPA in the basic sciences after 1PY.

Need

In the current literature, there has been a great deal of controversy with respect to admission criteria that are indicative of academic success in PT programs at both the baccalaureate and master's level. While current literature focuses on admission criteria that are indicative of academic success at the baccalaureate level, research on admission criteria at the master's level is severely limited. Currently, the lack of consistency regarding admission criteria and selection of applicants to graduate PT programs has become compounded by a lack of definitive admission criteria. In 2005, admissions committee are faced with the continued challenge of accepting applicants, who have the greatest potential to academically succeed in their entry-level doctoral program. As reported by Massey (2003), the increase in the number of accredited entry-level DPT programs has grown tremendously in the last few years. As of 2003, PT professional programs have grown from 19 entry-level DPT programs to 74 programs (Massey, 2003). As of 2005, 209 colleges and universities offer professional PT education programs, where 115 of these are at the doctoral level (2005 Fact Sheet-*American Physical Therapy Background Sheet 2005.* Alexandria, VA: American Physical Therapy Association: May 2005). Due to the increase in accredited entry-level DPT programs, the need for research on admission criteria for entry into these programs is crucial. Unfortunately, Dockter's (2001) study

appears to be the only one that addresses potential admission criteria to DPT programs.

Therefore, admissions committees are lacking sufficient empirical research to assist in the selection of qualified applicants to DPT programs. In light of the current absence of this significant research, admissions committees are at great risk of not selecting the applicants with the strongest potential to succeed, both academically and clinically.

Chapter II

REVIEW OF LITERATURE

Predictors of Academic Success for Medical School Admission

In the current literature, there is much controversy with regard to admission variables that are predictors of academic success in allied health degree programs. Admissions committees are constantly struggling to select applicants, who exhibit the greatest potential to succeed in their professional programs.

Historically, admissions committee have found that selecting applicants to medical school has been a difficult task; primarily since there is no consistency of admission variables in the literature that are predictive of academic success (Scott, Greig, Brock & Hunt, 1988; and Hojat, Blacklow, Robeson, Veloski & Borenstein, 1990). Due to this disparity of predictors, standard admission criteria have become more difficult to establish.

Scott et al. (1988) retrospectively reviewed the transcripts of the 1978 and 1979 classes entering the University of Washington, School of Medicine, in order to determine if students' college grades in the sciences (biology, organic chemistry, physics, and additional chemistry courses), during the freshmen year would help to predict their ability to academically succeed in medical school.

During the 1978-79 academic year, a total of 350 students were enrolled as undergraduates at the University of Washington. Upon completion of the baccalaureate programs, 156 students were admitted to the University Of Washington Medical School, 102 students were denied admission, but were admitted to another medical school, and 92 students were not admitted to any medical school.

Scott et al. (1988) evaluated the data in a preliminary analysis to determine if a relationship existed between the initial grades and overall science GPAs. A strong correlation existed between both classes of students (r= 0.72). A second analysis was then performed to examine the correlation, if any, between the initial grades and undergraduate GPAs with students' scores on two exams, the National Board of Medical Examiners Part I and II (NBME Part I and II), as well as the Medical College Aptitude Test (MCAT), the medical college entrance exam. A low-to-moderate correlation was determined (r = a range from 0.04 to 0.38) (Scott et al., 1988).

Scott's findings also identified that GPAs alone and initial grades resulted in multiple correlations with the MCAT sub-scores and NBME I and II, which were equal. However, when the combined results of the MCAT sub-scores and the overall GPA were considered, interesting correlations were obtained. The multiple correlations, using combined results of the MCAT sub-scores and the overall GPA (r= .57), were higher than those correlations which examined MCAT sub-scores and initial grades (r= .36), as well as MCAT sub-scores and overall science grades alone (r= .32). The question remains:

Are other predictors (besides initial GPA and overall science GPA), indicative of academic success as measured by students' performance on standardized medical exams?

Hojat et al. (1990), in a retrospective study, reviewed a group of 610 students who entered Jefferson Medical College between 1985 and 1987. By categorized subjects' post- baccalaureate studies, prior to applying to medical school, the researchers established five groups: (1) 58 students had non-degree medical undergraduate coursework after earning a baccalaureate degree, (2) 15 students had participated in non-degree graduate science classes, (3) 14 students earned a graduate degree in any discipline, (4) 60 students had some combination of the three groups listed above, and (5) 463 students had earned a baccalaureate degree with no further preparation (Hojat et al. 1990).

In this study, the undergraduate science and non-science GPAs, the MCAT sub-scores (science problems, reading, and quantitative subtests) were found to be predictors of success. The criterion variables were freshman science grades, sophomore science grades, and the total score on the NBME Part I. These findings indicated that younger applicants, with a high undergraduate GPA, would have the greatest potential to successfully complete the academic challenges of medical school. Interestingly, post-baccalaureate preparation may or may not correlate positively to academic performance in the first two years of medical school. In turn, undergraduate

GPA was found to be the key predictor of academic success in medical school.

Cooke, Fontenella & Cooke (1992) retrospectively reviewed 8,541 applicant files of students who attended Cornell University and applied to medical school from 1982 to 1989. The purpose of this study was to determine which predictors were indicative of successful acceptance into at least one of 19 selective medical schools. The predictor variables were pre-cumulative overall GPA, MCAT sub-scores, personal interview, life experiences, state of residency, and extracurricular activities. Cooke et al. (1992) noted that medical school acceptance rate was strongly dependent on GPA. Specifically, the acceptance rate increased approximately by a factor of 2, as undergraduate GPA increased in increments of 0.2. Cookes' study further supports Hojat's findings in that pre-cumulative GPA appears to be an indicator of successful academic performance in medical school.

Smith (1991) retrospectively studied 492 students admitted to Brown University's Medical Program from 1980 through 1985. This study focused on the personal interview as a predictor of successful academic performance in medical school or during the residency period. The personal interview was studied as an admission variable for those applicants that entered medical school from 1980 through 1982, but was eliminated for those applicants who entered medical school from 1983 through 1985. There was no correlation between students who did or did not participate in the interview process and success in medical school and residency training. Smith's findings offer

further support to Cookes' findings in that the personal interview does not appear to be indicative of academic success in medical school.

In summary, pre-cumulative GPA was found to be the key predictor of academic success in medical school as measured by the overall GPA, however, was not a predictor of student performance on the MCAT and NBME Parts I and II. Conversely, the personal interview does not appear to be a predictor of academic success in medical school; however, it may predict how a student will perform on the licensing exam as well as in the clinical arena.

Table 1 Predictors of Success for Admission to Medical School

Author/Year	**Predictors Studied**	**Significant Predictors**
Cooke et al. (1992)	Pre-cum. overall GPA MCAT Interview Life experiences	Pre-cum. overall GPA
Smith (1991)	Personal interview	NONE
Hojat et al. (1990)	UG Sci. GPA UG Non-Sci. GPA MCAT	UG Sci. GPA UG Non-Sci. GPA
Scott et al. (1988)	Initial college GPA (Yr1) Overall UG Sci. GPA (Yr4) MCAT NBME Parts I and II	Initial college GPA (Yr1) Overall UG Sci GPA (Yr4) MCAT NBME Parts I and II

Note:
GPA= grade point average
Pre-cum. overall GPA= the grade point overall average of the applicant's undergraduate coursework.
UG SCi. GPA= undergraduate science coursework GPA.
UG Non.-Sci. GPA= the non-science undergraduate coursework GPA.
Initial college GPA (Yr1)= the grade point average of the student's undergraduate freshmen year.
Overall UG Sci. GPA (Yr4)= the overall undergraduate grade point average in the sciences only.
MCAT= medical college admission test. There are three sub-scores of the MCAT: [(MCAT- Q)- the MCAT quantitative section, (MCAT-R)- the MCAT reading section, (MCAT-S)- the MCAT science section)].
NBME Parts I and II= the national board of medical examiners parts I and II.

Predictors of Academic Success for Nursing School Admission

Similar to the process admissions committee use to determine predictors of academic success in medical school, the selection process of the most qualified applicants to nursing school faces a similar dilemma. McKinney, Small, O'Dell & Coonrod (1988) in a retrospective study, reviewed 136 nursing graduate student applicant files between 1983 and 1985 from Wesleyan College. The following predictors of academic success in the nursing baccalaureate program were evaluated: Scholastic Aptitude Test (SAT), sub-scores SAT (math and verbal), SATTotal (SATT), pre-nursing GPA (PNGPA), cumulative nursing GPA (NGPA), nursing theory GPA (NTGPA), nursing clinical GPA, (NCGPA), repeated courses, age, and the Mosby Access Test.

These predictors of academic success were studied in relation to the criterion variable of successful performance on the National Council Licensing Examination (NCLEX). The SATT (r= 0.58), PNGPA (r= 0.39), NTGPA (r= 0.55), NGPA (r= 0.43), GPA (r= 0.59), repeated courses (r= -0.31), and the Mosby Access Test scores (r= 0.70) were found to independently correlate with the NCLEX.

In a similar study, Foti & De Young (1991) retrospectively studied 298 nursing students who had graduated from a baccalaureate nursing program at William Paterson College from 1985 through 1988. Cumulative GPA, science GPA, SAT sub-scores (SAT Verbal and SAT Math), scores on the Nursing Leaque for Nursing baccalaureate test (NLN), and the Mosby

Access Test score were the predictors of success as measured by the scores on the NCLEX. Correlations existed between the Mosby Access Test (r=.66), overall GPA (r= .59), GPA in the major (r= .59), NLN Achievement Test (r= .51), SAT verbal (r= .46), and the NCLEX.

The studies by both Mc Kinney et al. and Foti & De Young are similar in that they not only viewed one baccalaureate nursing program over a period of 3 years, but also researched the key predictors of success in relation to the NCLEX. Both noted that the undergraduate GPA, SATV, and the Mosby Access Test were the key predictors of success, as measured by the NCLEX.

Byrd, Garza & Nieswiadomy (1999) retrospectively studied 278 students that were also enrolled in a baccalaureate nursing program. Admission variables evaluated included age on entry into the nursing program, ethnicity, degree status, cumulative science GPA, cumulative social science GPA, cumulative pre-nursing GPA, and letter grades earned in each nursing course during the first academic year. Interestingly, the only significant correlation was noted between the science GPA in the first academic year and successful completion of program requirements.

This research study is one of the few studies in nursing which measures academic success by successful completion of the nursing program, rather than successful performance on the NCLEX. Byrd et al. (1999) studied admission criteria for nursing students, using one of the same predictors that Scott et al. (1988) used for medical applicants GPA (i.e., first undergraduate academic year). Both of the above referenced studies support

the use of this variable as a predictor of successful completion for both nursing and medical school programs.

Table 2 Predictors of Success for Admission to Nursing Programs

Author/Year	Predictors Studied	Significant Predictors
Bryd et al. (1999)	Cum. Sci. GPA Cum. Soc. Sci. GPA PNGPA Year 1 Nursing Grades Age Degree Status Ethnicity	Cum. Sci. GPA
Foti and De Young (1991)	Cum. GPA Cum. Sci. GPA GPA (major) SAT NLN The Mosby Access Test	Cum. GPA GPA (major) SATV NLN The Mosby Access Test
McKinney et al. (1988)	PNGPA NGPA NTGPA NCGPA SAT Age Repeated Courses The Mosby Access Test	PNGPA NGPA NTGPA SAT Repeated Courses The Mosby Access Test

Note:
GPA = grade point average
Cum. Sci. GPA= cumulative science GPA
Cum. Soc. Sci. GPA= cumulative social Science GPA
PNGPA= pre-nursing GPA
NGPA= nursing GPA
NTGPA= nursing theory GPA
NCGPA= nursing clinical GPA.
SAT= scholastic aptitude test; SATV= SAT verbal sub-score; SATM= SAT math sub-score.
NLN= the test score on the nursing league for the nursing baccalaureate test.
Age refers to age on admission to the nursing program.

Predictors of Academic Success for Chiropractic School Admission

As previously noted, the selection of applicants by admissions committee to both medical and nursing schools is a difficult task. Likewise, the chiropractic profession faces similar challenges. Zhang (1999) retrospectively studied 52 students from Sherman College of Chiropractic in both 1994 and 1995 to determine a correlation, if any, between students' entering GPA, academic performance in the basic sciences (general anatomy, spinal anatomy, physiology, biochemistry, microbiology, and pathology) and performance on the National Board of Chiropractic Examiners Part I Examination (NBCE Part 1) relative to overall final class grades in chiropractic college.

Zhang (1999) observed a strong correlation between the students' pre-cumulative GPA and overall final class grades (r= .720), while a moderate to high correlation existed between the students' pre-cumulative GPA and individual basic science courses: general anatomy (r= 0.670), spinal anatomy (r= 0.620), physiology (r= 0.570), biochemistry (r =0.548), microbiology (r= 0.640), and pathology (r = 0.583). A moderate correlation existed between the students' pre-cumulative GPA and overall performance on the NBCE (r= 0.515). A low-to-moderate correlation was found between students' pre-cumulative GPA and students' performance on the NBCE exam sub-scores: general anatomy (r= 0.514), spinal anatomy (r= 0.521), physiology (r= 0.512), biochemistry (r= 0.552), microbiology (r= 0.292), and pathology (r = 0.206). From the numerous correlations noted in Zhang's study, it is evident that

overall GPA may be a more significant predictor of class performance than a student's score on the NBCE (Zhang, 1999).

In order to predict academic success during the first academic year of a chiropractic program, Green, Johnson & McCarthy (2003) retrospectively studied three consecutive classes, totaling 192 students at Palmer College of Chiropractic West, (PCCW). Green et al. (2003) reported that in order to determine pre-admission variables as predictors of success in the first academic year, they must be correlated to their overall first year GPA (Y1GPA).

Green et al. (2003) selected predictors that were considered to be pre-admission academic variables, as well as personal variables, in an attempt to determine which, if any, were significantly correlated to Y1GPA. The selected predictor variables included gender, country of citizenship and birth, cumulative college GPA, chemistry GPA, biology GPA, physics GPA, cumulative college semester units, and academic degrees earned. The following predictors correlated significantly with Y1GPA: cumulative college GPA (i.e., pre-cumulative GPA - r= 0.525), chemistry GPA (r= 0.466), biology GPA (r= 0.379), and physics GPA (r= 0.392). The only correlation that was not significant existed between cumulative college semester units and Y1GPA (r= 0.109) (Green et al. 2003). Pre-cumulative GPA, physics GPA, and chemistry GPA were the key predictors of Y1GPA, as determined through a regression model. Biology GPA and cumulative college semester units were excluded from the regression analysis due to their weak correlation

coefficients. From this correlation study, Green et al. (2003) was able to create a regression line, in order to create a prediction formula of YIGPA.

Subba Reddy (1994) retrospectively studied five successive classes that matriculated at Palmer College of Chiropractic from October 1990 through March 1992 in order to assess students' retained knowledge in the basic sciences (biology, chemistry, and physics). In an effort to assess the entering students' knowledge in the basic sciences, a Chiropractic College Admission Test (CCAT) was designed. The CCAT was designed by a committee which consisted of five of the faculty at the chiropractic college, including the researcher as chairperson (Subba Reddy, 1994). The CCAT consisted of 90 questions in total, 30 from each of the three basic science content areas.

The CCAT was administered to a total of 781 students. The college had administered the CCAT, in an attempt to determine if a correlation existed between students' performance on the CCAT and their GPA. For all five classes to which this exam was administered, significant correlations existed between the CCAT test scores and students' GPAs. However, these correlations were not strong, (Subba Reddy, 1994), which suggests that the CCAT scores are a weak indicator of students' academic success in chiropractic school. One of the limitations of this study was that the CCAT was not utilized as an admission exam. In order to determine if the CCAT can be used as a predictor of academic success, it would need to be used as a

general admission exam for all chiropractic schools, similar to the use of the MCAT as an admission exam for all medical schools.

In summary, the research conducted by both Zhang (1999) and Green et al. (2003) reported that pre-cumulative GPA was a key predictor of academic success in chiropractic school, as measured by GPA. Moderate to good correlations existed between pre-cumulative GPA and overall GPA, as well as overall GPA and Y1GPA.

In conclusion, the existing literature reported thus far suggested that there are several key predictors which appear to be indicative of academic success, as measured by various criterion variables (e.g., overall GPA in the professional program, program completion, Y1GPA, and success on exams such as the MCAT, NCLEX, and NBME instruments). Admission variables noted as predictors of academic success in medical, nursing, or chiropractic schools included pre-cumulative GPA, pre-science overall GPA, specific science GPAs (i.e., pre-biology GPA, pre-chemistry GPA, and pre-physics GPA), MCAT, CCAT, and SAT scores. Some of these predictors were reported in only one of the professions, for example, the MCAT for medical school, while pre-cumulative GPA was noted for all three professions.

Within the medicine, nursing and chiropractic professions, there does not appear to be one standard set of admission criteria which are indicative of academic success within or across professional programs.

Table 3 Predictors of Success for Admission to Chiropractic College

Author/Year	**Predictors Studied**	**Significant Predictors**
Green et al. (2003)	Cumulative GPA Biology. GPA Chemistry GPA Physics GPA Gender Country of citizenship Degree status College credits earned	Cumulative. GPA Biology GPA Chemistry GPA Physics GPA Gender Country of citizenship Degree Status
Zhang (1999)	Pre-cum. GPA Academic performance in: General anatomy Spinal anatomy Physiology Biochemistry Microbiology Pathology NBCE Part I	Pre-cum. GPA Academic performance General anatomy Spinal anatomy Physiology Biochemistry Microbiology Pathology NBCE Part I
Subba Reddy (1994)	CCAT	NONE

Note:
GPA= grade point average.
Cumulative GPA= grade point average of the student's undergraduate studies.
The degree status refers to whether or not a student entering chiropractic college has a prior degree to matriculation at the baccalaureate or master's level.
College credits earned are evaluated when the applicant does not have a baccalaureate degree or higher.
Pre-cumulative GPA= the cumulative GPA of the student's academic coursework at the undergraduate level. Some authors may use Pre-cumulative GPA (i.e., Zhang 1999), whereas others authors use Cum. GPA (i.e., Green et al. 2003).
CCAT= Chiropractic College Admissions (Assessment) Test. The CCAT measures the applicant's retained knowledge in the basic sciences, that is biology, chemistry and physics. The problem encountered with the CCAT was that it had been required for student's to take after they were matriculated to the chiropractic program. It is questionable if the CCAT can be considered an admission criteria.

Predictors of Academic Success for Physical Therapy Program Admission

In the current literature, much controversy exists with regard to the most effective admission criteria, for indicating future academic success in a physical therapy program. Interestingly, researchers have noted various admission criteria as positive indicators of future academic success.

McGinnis (1984) administered a biographical questionnaire to 198 pre-physical therapy students who attended Northern Illinois University (NIU) from 1975 to 1979 to identify the characteristics of both successful and unsuccessful pre-physical therapy majors within a baccalaureate PT program. Of the 198 pre-physical therapy students who were given the survey, 42 completed the questionnaire. Academic information for these 42 students was secured from the students' academic files. McGinnis evaluated the data to determine if a relationship existed between pre-cumulative GPA, overall pre-science (or prerequisite course GPA), the admission interview, and field experience to that of the students' overall professional physical therapy grade point average (PTGPA). Despite the low number of students completing the questionnaire, McGinnis found a positive relationship between the pre-professional GPA, (i.e., that is their grade point average at the end of their freshman year) and their entrance into a baccalaureate Physical Therapy program.

Hayes et al. (1997), in their retrospective study, reviewed 138 PT files from the University of Miami between 1982 and 1987. One hundred and seven of the 138 files were complete and were used in the study. Students'

age, overall pre-professional GPA, pre-professional science GPA, interview score, and gender were noted. The pre-professional science GPA was the strongest indicator of success in the professional PT program. Furthermore, while chemistry and physics were important determinants, students' performance in their freshman anatomy course was observed to be the primary predictor of the students' overall potential for academic success in this baccalaureate PT program. Interestingly, the findings of Hayes et al. (1997) did not support those of McGinnis (1984).

Templeton et al. (1994) retrospectively reviewed 111 students' academic files from the PT program at East Carolina University (ECU) to establish which admission criteria correlated with academic success. Twelve preadmission variables were assessed including: pre-professional GPA, pre-science GPA, pre-physics GPA, pre-chemistry GPA, pre-math GPA, pre-biology GPA, and their six subcategory scores on the Allied Health Professions Aptitude Test (AHPAT). The six subcategory scores of the AHPAT are: ABIO (biology sub-score, ACHM (chemistry sub-score), AVA (allied verbal sub-score), ARC (allied reading comprehension), AQA (allied quantitative ability), and the MAHPAT (the mean allied health aptitude test) (Templeton et al., 1994). The AHPAT was developed in the early 1970's in order to predict those applicants with the greatest potential to succeed in a baccalaureate allied health field (Balogun, 1987).

Of the 12 pre-admission academic variables, there was a positive correlation between the students' pre-chemistry GPA, pre-physics GPA, pre-cumulative science GPA, and the AQA when compared to the PTGPA. Templeton et al. (1994) noted no statistical significance between pre-cumulative GPA and PTGPA.

These findings did not support those of McGinnis (1984). However, the findings of Templeton et al. (1994) did support those of Hayes et al. (1997) in that pre-science GPAs are significant admission criteria when discussing academic success in a professional PT program. Interestingly though, Hayes et al. (1997) noted that pre-anatomy GPA positively correlated to the PTGPA, not the pre-physics and pre-chemistry GPA as found by Templeton et al. (1994). While Templeton et al. (1994) noted that the AHPAT was a significant academic criterion for admission to a professional PT program at the baccalaureate level, the AHPAT has not been used in master's or doctoral level programs as an admission criterion.

Balogun et al. (1986), in their retrospective study of 83 student files from Russell Sage College (NY) evaluated the admission criteria to determine any statistical significance in predicting academic success upon completion of their baccalaureate PT program. Admission criteria evaluated included pre-cumulative GPA, the AHPAT subtest scores, an essay, pre-professional faculty evaluations, clinical evaluations from volunteer work, and interview scores. Of the pre-admission criteria reported, the pre-cumulative GPA, personal essay, and Mean AHPAT (MAHPAT) were statistically significant to

the overall PTGPA (Balogun et al. 1986). Of the AHPAT sub-scores that were studied, the MAHPAT, AVA, and ABIO were significantly correlated to the PTGPA. This study supported the findings of McGinnis (1984) in that the pre-cumulative GPA was the strongest predictor of academic success in a baccalaureate PT program. However, these results did not further support the findings of Templeton et al. (1994) with regard to AHPAT. Balogun et al. (1986) noted that the AHPAT was not as significant as the pre-cumulative GPA and the personal essay. Balogun did report that the MAHPAT sub-score had the highest correlation with the PTGPA, not the AQA as reported by Templeton et al. (1994).

Levine, Knect & Eisen (1986) retrospectively reviewed the graduate files of the entering classes of 1982 and 1983 from The University of Illinois, to determine which pre-professional and personal characteristics were indicative of academic and clinical success in a baccalaureate PT program. They evaluated: pre-professional science GPA, pre-professional overall GPA, individual interviews for the applicants in the class of 1982, and group interviews for the applicants in the class of 1983. The criterion variables were academic and clinical success as measured by cumulative overall GPA and clinical performance in the PT program. Clinical performance was measured by the Illinois Consortium for Clinical Education, Physical Therapy Student Performance Report where the clinical instructor measures performance as either 'competent', 'inconsistently competent' or 'failure to demonstrate competency' (Levine et al. 1986).

For the class of 1982, two moderate correlations existed between the pre-professional science GPA and the cumulative GPA (r= .54), and secondly; between the pre-cumulative GPA and cumulative GPA (r= .50). Interestingly, for both classes, individual and group interviews did not correlate significantly with either academic or clinical performance in the program. Although the interview was not found to be a predictor of academic success, it was reported that the group interview was useful for admissions committee to assess the interpersonal skills of the applicants, thus screening those applicants who may have a greater potential to be less effective in the clinical arena.

At the University of Kentucky, Seymour, McDougall, Wadsworth & Sanders (1982) reported that the admission process for their PT program was comprised of 100 points, 50 of which was determined by academic indicators, 5 points determined by the Watkins- Glaser Critical Thinking Appraisal Test (to measure the problem solving ability of the applicant) and 45 points based on the combined score of two interviews. The interview process is extremely detailed and requires a series of training sessions for the admissions committee to learn how to use specific criteria to rate the applicants' interviews, as well as ranking the criteria with regard to importance.

Although Seymour et al. (1982) noted the usefulness of the interview in assessing non-academic information, the analysis of the interview process was not only time consuming but complicated. Therefore, its usefulness as an admission variable was questionable. Some admissions committee members

found the interview difficult to standardize (Dietrich, 1979), while others found it impossible to measure factors such as honesty, responsibility, and interpersonal skills (Laurencell, Kay & Edelsburg, 1979). Although the interview had not been noted to correlate significantly with academic or clinical success in a PT program, the findings of Seymour et al. (1982) and Levine et al. (1986) support the usefulness of the interview in evaluating the interpersonal skills of the applicant.

Many academic and non-academic admission variables have been utilized by different admissions committee as predictors of success in a professional, baccalaureate level PT program. However, research conducted on master's level PT programs is limited.

Day (1986) retrospectively reviewed 522 post-baccalaureate students, each of whom had been admitted to one of four master's level PT programs between 1975 and 1982. Key predictors were assessed to determine if any relationship with final GPA existed. Specific predictors were year of admission, age on admission, the Graduate Record Examination (GRE) [i.e., GRE Total (GRE-T), GRE Verbal (GRE-V) and GRE Analytical (GRE-A)], race, pre-admission overall GPA, biology GPA, and pre-professional/pre-requisite course GPA (Day, 1986). The final GPA in the master's level program (MPTGPA) was also used as the criterion variable. Day (1986) reported that the predictors of academic success which significantly correlated to the MPTGPA were the preadmission overall GPA/ pre-cumulative GPA and the GRE-A sub-score.

Predictors of an applicant's success in a master's level PT program were also reported by Kirchner, Holm, Ekes & Williams (1994). A convenience sample of 46 students who graduated from a two year master's degree program at the University of Puget Sound was studied. Identified significant predictors included undergraduate overall GPA, GRE scores (GRE-T, GRE-A and GRE-Q), scores on reference letters, scores on the personal essay, and scores on the writing sample (Kirchner et al., 1994). The main predictor that significantly correlated with academic success, as measured by the MPTGPA, was the undergraduate overall GPA.

The findings of both Kirchner et al. (1994) and Day (1986) noted pre-cumulative GPA as the key predictor of academic success. In the study by Day (1986), a strong statistical significance between pre-cumulative GPA and GRE-A sub-scores relative to the MPTGPA was noted. In turn, the findings of Kirchner et al. (1994) concur in part with those of Day (1986), in that the significant predictor of MPTGPA was the pre-cumulative GPA ($r = .69$). Furthermore, Kirchner et al. (1994) reported only a moderate correlation between GRE-A with MPTGPA ($r= .36$).

Thieman at al. (2003) retrospectively focused on 122 students who were admitted to a master's degree program at the College of St. Catherine between 1995 and 1998. As reported by Day (1986) and Kirchner et al. (1994), the criterion variable was the MPTGPA. Prerequisite GPA, pre-admission overall GPA, GRE sub-score, number of undergraduate credits, and previous degrees were evaluated for their predictability. A moderate

correlation existed between prerequisite GPA and MPTGPA (r= .509), while a low-to-moderate correlation existed between GRE scores and MPTGPA (r=.304).

The findings of Thieman et al. (2003), Kirchner et al. (1994), and Day (1986) support pre-cumulative GPA as a positive predictor of MPTGPA. However, only Day (1986) and Kirchner et al. (1994) noted GRE-A as a moderate predictor of MPTGPA. Overall, the literature pertaining to baccalaureate and master's level PT programs suggest that both pre-cumulative GPA and a standardized exam (e.g., SAT, ACT, AHPAT, and GRE) were the key predictors of academic success (McGinnis, 1984; Gramet & Terracina, 1988; Balogun et al., 1986; Day, 1986; and Kirchner et al., 1994).

Nevertheless, there is controversy in the literature with regard to the usefulness of the SAT, AHPAT, and GRE exams. Gramet & Terracina (1988); Templeton et al. (1994); and Day (1986) reported the usefulness of the SAT, AHPAT, and GRE, respectively, as a measure of academic success in PT programs. However, Balogun (1987) and Cocanour & Peatman (1988) noted that the usefulness of standardized test scores is of no significance to admissions committee. Therefore, the struggle for admissions committee to establish a 'gold standard' on admission variables that predict academic success in PT programs continues today.

Table 4 Predictors of Success for Admission to Physical Therapy Programs

Degree	Author/Year	Predictors Studied	Significant Predictors
MS	Thieman et al. (2003)	Pre-cum. GPA GRE Pre-requisite GPA Degrees UG credits	Pre-requisite GPA
DPT	Dockter (2001)	Pre-cum. GPA Degrees *TAS Interview Age on admission Reference letter(s) Volunteer work	Pre-cum. GPA *TAS Age on admission
BS	Hayes et al. (1997)	Pre-cum. GPA Gender Pre-sci. GPA Interview	Pre-sci. GPA (anatomy)
MS	Kirchner et al. (1994)	Pre-cum. GPA GRE Writing Sample Essay Reference letter	Pre-cum. GPA
BS	Templeton et al. (1994)	Pre-cum. GPA Pre-sci. GPA Pre-phys. GPA Pre-bio. GPA Pre-chem. GPA Pre-math GPA AHPAT sub-scores	Pre-sci. GPA Pre-chem. GPA Pre-phys. GPA AHPAT sub-score AQA
BS	Balogun et al. (1986)	Pre-cum. GPA Essay AHPAT sub-scores Interview Faculty and clinical evaluations	Pre-cum. GPA Essay MAHPAT
MS	Day (1986)	Pre-cum. GPA Age admitted Pre-bio. GPA Year admitted Pre-req. GPA race GRE	Pre-cum. GPA Pre-req. GPA GRE-A
BS	Levine et al. (1986)	Pre-cum. GPA Pre-sci. GPA Individual and group interviews	Pre-cum. GPA Pre-sci. GPA
BS	McGinnis (1984)	Pre-cum. GPA Interview Pre-sci. GPA Field experience	Pre-cum. GPA
BS	Seymour et al. (1982)	Interview	NONE

Note:
GPA= grade point average; UG credits= undergraduate credits
The AHPAT= the allied health professional aptitude test. This test has six sub-scores: (1). ABIO = the AHPAT biology sub-score, (2) ACHM= the AHPAT chemistry sub-score,(3). AQA = the AHPAT quantitative sub-score, (4). ARC = the AHPAT reading comprehension sub-score, (5). AVA= the AHPAT verbal ability sub-score and (6). The MAHPAT= the AHPAT average or mean of the sub-scores.
GRE= graduate record examination; the GRE sub-scores are: [(GRE-Verbal) = GRE-V, (GRE-Analytical)= GRE-A and the (GRE-Quantitative)= GRE-Q)].
*T.A. S.= the total admission score. TAS= 60% pre-cum. GPA, 32% interview and 8% writing sample

Summary

In this review, admission variables as predictors of academic success have been discussed relative to professional programs in medicine, nursing, chiropractic, and physical therapy. Studies pertaining to admission variables in the field of nursing are extensive at the baccalaureate level. Research pertaining to the medical and chiropractic fields has identified predictors of academic success for doctoral level programs. The profession of PT is unique, in that it is a profession that has identified predictors of academic success for primarily the baccalaureate level, with limited studies at the master's and doctoral level.

Currently, PT programs are at the master's and doctoral levels, with the number of DPT programs increasing to meet the APTA Vision 2020 (that is as of 2020 all PT programs should all be licensed at the doctoral level). Since the number of entry level doctoral programs is increasing drastically (from 74 in 2003 to 115 in 2005), research in the area of academic variables that are predictors of academic success at the doctoral level is essential. Due to the lack of admission guidelines provided by the Commission on Accreditation in Physical Therapy Education (CAPTE), the admission process for DPT programs has become more complicated.

Evaluative criteria for the accreditation of physical therapy educational programs were established in 1998 (Biennial Accreditation Report, APTA, 1998). In January 2002, CAPTE revised the criteria with the drafting of the

APTA Vision 2020, which stated that CAPTE would only accredit post-baccalaureate level programs.

As a result, academic institutions have begun to provide diverse options for attaining a degree in physical therapy. Some institutions accept undergraduate students directly, while others require that they earn a baccalaureate degree prior to applying. As the profession of physical therapy is moving towards an entry-level doctoral profession, a majority of PT programs offer the DPT. As of May 2005, 209 colleges and universities offer professional PT education programs. Approximately 115 (55.1%) of these PT programs are at the doctoral level and an estimated 83 (39.5%) are planning to convert from a master's level to a DPT (2005 Fact Sheet—*American Physical Therapy Association Background Sheet 2005.* Alexandria, VA: American Physical Therapy Association: May 2005). To meet Vision 2020 (Massey, 2003), the need to determine the strongest predictors that are indicative of academic success in an entry-level DPT program is essential.

The establishment of pre-admission criteria is essential to ensure that the admission process identifies students with the greatest potential to succeed both academically and clinically. As noted in the current literature, there are limited studies that address admission criteria for professional PT programs beyond the baccalaureate level.

In the sole study addressing the admission criteria at the doctoral level, Dockter (2001) recently reviewed PT student records at the University of Bismarck, in an attempt to determine which pre-admission factors correlated

to students' performance after the first professional year (1PY) in the program. Overall success in the program was measured by their performance on the National Physical Therapy Licensing Examination (NPTE). The study used a sample of convenience of 107 student records from four consecutive PT classes. Demographic information, pre-professional core course GPA, total admission score (equivalent to pre-cumulative GPA, interview scores, and writing sample), volunteer work, degree status, scores on students' personal interviews, and writing samples were reviewed. Significant correlations were observed between students' year one GPA and pre-admission criteria. Specifically, students' age upon admission and total admission score were significantly related to their successful year one GPA performance.

Dockter (2001) reported that although the students' pre-professional core course GPA was significantly related to performance on the NPTE, this relationship was weak. However, the GPA after the first year in the professional program was a stronger predictor of performance on the NPTE. Dockters' (2001) findings did not support previous findings noted by Hayes et al. (1997) and Templeton et al. (1994) in which the prerequisite coursework (including prerequisite sciences) was the strongest indicator of an applicants' academic success in a PT program. A potential reason for this difference may be attributed to the fact that the student pool used by Dockter was from master's and doctoral level PT programs, while Hayes et al. (1997) and Templeton et al. (1994) used student pools from baccalaureate level

programs. Therefore, two different levels of learners were assessed. The sole study by Dockter (2001), which addressed the admission criteria for success in an entry-level DPT program serves as a catalyst for further research.

In conclusion, the purpose of this study was to determine predictors of success, as measured by students' PTGPA in the basic sciences after the 1PY in an entry-level DPT program. Furthermore, although the Normative Model of Physical Therapist Professional Education, Version 2004 suggests that an applicant should possess a baccalaureate degree prior to entering a doctoral level program, research is needed to support this statement. As a result, one of the admission variables in this study focuses on the need of a baccalaureate degree as a prerequisite to enter a DPT program. The question remains: Does a baccalaureate degree correlate with successful performance in the students' first year of the professional basic science courses?

In summary, the academic variables that were selected for this study are: (1) age on admission, (2) degree status of the applicant, (3) gender, (4) pre-cumulative GPA, and (5) prerequisite course (key course) GPA. The criterion variable is PTGPA in the basic sciences after the first professional year (1PY). In the review of the literature, these variables have been identified as key predictors of academic success as measured by GPA in some, but not all baccalaureate and master's level PT programs. Therefore, the goal of this study is to provide information that may assist admissions

committee to select those applicants who have the academic qualifications to potentially succeed in both the academic and clinical aspects of a DPT program.

Chapter III

METHODS

Analysis

This study used a correlation-regression analysis to determine if any significant relationships existed between five predictors: (1) age on admission, (2) gender, (3) degree status, (4) pre-cumulative GPA, and (5) pre-requisite coursework GPA, and the criterion variable, PTGPA in the basic sciences after 1PY. If one or more significant relationships existed a simple or multiple regression equation would be established. Simple regression is used when there is only one measured significant correlation between a predictor variable and the dependent variable, whereas multiple regression is used when there is a minimum of two measured significant correlations between the predictor variables and the dependent variable (Munro, 2001). In order to obtain a significant power of .80, while given a medium effect size of .30, as determined by Cohen's Specialty Convention, a sample size of 85 subjects was required. However, since the number of subjects in this study could not exceed 75 (that is 25 subjects per three classes of students), non-parametric correlative statistics were used. The Seton Hall University (SHU) Institutional Review Board (IRB) approved the proposal.

Subjects

The subjects in this study consisted of 63 students from three physical therapy classes (Fall 2002 through Fall 2005), who were admitted to the DPT program at Seton Hall University (SHU) in South Orange, NJ. A sample of convenience was used. Minimum requirements for acceptance into the DPT program at SHU are the following: a preferred 3.0 overall pre-professional GPA, a preferred 3.0 prerequisite course GPA (english I, oral communications, psychology, general chemistry I and II, general physics I and II, anatomy and physiology I and II, and calculus I), 50 hours of volunteer work, and either a baccalaureate degree in any discipline, or a minimum of concentrated coursework totally 105 credits from SHU's Department of Biology.

There are two routes of entry for students to enter the DPT program at SHU. The first route is for those students who have been accepted into the Department of Biology at SHU as incoming freshmen. These students must have successfully completed the criteria previously listed for acceptance in the DPT program. The admissions committee then filled the remaining seats in the DPT program from outside applicants, that is applicants that have earned a baccalaureate degree, as well as having completed all the DPT program admission criteria.

Procedure

Following approval from the IRB at SHU, the PT Program Director was contacted to obtain the required study data from the students' application files. The required information included: age, gender, degree status, pre-cumulative overall GPA, prerequisite core course GPA, and physical therapy overall GPA (PTGPA) in the basic sciences of 1PY. The information was then sent to the investigator by the Program Director, in the form of an Excel spreadsheet to maintain the subject's confidentiality.

Data Analysis Methods

Pre-admission criteria such as age on admission, gender, degree status, pre-cumulative overall GPA, and prerequisite coursework GPA were the independent variables. The GPA of the basic sciences after the first year of the DPT program was the dependent variable.

Descriptive Statistics

Two main types of statistics were used in this study, descriptive and inferential. Descriptive statistics were used to characterize data in summary tables, charts, and graphs (Munro, 2001). Measures of central tendency (i.e., means, medians, modes, and standard deviations) were used to summarize the typical value of a variable, usually referred to as the average (Munro, 2001). However, descriptive data was limited in that although it may summarize important aspects of numerical data, it could not predict future performance nor support generalizations (Portney & Watkins, 2000).

Descriptive statistics were useful to the researcher, since they assisted in determining whether the data was normally distributed. Selection of the type of inferential statistics used in the study, either parametric or non-parametric, followed.

Statistical Testing

Statistical testing, also known as inferential statistics, allows the researcher to generalize the behavior of samples to a population (Portney & Watkins, 2000). In this study, its use ascertained whether relationships between the five predictor variables and the one dependent variable existed. Due to the small sample size, non-parametric statistics was used to analyze the data, in order to determine if a correlation existed between the five independent variables and one dependent variable. The non-parametric statistic used was the Spearman rho correlation coefficient test, also known as Spearman's rho.

SPSS (version 12.0) software was used for statistical analysis of the data. Since the DPT class size was low in numbers, the data from the three consecutive DPT classes were analyzed as a group. Correlations between academic success and pre-admission criteria were determined from this pool of students. Correlations were calculated using the PTGPA (1PY) year in the basic sciences (advanced anatomy, human physiology, neuroscience, and kinesiology) as the dependent variable. To determine the predictors of academic success, the statistically significant admission variables were addressed using a regression analysis. The results were used to formulate a

prediction equation, thus allowing for predictions on the dependent variable (Y) based on any predictor or independent variable (X).

Chapter IV

RESULTS

Study Sample

The study sampled consisted of 63 students; 16 of these students were male, and 47 were female. The number of students who entered the DPT with an earned baccalaureate degree and those who had not earned one, at the time of matriculation, was 37 and 26, respectively.

Of the 16 male students who participated in the study, 8 had earned a baccalaureate degree prior to admissions, while 8 had not. Of the 8 male students who had earned a baccalaureate degree, 7 had earned a Bachelor of Science degree (BS), while only 1 had earned a Bachelor of Art degree (BA). Furthermore, of the 47 female students, 29 had earned a baccalaureate degree prior to admission, while the remaining 18 had not. Of the 29 female students who had earned a baccalaureate degree, 27 had earned a Bachelor of Science degree (BS), while 2 had earned a Bachelor of Art degree (BA). The number of students in this study based on gender, degree status, and type of degree are presented in Table 5 which follows.

Table 5 Subject Participation Based on Gender, Degree Status and Type of Degree
T

Total male students	16	
Male students without degree	8	
Male students with degree	8	
Total male students with BS degree		7
Total male students with BA degree		1
Total female students	47	
Female students without degree	18	
Female students with degree	29	
Total female students with BS degree		27
Total female students with BA degree		2
Total participating students	63	

BS= Bachelor of Science degree
BA= Bachelor of Arts degree
The degree status of the subject was significant in this study since it identified those subjects (students) who matriculated in the Doctor of Physical Therapy with or without a baccalaureate degree.

Data Analysis

The data obtained were analyzed through the use of both descriptive and inferential statistics. Descriptive statistics are those which summarize variables using measures of central tendency such as the mean, median, mode, standard deviation, and frequencies (Munro, 2001). The relationship between the five independent variables (age, gender, degree status, pre-cumulative GPA, prerequisite GPA), and the one dependent variable (PTGPA in the basic sciences after 1PY) were analyzed using inferential statistics, with an alpha of .05 as the level of significance. The Spearman rho correlation coefficient and a multiple linear regression were used to analyze the relationship between the five predictors or independent variables and the one dependent or criterion variable.

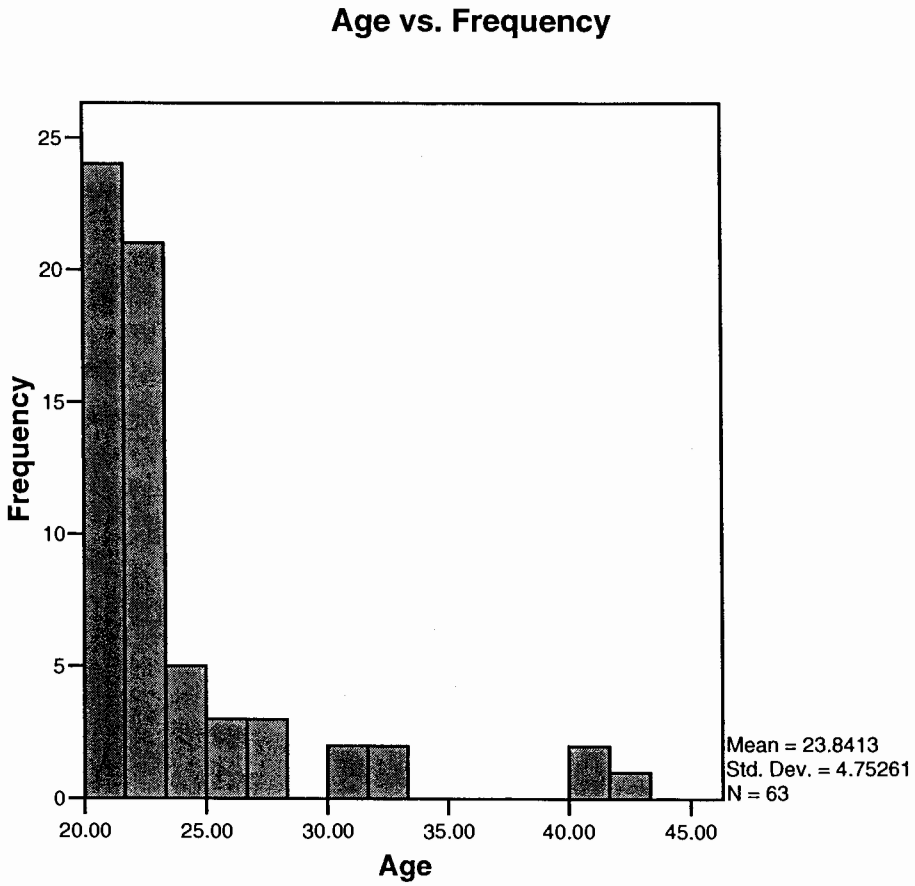
Descriptive Statistics

Using the SPSS computer software (version 12.0), measures of central tendency (mean, median, and mode), were calculated. The frequency and standard deviations of the following three of the five independent variables (age, pre-cumulative GPA, and prerequisite GPA), as well as the criterion variable; PTGPA of the basic sciences of the 1PY was also calculated. This enabled the researcher to determine whether or not the data was normally distributed, which, in turn determined which type of inferential statistics were necessary to analyze the data quantitatively. Descriptive statistics are presented in Figures 1-6 to follow and Table 6 (p. 64).

Frequency Distributions

Frequency distributions of the five predictors (independent variables) and one dependent variable are presented in Figures 1 through 6. The first predictor, age on admission to the DPT program is presented in Figure 1. The independent variable age (see Figure 1), yielded a mean age of approximately 23.8. The mean score was above the median, 22.0. The mean age of 23.8, as well as the median age of 22.0, was also higher than the mode, which was 21.0 (See Table 6, descriptive statistics). The data with regard to age in Figure 1 were not normally distributed.

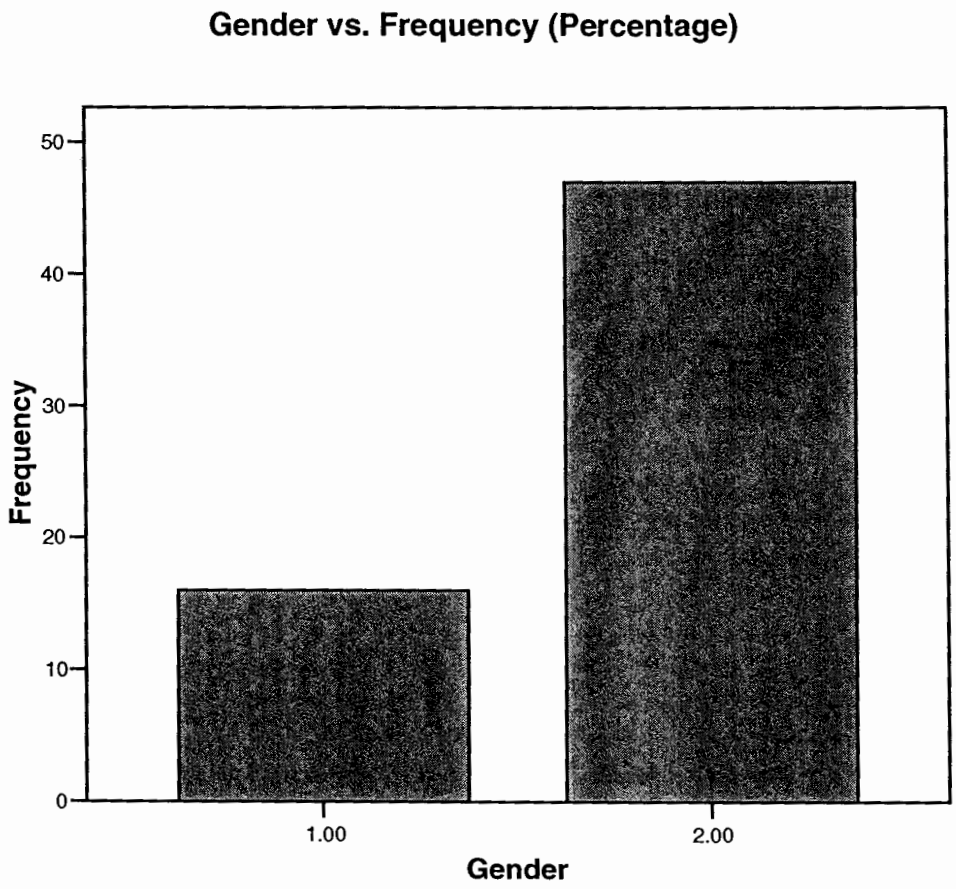
Figure 1. Age Frequency Distribution



In calculating the frequency regarding gender, the numbers '1' and '2' were assigned to males and females, respectively. The level of measurement for the independent variable, gender (see Figure 2), is nominal. Therefore Figure 2 below represents the total number of males and females (that is the frequency or percentage) that had entered the DPT at SHU in the classes beginning Fall 2002, 2003, and 2004. The frequency or percentage of males and females in this study was 16 and 47 percent respectively (see Figure 2).

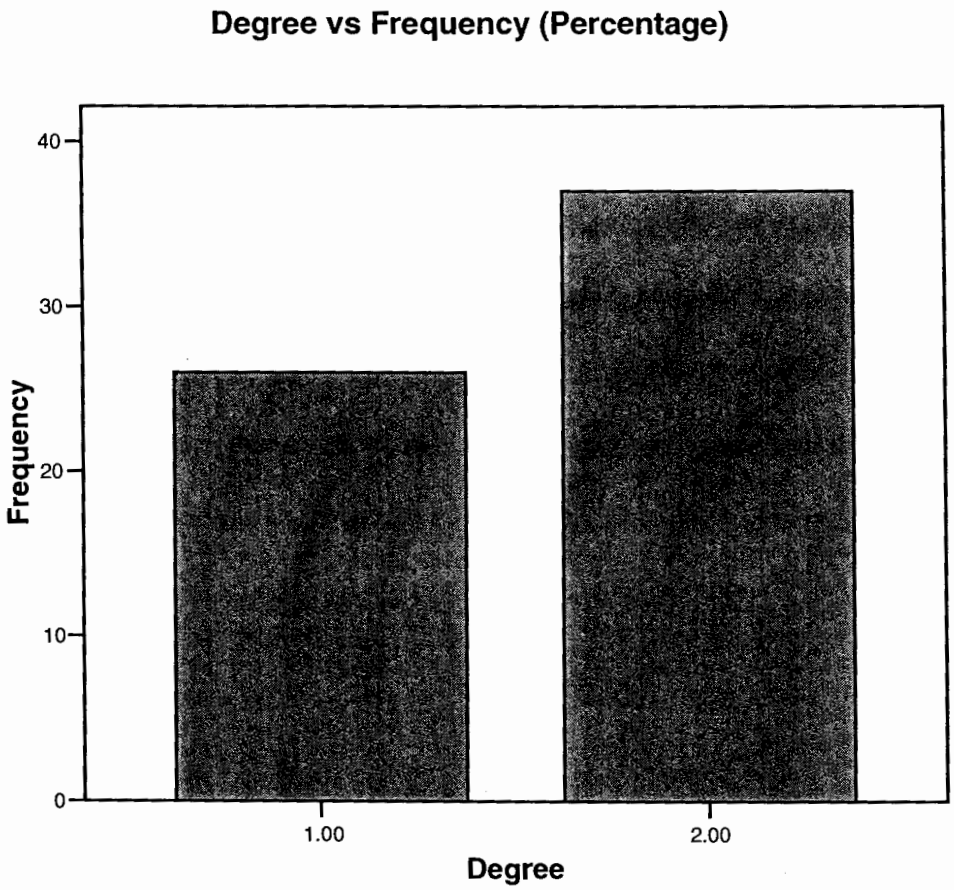
,

Figure 2. Gender Frequency Distribution



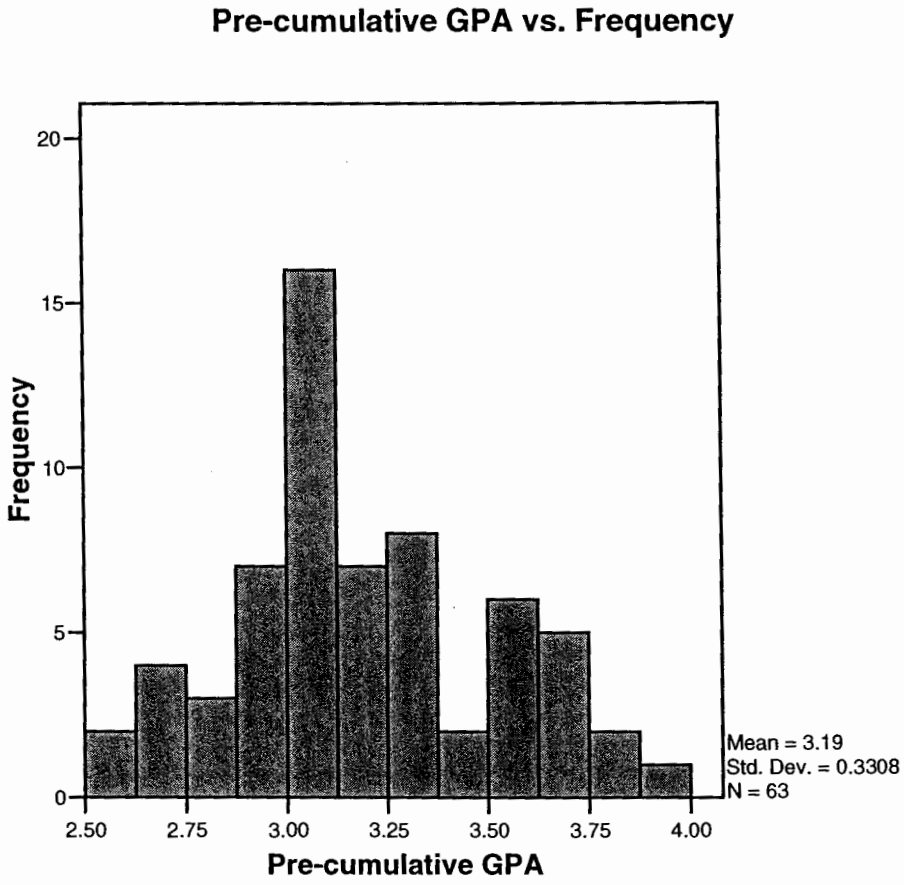
For calculating frequency regarding degree status of the students, the numbers '1' and '2' were assigned to a baccalaureate degree not being earned and being earned respectively. The level of measurement for the independent variable degree status (see Figure 3), is nominal. Therefore Figure 3 below represents the total number of students that had not earned a baccalaureate degree and those who had earned a baccalaureate degree (that is the frequency or percentage), prior to entering DPT at SHU in the classes beginning Fall 2002, 2003, and 2004. The frequency or percentage of those students who had earned a baccalaureate degree and those who had not was 26 and 37, respectively (see Figure 3).

Figure 3. Degree Frequency Distribution



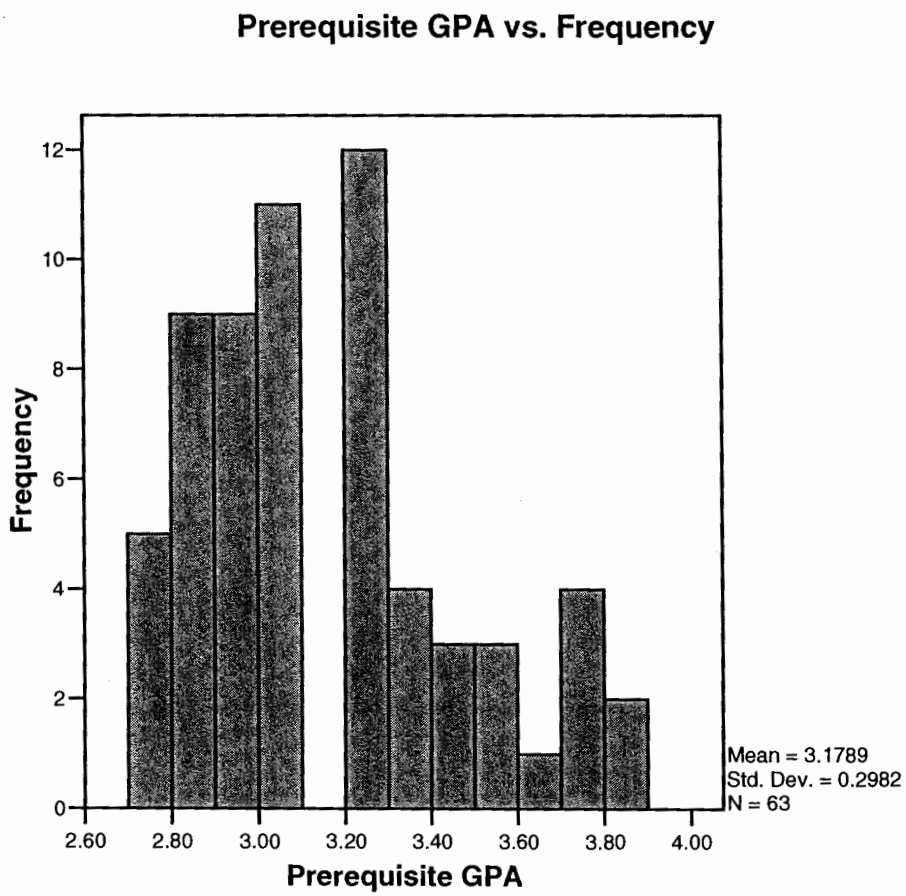
The independent variable, pre-cumulative GPA (see Figure 4), yielded a mean score of 3.19, a median score of a 3.11, and a mode of a 3.00. The minimum pre-cumulative GPA was a 2.51 and the maximum pre-cumulative GPA was a 3.98. The range or the difference between the maximum pre-cumulative GPA and minimum pre-cumulative GPA was 1.47. The independent variable pre-cumulative GPA was also not normally distributed (see Figure 4).

Figure 4. Pre-Cumulative GPA Frequency Distribution



The independent variable of prerequisite GPA (see Figure 5), yielded a mean score of approximately 3.18, median score of 3.11, and mode of 3.00. The maximum prerequisite GPA was 3.88 and the minimum pre-requisite GPA was 2.70. The range or the difference between the maximum prerequisite GPA and the minimum prerequisite GPA was 1.08. The independent variable prerequisite GPA was not normally distributed (see Figure 5).

Figure 5 Prerequisite GPA Frequency Distribution.



The dependent or criterion variable PTGPA in the basic sciences after 1PY (see Figure 6), yielded a mean score of approximately 3.47, a median score of 3.50, and a mode of 4.00. The maximum PTGPA was 4.00 and the minimum PTGPA was 2.28. The range or the difference between the maximum PTGPA and the minimum PTGPA was 1.72. The dependent variable PTGPA in the basic sciences after 1PY was not normally distributed (see Figure 6).

Figure 6. PTGPA Frequency Distribution

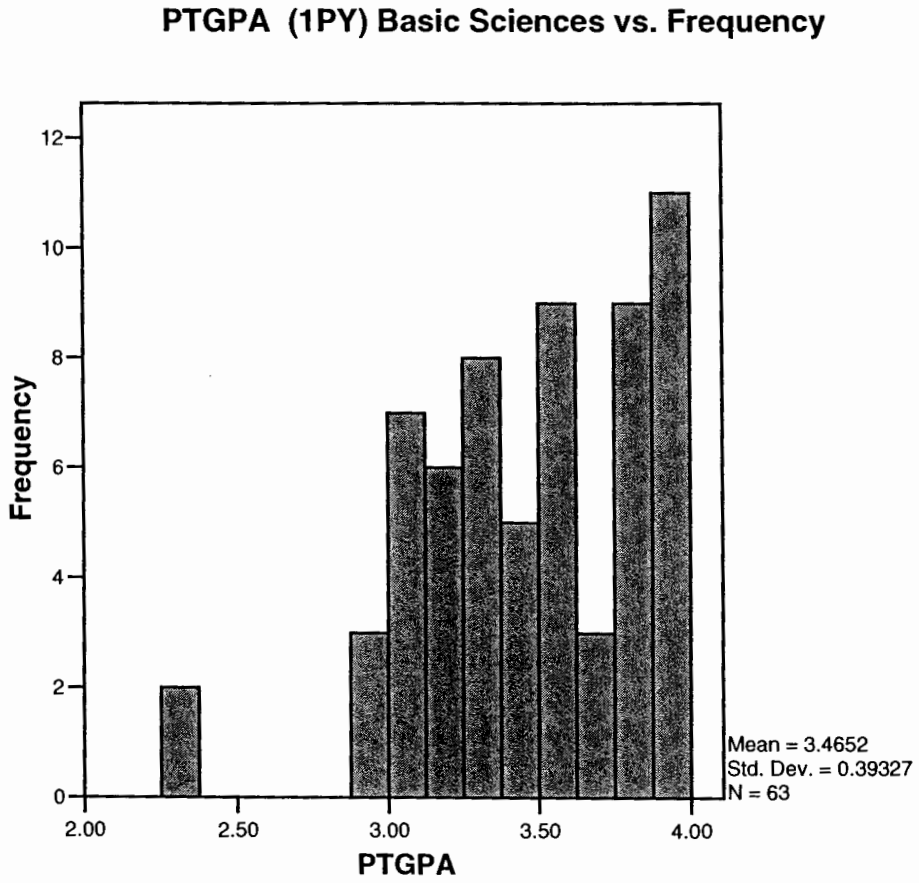


Table 6 Descriptive Statistics of Independent and Dependent Variables

		Age	Gender	Degree	Pre-cum GPA	Pre-req GPA	PTGPA after Yr1 of basic sciences
N	Valid	63	63	63	63	63	63
	Missing	0	0	0	0	0	0
Mean		23.84	N/A*	N/A	3.1900	3.1789	3.4652
Median		22.00	N/A	N/A	3.1100	3.1000	3.5000
Mode		21.00	N/A	N/A	3.00	3.00	4.00
Std deviation		4.75	N/A	N/A	.300	.298	.393
Variance		22.58	N/A	N/A	.109	.089	.155
Range		22.00	N/A	N/A	1.47	1.18	1.72
Minimum		20.00	N/A	N/A	2.51	2.70	2.28
Maximum		42.00	N/A	N/A	3.98	3.88	4.00

*N/A= Not Applicable – descriptive statistics in this table cannot be defined numerically for the independent variables of both gender and degree status of the applicant. This is because the level of measurement for both of these variables is nominal.

Results of Descriptive Analysis

Significant results were noted from the measures of central tendency. The mean age of 23.8 correlates with the fact that the number of students who had completed a baccalaureate degree prior to admission was greater (37) than the number of students who had not completed a baccalaureate degree prior to admission (26). Since there were more students in this study that had completed a baccalaureate degree than had not, the average age on admission would have been expected to be over 21, that is the age of a typical undergraduate junior in college. Approximately 50 of the 63 students who entered the DPT program were in the age range of 20 to 25 (Figure 1). Therefore the predictor of age on admission of students to the DPT is not normally distributed.

From the frequency distributions of pre-cumulative GPA, prerequisite GPA, and PTGPA, that is Figures 4, 5, and 6 respectively, the data is again not normally distributed. Therefore, non-parametric statistics were needed to interpret the data, to determine if there were any statistically significant correlations between these two predictors (pre-cumulative GPA and pre-requisite GPA) and the one criterion variable PTGPA. In summary, the descriptive statistics was useful in selecting which inferential statistics to use in this study.

Statistical Testing Analysis

Spearman rho Correlation Coefficient

The Spearman rho correlation coefficient test was used to determine significant correlations between the five independent variables, as well as the one dependent variable. Table 7 identifies significant correlations between the independent variables, as well as any significant correlations between an independent variable and dependent variable. These findings allowed the researcher to use a regression analysis to ultimately determine the individual effect of each independent variable on the dependent variable (PTGPA in the basic sciences after 1PY).

There were five significant correlations, of which four were between independent variables and one significant correlation between the independent variable of pre-cumulative GPA and the dependent variable PTGPA in the basic sciences after 1PY.

In the first correlation, a positive correlation existed between degree status and age. The Spearman rho correlation was .531, $p<.01$. The second correlation between pre-cumulative GPA and age was negatively correlated (-.256), $p<.05$. The third correlation between pre-cumulative GPA and pre-requisite GPA was a .615, $p<.01$. The fourth correlation between degree and pre-cumulative GPA was negatively correlated (-3.09, $p<.05$). The fifth correlation between an independent and dependent variable, that is pre-cumulative GPA and PTGPA in the basic sciences after 1PY was a .441, $p<.01$ (Table 7). Once a significant correlation between the independent variable, (pre-cumulative GPA), and dependent variable, (PTGPA in the basic sciences after 1PY), was determined, a multiple linear regression was implemented.

Table 7 Spearman rho Correlation Coefficients

Variables	*Correlation Coefficient*
Age and Pre-cumulative GPA	-.256*
Age and Degree	.531**
Pre-cumulative GPA and Degree	-.309*
Pre-cumulative GPA and Prerequisite GPA	.615**
Pre-cumulative GPA and PTGPA[a]	.441**

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)
[a] Correlation between independent variable, pre-cumulative GPA and dependent variable PTGPA

Multiple Regression Equation

The Multiple regression equation represents the linear relationship between the five independent variables X_1 (pre-cumulative GPA), X_2 (age), X_3 (gender), X_4 (degree status), and X_5 (prerequisite GPA) with the dependent variable Y' (PTGPA in the basic sciences after 1PY) (Kirkpatrick & Feeney, 2005).

The construction of the least squares regression equation is determined from the unstandardized and standardized coefficients. The values listed under Beta (standardized coefficients) represent a set of coefficients that would be used if all the variables were converted to Z-scores. From the standardized coefficients the regression equation was established (Table 8). The regression equation was determined from the Beta coefficients in Table 8 below (all the variables have been converted to z-scores). In Table 9, each of the five independent variables were correlated with the dependent variable and the significance of these zero order correlations were computed using Spearman rho's correlation coefficient (Appendix C for the SPSS version 12 Spearman rho correlation coefficients). In the model summary in Table 10, each model represents a forward stepwise regression of the five predictors that were chosen. A forward stepwise regression was generated using SPSS and the order in which the predictors were added to the stepwise progression was based on the strongest correlation (r) to the dependent variable (PTGPA in the basic sciences after 1PY) (Table 9). From Model B in Table 10, the greatest adjusted R squared

was calculated using predictors pre-cumulative GPA and age. The greatest adjusted R-squared was .206 or 20.6%. Pre-cumulative GPA attributed to 16.7 % of the variance, while age attributed to 3.9% of the variance. Therefore, the predictors pre-cumulative GPA and age accounted for 16.7% and 3.9%, respectively, of the total variance (20.6%) of the PTGPA in the basic sciences after 1PY. Consequently, 79.4% of the variance between the independent and dependent variables cannot be explained by the regression equation alone.

Table 8 Multiple Correlation Coefficients

Model	Unstandardized Coefficients	Standardized Coefficients	Significance
	B	Beta	
1 Pre-cum GPA	.506	.425	.001
2 Pre-cum GPA	.494	.415	.001
Age	-.019	-.224	.052
3 Pre-cum GPA	.549	.462	.008
Age	-.019	-.224	.054
Prerequisite GPA	-.084	-.063	.708
4 Pre-cum GPA	.619	.521	.055
Age	-.022	-.263	.033
Prerequisite GPA	-.120	-.091	-.595
Degree	.104	.131	-.310
5 Pre-cum GPA	.618	.519	.005
Age	-.022	-.263	.034
Prerequisite GPA	-.111	-.084	.624
Degree	-.099	.125	.339
Gender	.059	-.066	.520

The Beta coefficients in Model 5 are necessary to create a prediction (regression) equation. Predicted Z(PTGPA) = 0 + (.519)*(Zpre-cumGPA) + (-.263)*(Zage) + (-.084)*(prerequisite GPA) + (.125)*(Zdegree) + (.066)*(Zgender).

Table 9 Zero-Order Correlations between the Five Predictors and Criterion Variable PTGPA in the Basic Sciences after 1PY**

Predictor	Correlation	Significance
Pre-cumulative GPA	.441	.000
Age	-.206	.105
Gender	.010	.938
Degree	-0.75	.557
Prerequisite GPA	.183	.152

**These correlations were generated from the Spearman rho correlation coefficients. (See Appendix C).

Based on both the zero order correlation between each independent variable and the dependent variable PTGPA in the basic sciences after 1PY, as well as level of significance (Table 9 above), the stepwise forward regression would begin with [(pre-cumulative GPA), then (pre-cumulative GPA + age), then (pre-cumulative GPA + age + prerequisite GPA), then (pre-cumulative GPA + age + prerequisite GPA + degree) and the last one would be(pre-cumulative GPA + age + prerequisite GPA + degree, and finally, gender)].

Table 10 Model Summary

Model	R	R-squared	Adjusted R –squared	Standard error of estimate
1	.425(a)	.181	.167	.35884
2	.481(b)	.231	.206	.35053
3	.487(c)	.237	.198	.35280
4	.498(d)	.248	.196	.35366
5	.501(e)	.251	.185	.38489

Predictors: (a) (constant), pre-cum GPA
Predictors: (b) (constant), pre-cum GPA, age
Predictors (c) (constant), pre-cum GPA, age, gender
Predictors (d) (constant), pre-cum GPA, age, gender, degree
Predcitors (e) (constant), pre-cum GPA, age, gender, degree, pre-requisite GPA

Summary of Results

Since the data were not normally distributed, as well as a small sample size based on Cohen's Specialty Convention, non-parametric correlative statistics, Spearman's rho correlation coefficient was used. The only statistically significant predictor of PTGPA in the basic sciences after 1PY was the pre-cumulative GPA (.441, $p < .01$).

The multiple regression analysis determined that two of the five predictors accounted for 20.6% of the variance of PTGPA in the basic sciences after 1PY. The pre-cumulative GPA (p=.000) and age (p=.105) on admission to the program comprised 16.7% and 3.9% respectively, of the total variance (20.6%), of the dependent variable.

Chapter V

DISCUSSION

A. Introduction: Purpose and General Results Reviewed

The purpose of this study was to analyze the predictors of academic success in an entry-level DPT, as measured by the PTGPA in the basic sciences after 1PY. This correlative study analyzed the relationships between five admission criteria/variables: (1) age on admission to the program, (2) gender, (3) degree status of the applicant (4) pre-cumulative GPA, and (5) prerequisite course GPA, as well as the relationship between each independent variable and the dependent variable, PTGPA.

The results of this study are extremely useful to DPT admissions committee, since there is limited research to date on what admission variables statistically correlate to academic success in an entry-level DPT program. Descriptive statistics, for each of the five admission variables, as well as the one criterion variable, were important since the data obtained and analyzed was not normally distributed (see Figures 1-6). Of note, because of the small sample size, non-parametric statistics had to be used in this study to analyze the data. The non-parametric test used was the Spearman rho correlation coefficient test.

B. The Spearman rho Correlation Coefficients.

The Spearman rho correlation coefficient test had determined that only one predictor (pre-cumulative GPA), was moderately statistically significant to the PTGPA. This correlation coefficient (r= 0.441) was significant at the .000 level. There were also correlations that were significant among the independent variables, such as age and degree (r=.531 at the 0.01 level), pre-cumulative GPA and age (r= -.256 at the 0.05 level), pre-cumulative GPA and degree (r= -.309 at the 0.05 level), and pre-cumulative GPA and prerequisite GPA (r= .615 at the 0.01 level).

C. Significant Correlations and the Impact on this study

The significant correlation between the independent variable (pre-cumulative GPA), and the dependent variable (academic success as measured by PTGPA), has also been consistent with previous studies regarding predictors of academic success in both baccalaureate and master's level PT programs. Interestingly, pre-cumulative GPA had been noted to be the strongest admission variable, indicative of academic success in baccalaureate, master's level and one published entry-level doctoral PT program (McGinnis, (1984); Balogun et al., (1986); Day, (1986); Thieman et. al., (2003); and Dockter, (2001).

There is limited information in the literature with regard to predictors of academic success for entry-level DPT programs. In the only published study by Dockter (2001), pre-cumulative GPA was the key predictor of academic success in an entry-level doctoral program.

Published studies for baccalaureate, master's level and Dockter's (2001) study have reported that the pre-cumulative GPA is the main predictor of academic success in a PT program. However, research indicates that this is not the only key predictor (McGinnis, 1984; Balogun et al 1986; Thieman et al 2003; Kirchner et al 1994; Day, 1986; and Dockter, 2001).

In addition to pre-cumulative GPA, McGinnis (1984) and Balogun et al. (1986) noted that other admission criteria such as age on admission, interview scores, prerequisite GPA, and scores on the personal essay were also found to be significant predictors of academic success.

This current study, did not support the findings of past studies, which addressed other academic and non- academic variables (i.e., prerequisite GPA, personal essay, and interview score), in addition to pre-cumulative GPA. This may be due to the fact that this study assessed admission criteria at the doctoral level, while past studies (except for Dockter's), assessed admission variables at the baccalaureate and master's level. Therefore, two different levels of learners were being investigated.

In the current study, the pre-cumulative GPA accounted for 16.7% of the variance of the PTGPA in the basic sciences after 1PY of the DPT program (Table 10). However, by use of a forward stepwise regression, 20.6% of the variance was explained by multiple regression analysis. Although pre-cumulative GPA did account for 16.7% of the variance, that is it was the key predictor of PTGPA in the basic sciences after 1PY, the total variance was greatest when both pre-cumulative GPA and age were

considered. The pre-cumulative GPA plus age accounted for 16.7% and 3.9% respectively, of the total variance. Therefore, almost 79.4% of the total variance cannot be explained by the effects that the independent variables had on each other, as well as on the dependent variable. Other factors that may explain the low variability are qualitative in nature and considered non-objective (Dockter, 2001). Confounding factors influencing the low variability, may be inadequate study habits, inability in using different learning styles to assist mastering the material, as well as inadequate enthusiasm and motivation to succeed in the professional program.

Although multiple regression is a powerful analysis it is not always accurate, especially if the sample size is low and the predictors are high (Munro, 2001). In this study, statistically significant correlations between the independent variables existed. There were four correlations: (1) the correlation coefficient with regard to age and degree was a .531 at the 0.01 level. Although, there was no correlation with either age or degree to PTGPA; the positive correlation between age and degree is significant. This correlation may be explained by noting as the age of an applicant increases, the greater the probability of the individual having a degree prior to enrollment to the PT program.

D. Significant Negative Correlations

There was another significant correlation between age and pre-cumulative GPA ($r = -.256$). The inverse relationship was significant at the

0.05 level, that being, as age increased, the pre-cumulative GPA decreased. There have been studies to confirm the inverse relationship between pre-cumulative GPA and age (Dockter, 2001). However, as Dockter mentioned in her study, there is a great deal of controversy in the literature regarding the relationship of age and pre-cumulative GPA for baccalaureate and master's level programs. At present, research addressing programs at the doctoral level is essential to assess the relationship between age and pre-cumulative GPA. This study is in concert with the findings of Dockter's research.

In most of the literature, authors noted that as the age of an individual increased, their academic achievement declined, as reflected by their pre-cumulative GPA. This was evident not only in the field of PT, but other fields such as medicine and chiropractic (Scott et al., 1988; Hoyat et al., 1990; Green et al., 2003; and Zhang, 1999). Possible rationales may be that older students (a.k.a., non-traditional students) have more outside responsibilities (e.g., possibly being married, having children, as well as working part or full time), which may interfere with their studies. These responsibilities may be distractions, which may cause a student to have less quality time to attend to their studies, therefore resulting in a weaker overall pre-cumulative GPA.

Similarly, to the negative correlation between pre-cumulative GPA and age in this study, there was also a negative correlation between pre-cumulative GPA and the degree status of the applicant (r= -.309). Consequently, students who have earned a degree (BA or BS), prior to admissions to the graduate PT program, generally had a lower pre-cumulative

GPA when compared to the '3 plus' dual degree students. Non-traditional (older students in most cases) students usually have earned a degree prior to enrollment to the graduate PT program, but may have had a lower pre-cumulative GPA when compared to the younger, non-degree student entering the DPT at SHU. As previously mentioned, this may be attributed to the fact that many of the non- traditional students may have studied for their degree while simultaneously working full time or raising a family. The older students may also have a more difficult time adjusting to the demands of the academic arena, in comparison to their younger colleagues, who are already conditioned to the academic environment. Therefore, older students may be expected to be weaker students than the younger colleagues, due to the above reasons.

E. Significant Positive Correlations

The strongest positive statistically significant correlation between the independent variables was seen between pre-cumulative GPA and prerequisite GPA (r=.615 at the 0.01 level). As pre-cumulative GPA increased, prerequisite GPA also increased. This may be due to the fact that the prerequisite GPA, for both '3 plus' dual degree students and those having a BS in the natural sciences, is the GPA of selected critical courses representing approximately one third of the credit hours (37 credits) to the pre-cumulative GPA (105 credits). The prerequisite course GPA is the average of the following courses: (1) english 1, (2) oral communications, (3) psychology, (4) general chemistry I and II, (5) general physics I and II, (6)

anatomy and physiology I and II and, (7) calculus I. These courses, for those students who are '3 plus' dual degree and many who have a BS degree prior to matriculation, are included in their pre-cumulative overall GPA.

This is not necessarily the case for those students who enter the program with a BA degree in any discipline (in this study, there were three students that entered with a BA degree). Therefore, this may explain why the strongest statistical correlation existed between the independent variables pre-cumulative GPA and prerequisite science GPA. Ironically, there was no statistically significant correlation between prerequisite GPA and PTGPA, yet, there was a statistically significant correlation between pre-cumulative GPA and PTGPA. This finding suggests the following two possibilities: (1) the courses that had been identified as prerequisite courses or key courses for baccalaureate and master's level PT programs, may not necessarily be an indication of academic success for entry-level doctoral programs as seen in this study, as well as Dockter's study (Templeton et al., 1994; and Hayes et al., 1997). (2) As was previously done in other studies, it may be useful to consider each course which comprised the prerequisite overall GPA, as a separate admission variable. That information would be more useful to study, since it would allow one to note which of the prerequisite courses if any, are key indicators of academic success, therefore providing admissions committee with more specific admission guidelines.

As noted previously, there were four significant correlations between the five independent variables presented in this study. Pre-cumulative GPA

was the moderate statistical significant correlation as previously mentioned earlier. However, regarding degree status of the applicant, as well as gender of the applicant, the results do not relate either predictor as significant. Degree status of the applicant has enabled us to note that as age of the applicant increases, the pre-cumulative GPA is generally weaker (r = -.309).

However, as an applicant is older in age, they usually will have earned a degree prior to applying to an entry-level doctoral program. As the age of the applicant increases, the pre-cumulative GPA decreases (r = -.309), thereby suggesting that older non-traditional students, who have attained a baccalaureate degree are less likely to succeed academically, than the younger traditional students, who have not yet earned a baccalaureate degree. However, it is interesting to note that the above holds true for both males and females. Therefore, the gender of the applicant does not have an impact on academic success, as measured by PTGPA.

F. Scenarios of Importance to the Present Study

There were data, presented in this study, on two subjects, whose pre-cumulative GPA and/or prerequisite GPA, based on a numerical basis alone, would not account for their acceptance in this entry-level DPT program.

Scenario I:

One of the students was a female, 40 years of age, who earned a BS degree. The students' pre-cumulative GPA was a 3.31 and her prerequisite science GPA was a 2.88, which is lower than the preferred 3.0 GPA. Her

PTGPA in the basic sciences was a 2.33, lower, than the preferred 3.0 needed to remain in good academic standing in a graduate program.

In a situation such as this, there are a number of factors that may account for a low PTGPA after 1PY. Although, the student had earned a BS degree from an accredited university prior to matriculation, the length of time between completing a baccalaureate degree and beginning a professional DPT program would be a key factor that one must consider. Since the student is 40 years old, the student may be returning to school after a period of years. Therefore, the pre-cumulative GPA may be from several years ago and her current PTGPA may be due to an adjustment period of being a returning student.

Scenario II:

A second scenario in this study involved a 24 year old female with a BS degree, who was granted admission to the SHU DPT program with a very low pre-cumulative GPA of a 2.51 and a prerequisite science GPA of a 2.80. Although the student may have had sufficient volunteer work, excellent reference letters in her application package, and a high GRE score, her overall pre-cumulative GPA of a 2.51 would suggest she was not a desired candidate.

Despite the low pre-cumulative GPA, her PTGPA of the basic sciences after 1PY was slightly under the 3.0, (2.89), therefore this student did well despite the low pre-cumulative GPA. There are several factors one must take into account when selecting applicants. The pre-cumulative GPA is reflective

not only of the students' ability to do well in a professional PT program, however, it is also necessary to note the academic institution from which the student has studied. Some academic institutions have a grading scale of only pluses, while others have a plus/minus scale. The plus/minus scale usually generates GPAs that are lower than GPAs generated from an institution with a plus scale only. It is also important to note the level of classes that the student is enrolled in, for example honors classes may be noted on a students' official transcript. A student with honors courses may have a GPA which may be lower numerically than their classmates, who are not in an honors curriculum. Therefore, although students have been selected with lower GPAs than some students that may have been declined admission, it is important to note that the pre-cumulative GPA must be evaluated further. It is not only the numerical GPA that is important to admissions committee, but also the grading scale of the institution where the degree was earned, as well as whether the student was enrolled in an honors program or not. In many student academic profiles, transcripts to academic institutions will not only designate if the GPA is based on honor's courses and a plus/minus grading scale, but also will provide an unweighted GPA and weighted GPA to reflect the impact of the honor's courses, as well as the plus/minus grading scale. The weighted GPA is the GPA that standardizes the student, so that the students' GPA is equivalent to all other applicants.

Of the five independent variables discussed in this study, gender was the only one that did not correlate significantly with any of the other

independent variables. Therefore, the gender of the individual may not be related to academic success in an entry –level doctoral program. It is interesting to note that there were more female than male students in the DPT at SHU, approximately three times as many females as males (females = 47 and males = 16). Although gender is not significant with regard to academic success in this entry-level doctoral program, it is interesting it to note the number of males and female who entered the DPT without a degree and the proportion of males and females that entered with a BS or a BA.

Interestingly enough, of the 16 males that attended the DPT at SHU, eight of the males had a baccalaureate degree, and eight had not (See Table 5). Of the eight having a baccalaureate degree, seven held a BS degree and one held a BA degree. The breakdown of female students, who attended the DPT at SHU was disproportionate when compared to the males. There were 47 female students in this study. The breakdown of female students who had earned a baccalaureate degree was also disproportionate; however of the 16 male students, 8 had a degree upon matriculation and 8 did not.

The number of female students not having a degree was 18 and those having a degree were 29. Similar to the men, most of the female students had BS degrees; 27 females had earned a BS degree, while two had earned a BA degree. There was a larger number of female students in the DPT at SHU, the number that had a degree was one and half times the amount of those not having a degree. However, as already noted, an earned degree does not necessarily correlate with academic success in a DPT program. Although

students with a degree performed equally well, in comparison to those who did not have a degree, there is not enough information to be able to conclude whether or not a student with a BS degree will be academically stronger, than a student who has earned a BA degree. Since only three of the 37 students in total had earned a BA degree, this is an area that needs to be addressed in future studies.

To complicate the admission process further for DPT programs, the Normative Model of Physical Therapy (2004) suggests that an applicant should possess a bachelor's degree prior to admission to an entry-level doctoral program. Vision 2020 reported that all PT programs would be at the doctoral level by the year 2020 (Massey, 2003). Dockter (2001) noted that the results of her study did not support the requirement of a bachelor's degree prior to admission.

In agreement with Dockter's study, the DPT at SHU did not find a statistically significant correlation between students entering the DPT program with or without a baccalaureate degree and academic success as measured by the PTGPA. Therefore, the SHU study, as well as Dockter's study, both suggest that there was no significant correlation between the degree status of the applicant and academic success in the entry-level DPT program.

G. Limitations of the Study and Implications for Future Research

The purpose of this study was to determine which, if any, academic variables correlated significantly to academic success, as measured by the PTGPA in the basic sciences after 1PY (PTGPA). There are several limitations to this study:

(1) This study is based on one entry-level DPT at SHU, therefore the results of this study cannot be generalized.

(2) Prerequisite GPA, (key course GPA) can be used as an overall predictor of PTGPA, but the individual science prerequisite courses may be used an individual predictors. A limitation of this study was that the GPA of each individual science course was not looked at specifically, to determine if any one individual science is a significant predictor of PTGPA.

(3) The sample size was not large enough in order to utilize parametric statistics. Since the number of subjects needed was a minimum of 85 to utilize parametric statistics, this study should be repeated with a minimum of 85 subjects, to determine the effect of a larger sample size.

(4) Many of the studies regarding admission variables/criteria for baccalaureate and master's degree programs mostly involved some type of standardized test, such as the Scholastic Aptitude Test (SAT) or the Graduate Record Examination (GRE). This study could be repeated with all students being required to show academic proficiency

on the same standardized exam one type of standardized test, such as the Scholastic Aptitude Test (SAT) or the Graduate Record examination. This study could be repeated with all students being required to show academic proficiency on the same standardized exam.

(5) The study could be repeated using the same subjects, however the dependent variable may be PTGPA (1PY), PTGPA (2PY), PTGPA (3PY) and performance on the National Physical Therapy Licensing Exam (NPTE). This type of study would be time consuming and it would take a number of years, in order to be able to secure that data. However, it would offer admissions committee valuable information on what admission variables/criteria or what year of the DPT program, positively correlates with success on the NPTE.

Chapter VI

Conclusions

The purpose of this study was to determine the academic variables/criteria that are indicative of academic success as measured by the PTGPA in the basic sciences after 1PY at SHU. As noted previously, only one admission variable, pre-cumulative GPA was statistically significant to PTGPA. Pre-cumulative GPA has been reported as the most widely used admission criteria for baccalaureate, master's levels and the only entry- level doctoral program (Dockter, 2001; Day, 1986; Thieman et al., 2003; Mc Ginnis, 1984; and Balogun, 1986). Pre-cumulative GPA, in and of itself, provides limited information to admissions committee on selecting applicants to entry-level DPT programs. To conclude the current study, it is necessary to review the four other predictors that were considered and suggest some plausible reasons, as to the possible significance of these predictors for admissions committee. Finally, it would be useful to consider some other predictors that may be necessary for admissions committee to explore further, to select the most qualified applicants to the DPT at SHU.

This study was intended to identify predictors that may have correlated significantly to academic success in an entry-level doctoral PT program.

However, as one views the other predictors that were indicated in this study, the following conclusions are presented. Age was found to be a non-significant negative predictor of PTGPA (-.209). This result would suggest that the younger the student, the stronger their PTGPA. However, in this study, the mean age was approximately 23.8 years, the median 22 years and the mode 21 years. Therefore, the age of the students in this study was predominately in the early to mid twenties, although the range in age of all students in this study was from 20 to 42 years. Therefore, since approximately 50 of the 63 students were in the 20-25 age group (Figure 1), this data substantiates that age was not a significant negative predictor of PTGPA. It would be interesting to note the effect of age on PTGPA in a similar study where there was a normal distribution regarding age of the students, that being almost as many students being older as younger.

Gender was the only predictor that did not correlate significantly with any of the other independent variables (i.e., age, degree status, pre-cumulative GPA, and prerequisite GPA), as well as the dependent variable, PTGPA. Although, there were almost three times as many females than males (females = 47, males =16), the gender of the student did not correlate significantly with any of the independent variables or the dependent variable, PTGPA. It was interesting to note that from the 47 female students, 18 had not earned a degree, while 29 did earn a degree. Of the 29 students that did earn a degree, 27 earned a BS, while only two had earned a BA. For the 16 male students, there were eight students who did not earn a degree, while

eight who had. Of the eight male students who had earned a degree, seven had earned a BS, while only one earned a BA. These statistics are also important when compared to the degree status of the applicant.

The students who had earned a bachelors degree prior to matriculation were 37 in total, 34 earned a BS degree, while only three earned a BA degree.

The remaining 26 students did not earn a baccalaureate degree. It was noted in this study that the degree status of an individual was not significantly related to the PTGPA, but it was negatively correlated (-0.75). This is true for both BS and BA degree students. However, because of the severe disproportion in the number of students who had earned a BS degree in comparison to a BA degree (34 earned a BS degree; three earned a BA degree), future studies on degree status in an entry-level doctoral program, with a proportionate number of students who earned a BS and BA degree would be useful. Therefore, one can conclude with regard to degree status, that there were not enough students who entered the DPT at SHU with a BA degree, to determine whether this type of degree is an indicator for academic success in an entry-level doctoral program, as measured by the PTGPA. It would have been beneficial in this study to have a equal number of students entering the program with a BS degree, BA degree or no degree.

The prerequisite course GPA would have had to be met for both cohorts of degree holding students. The most important concern with regard to degree is that the '3 plus' dual degree students will all earn a BS degree. However, if

the number of students having a BS degree and BA degree are relatively equal and both degree holding students did well in the entry-level doctoral program, admissions committee may be limiting their applicant pool to BS students.

Although it cannot be determined from this study, it would be useful to perform a similar study where the number of degree holding students are close to equal. If the students were to perform equally well academically, regardless of degree type, either a BA degree or a BS degree, the pool of applicants to entry-level DPT programs would be open to students from various different disciplines, rather than primarily from the biological sciences, as is the case in this study.

Therefore, not only does it increase the number of potential applicants for admissions committee to choose from, but it ensures that the applicants with the greatest potential to succeed are selected for admission. The findings in this study showed no difference in academic success (as measured by PTGPA), if the students earned or did not earn a baccalaureate degree. However, this study is in conflict with the Normative Model of Physical Therapy (2004). The Normative Model suggests that all students applying to entry-level DPT programs should all possess a baccalaureate degree prior to matriculation. Research studies on degree status and type of degree is imperative for admissions committee, when considering accepting applicants to an entry-level doctoral program.

The predictor, prerequisite course GPA is an important admission criteria/variable for the entry-level doctoral program. As previously mentioned the courses that comprise the prerequisite course GPA, (a.k.a. key course GPA), are important to consider when selecting applicants to a DPT program. The prerequisite courses were: (1) english I, (2) oral communications, (3) psychology, (4) general chemistry I and II, (5) general physics I and II, (6) anatomy and physiology I and II, and (7) calculus I. One of the problems in this study was that the findings on prerequisite GPA was only based on the average prerequisite GPA.

However, it has been found in other studies (Templeton et al., 1994; Hayes et al., 1997), that the prerequisite key courses may be significant to the PTGPA, if these courses were considered as individual predictors (i.e., general chemistry I and II, anatomy and physiology I and II, and physics I and II, etc.). The importance of studying each science as a single predictor of academic success, is that the sciences, such as anatomy and physiology in a professional PT program, are the basis for most of the body of knowledge and are the courses on which all learning in the profession of PT builds upon (Hayes et al., 1997).

Other sciences, such as chemistry, are significant, since it is indicative of a students' problem solving ability, which is critical for one to be proficient in when discussing patient care (Templeton et al., 1994). Therefore, the evaluation of courses at the undergraduate level (such as pre- anatomy GPA and pre-chemistry GPA), may be single significant predictors of PTGPA.

Templeton et al. (1994) had agreed with Hayes et al. (1997) in that pre-science GPAs are more critical in predicting academic success, as measured by the PTGPA, than the pre-cumulative GPA. Templeton et al. (1994) noted that the pre-chemistry and pre-physics GPAs were the key predictors of academic success, while Hayes et al. (1997) noted that the pre-anatomy was the key predictor.

Although, they agreed on the importance of the prerequisite sciences as a predictor of academic success, there studies disagreed as to which science(s) was the key predictor. Therefore, since the profession of PT is a problem-solving profession, it would be advantageous to consider not only the overall prerequisite course GPA, but also the prerequisite courses of the individual sciences. This information is useful when assessing the ability of an applicant to succeed in a PT program from both an academic and clinical perspective.

Over the years, PT admissions committee have never had one standard admission criteria that is universal from one PT school to another. Studies on PT admission variables, at the baccalaureate, master's level, and currently the doctoral level, have an immediate need for a set of admission variables/criteria that can be used universally for all programs.

Without having definitive admission criteria that are reflective of an applicant's potential to succeed academically in an entry-level doctoral program, admissions committees are still unable to confidently select applicants with the potential to succeed in an entry-level DPT program.

Interestingly enough, this current study adds support to Dockters' (2001) study, that being, pre-cumulative GPA was the key predictor of academic success in an entry-level DPT program. However, additional research is needed to determine other admission variables/criteria that would positively correlate to academic success in the professional DPT program. Pre-cumulative GPA is only one of the many admission variables that may correlate to academic success in the SHU DPT program or any other entry-level DPT program.

Further research on admission variables that are indicative of academic success is critical. A standard set of admission variables/ criteria that will serve as a 'gold standard' for selecting the most qualified applicants to a professional DPT program is essential for admissions committees. At present, due to the limited research in this area, efficacy of admission committees' ability to select the most qualified applicants is limited.

As of 2005, the field of PT has advanced toward increased autonomy in practice. With this in mind, PT admissions committees are responsible for selecting candidates, who can meet the current challenges of the entry-level doctoral program.

Additional research on admission variables/criteria, that are indicative of academic success in entry-level DPT programs is warranted. The selection process of applicants with the greatest potential to succeed both academically and clinically is important for the PT profession.

As the profession of PT has moved rapidly to an entry-level DPT program and autonomous practice, graduates have an added responsibility to be leaders and advocates of the PT profession (Massey, 2003). In the year 2006, it is imperative that admissions committees are unified in their criteria to select the applicants with the greatest potential to succeed as practitioners, educators and leaders.

REFERENCES

2005 Fact Sheet—American Physical Therapy Background Sheet 2005. Alexandria. Va: American Physical Therapy Association: May 2005.

Aggregate Information from the Biennial Accreditation Report. Paper presented at meeting of the Academic Administrators' special interest group, American Physical Therapy Association, 1998.

American Physical Therapy Association (2004). *A Normative Model of Physical Therapist Professional Education: Version 04.* Alexandria. Va. American Physical Therapy Association, 2004.

Balogun, J.A. (1987). Predictive validity of the allied health professions admission test. *Physiotherapy Canada, 39*(1), 39-42.

Balogun, J.A., Karacoloff, L.A. & Farina, N.T. (1986). Predictors of academic achievement in Physical Therapy. *Physical Therapy, 66*(6), 976-980.

Byl, N.N. (1988). Prescreening admissions criteria and academic success in baccalaureate-certificate program in Physical Therapy. Journal of Physical Therapy Education, Spring 1988, 13-17.

Byrd, G., Garza, C. & Nieswiadomy, R. (1999). Predictors of successful completion of a baccalaureate nursing program. *Nurse Educator, 24*(6), 33-44.

Cocanour, B. & Peatman, N. (1988). Predictors of success in a baccalaureate Physical Therapy program. *Journal of Physical Therapy Education, Spring (1988),* 27-29.

Cooke, W.D., Fontenella, D. & Cooke, W.D. (1992). The role of grades in gaining admission to highly selective medical schools. *Academic Medicine, 67*(12), 846-849.

Day, J.A. (1986). Graduate record examination analytical scores as predictors of academic success in four entry-level master's degree Physical Therapy programs. *Physical Therapy, 66*(10), 1555-1562.

Dietrich, M: Improving the allied health student selection process, Workshop presented at 12th Annual Meeting of American Society for Allied Health Professions, Nov. 1979.

Dockter, M. (2001). An analysis of Physical Therapy preadmission factors on academic success and success on the national licensing examination. *Journal of Physical Therapy Education, 15*(10), 60-64.

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

Gramet, P. & Terracina, L. (1988). Qualitative and quantitative variables in a selection admissions process. *Colleges and Universities, Summer, 1988,* 368-373.

Green, B.N., Johnson, C.D. & McCarthy, K. (2003). Predicting academic success in the first year of chiropractic college. *Journal of Manipulative and Physiological Therapeutics, 26,* 40-46.

Hayes, S.H., Fiebert, I,M., Carroll, S.R. & Magill, R.N. (1997). Predictors of academic success in a Physical Therapy Program: Is there a difference between traditional and nontraditional students? *Journal of Physical Therapy Education, 11*(1), 10-16.

Hojat, M., Blacklow, R.S., Robeson, M., Veloski, J.J. & Borenstein. B. D. (1990). Postbaccalaureate preparation and performance in medical school. *Academic Medicine, 65,* 388-391.

Kirchner, G.L., Holm, M.B., Ekes, A.M. & Williams, R.W. (1994). Predictors of student success in an entry-level master in Physical Therapy program. *Journal of Physical Therapy Education, 8*(2), 76-79.

Kirkpatrick, L.A. & Feeney, B.C. (2005). *A Simple Guide to SPSS for Windows for Version 12.0,* Belmont, CA: Thomson Learning, Inc.

Laurencille. P. ,Kay, B.A. & Edelsburg, S. P. : A study of the applicant pool for programs in Physical Therapy. Chicago, Northwestern Medical School, Department of Health Sciences and Art, 1979.

Levine, S.B., Knecht, H.G. & Eisen, R.G. (1986). Selection of Physical Therapy students: Interview methods and academic predictors. *Journal of Allied Health, 15*(2), 143-151.

Massey, B.F. (2003). APTA Presidential Address: Making vision 2020 a reality. *Physical Therapy, 83,* 1023-1026.

Mc Ginnis, M.E. (1984). Admission predictors for Pre-Physical Therapy majors. *Physical Therapy, 64*(1), 55-59.

McKinney, J., Small, S., O'Dell, N. & Coonrod, B.A. (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.

Munro, B. H. (2001). *Statistical Methods for Health Care Research,* Philadelphia, PA: Lipincott Williams & Wilkins.

Portney, L.G. & Watkins, M. (2000). *Foundations of Clinical Research.* Upper Saddle River, NJ: Prentice Hall Health.

Rheault, W. & Shafernich-Coulson, E. (1988). Relationship between academic achievement and clinical performance in a Physical Therapy education program. *Physical Therapy, 68*(3), 387- 380.

Scott, C.S., Greig, L.M., Brock, D.M. Hunt, D.D. Shaad, D.C. & Carline, J.D. (1988). Early identification of future medical students using initial undergraduate grades. *Medical Education, 28*, 389-392.

Seymour, R.J. , McDougall, R.V., Wadsworth, C.T. & Sanders, B.R. (1982). Use of the interview in admissions. *Journal of Allied Health, Spring, 1982,* 88-95.

Smith, S.R. (1991). Medical school and residency performances of students admitted with and without an admission interview. *Academic Medicine, 66,* 474-476.

Subba Reddy, K.V. (1994). Chiropractic college admission tests as predictors of academic performance at Palmer College. *The Journal of Chiropractic Education, 38-49.*

Templeton, M. S., Burcham, A. & Franck, L. (1994). Predictive study of Physical Therapy admission variables. *Journal of Allied Health,* 79-87.

Thieman, T.J., Weddle, M.L. & Moore, M.A. (2003). Predicting academic, clinical, and licensure examination performance in a professional (entry-level) master's degree program in Physical Therapy. *Journal Of Physical Therapy Education, 17*(2), 32-37.

Zhang J.Q. (1999). The correlation of students' entry-level GPA, academic performance, and the National Board Examination in all basic science subjects. *The Journal of Chiropractic Education, 13*(2), 91-99.

Appendix A

IRB Application and Study Approval

Application must be typed.

If more than one researcher, give information on a separate page for #1-4 for each researcher. Indicate who
is Principal Investigator.

1. NAME: __Gerald Ruscingno_____ HOME PHONE: __201-224-8373_____

EMAIL ADDRESS: _____ruscinge@shu.edu

2. HOME MAILING ADDRESS: 1375 River Road Unit 4-J Edgewater, NJ 07020

3. PLACE OF EMPLOYMENT: __Seton Hall University, 400 South Orange, NJ ____07079

4. POSITION OR JOB TITLE: __Faculty Associate_____ WORK PHONE: _ 973-275-2015_____

5. TITLE OF STUDY: Admission variables that are indicative of Academic Success in Doctor of Physical

Therapy Program

6. Study is: (a) Thesis _____ (b) Dissertation ___x_____ (c) Other [specify]

7. Does your research have a potential or actual financial interest of any kind (e.g. any form of payment for services, equity interests, intellectual property rights, etc.)?

____ Yes. (Please complete the Financial Conflict of Interest form at the end of this IRB application and submit with the application.)

__X__ No

8. Name of advisor, thesis or dissertation , class professor (If applicable): ___Dr. Genevieve Pinto Zipp

Dept: _School of Graduate Medical Education/ PhD Health Sciences Phone: 973-275-2457

9. Anticipated starting and completion dates: __6/1/05____ to __5/1/06_____

10. What is the purpose of the study? The purpose of this study is to determine admission criteria, which would be predictors of academic success, as measured by the Physical Therapy, basic science GPA, after year one in a Doctor of Physical Therapy (DPT) program.

11What is the Research Hypothesis or Research Question? _____

Hypothesis: Students who begin the Seton Hall DPT program with 3 years of concentrated

coursework in Biology, will perform similar to those students who begin the DPT with either a Bachelor

of Science or Bachelor of Arts degree, as measured by the Physical Therapy Grade Point Average,

(PTGPA) after year one in the basic sciences (advanced anatomy, human physiology, neuroscience

and kinesiology). In short, all students, regardless of their degree status and prior to entering the DPT

program should perform academically the same, as measured by the PTGPA after year one in

the basic sciences.

---

11. Explain your qualifications for conducting this research. _____

I am currently a Faculty Associate at Seton Hall University in the Department of Biology. I am also the

academic advisor for the dual degree DPT students (BIOT major code designation) of these students in

the Biology department. I advise these students for the first three years of their undergraduate studies.

The proposed study may be helpful for me in identifying those students (applicants) that would

have the greatest potential for academic success in the DPT program. _____

Furthermore, since, the Physical Therapy profession has moved to an entry-level doctoral degree,

the current admission criteria utilized for almost a decade at Seton Hall needs to be revisited, as these

criteria have traditionally been used to evaluate admission to a Master's degree Physical Therapy

program.

___

As the advisor of these BIOT students, it will help me tremendously to do this study. The

retrospective work of this study may provide me with information that would be

useful with regard to changes that may need to be made in the admission process. It may enable

me to determine which academic predictors are indicative of academic success in the SHU DPT

program.

This, allows me to statistically determine which predictors are indicative of academic

success, as measured by the PTGPA after year (of the basic science courses only), of the entry-level

doctoral program..

13 Explain the rationale and significance of the study

The rationale of doing the study is to determine the best predictors of academic success in a Doctor of Physical Therapy program, as measured by the PTGPA after year one of the basic sciences.

The significance of this study is to assist admission committees for Doctor of Physical Therapy programs in identifying the most salient predictors , (i.e. admission variables) , that are indicative of a student having the potential to academically succeed in a professional entry- level doctoral physical therapy program.

14. Describe the subjects, removing geographic identifiers that could compromise anonymity or confidentiality:

I will not have any interaction with the subjects(students), since this is a retrospective study and the data that I will need will be already available on an Excel spreadsheet provided from the Director of the SHU DPT program. Once IRB approval is secured, the Director will obtain the pertinent data from the Registrars' Office (age, gender, degree status, pre-cumulative GPA, prerequisite course GPA or key course GPA and PTGPA after year 1 of the DPT program in the basic sciences). The data will be sent to the Primary Investigator (PI), in the form of an Excel spreadsheet. In order to maintain anonymity of the students' (subjects) personal information; the names, addresses and social security numbers will not be released to the Director from the Registrar's Office and, therefore, the Primary Investigator (PI) will be blinded to the subjects' demographic information. All subjects will be coded by number in order to maintain confidentiality. Subjects will include all students enrolled in the SHU DPT program as of Fall 2002, 2003 and 2004.

Age (s) of subjects: _varies from 20-40 years at the point of entry to the DPT program.

Number of subjects: I will be looking at students that started in the Doctor in

Physical Therapy program in the Fall 2002, 2003 and 2004 classes.

Each year the DPT program enrolls a maximum of 25 students. Therefore, for the three years of admitted students referenced above, the maximum number of subjects would be 75.

15. From where and how will potential subjects be identified (e.g., outpatient list, class list, etc.)?

All student data for the SHU DPT Program, will be obtained from the Program Director.

(See response to question 13 for additional information.)

._____

How do you have access to this population?

As a Seton Hall University faculty member Department of Biology, I have requested from the Director

of the DPT program the use of the data such as age, gender, pre-cumulative GPA, prerequisite course

GPA, degree status , as well as the PTGPA after year one in the basic sciences. The Director has

access from the Registrars' Office. To maintain confidentiality the information from the Program

Director to the Principal Investigator would be received in the form of an Excel spreadsheet.

PLEASE SEE ATTACHED LETTER . PROGRAM DIRECTOR HAS AUTHORIZED HIS APPROVAL

FOR PRIMARY INVESTIGATOR TO UTILIZE THE DATA FROM THE REGISTRAR'S OFFICE FOR

THIS STUDY

16. Do you have a supervisory and/or professional relationship with the subjects? Yes ___ No _X

If yes, please explain how this relationship will not compromise the voluntariness of the subjects' participation in the study. NOT APPLICABLE

17. Will data be collected from or about any of the following protected populations: NO

____ minors (under 18 years of age; specify age)

____ prisoners

____ pregnant women

____ fetuses

____ cognitively impaired persons

For additional requirements regarding these categories of protected subjects, consult and follow the IRB Guidelines.

18. What are your criteria for subject selection? Selection of subjects must be equitable and, in the case of protected populations [see #13 above], should reflect their special needs. IRB Guidelines also require researchers to be sensitive to the use of educationally and economically disadvantaged persons as subjects. If you are excluding women or minorities from your subject pool, you must include a scientific justification for such exclusion.

_____

_____ All student data for those students enrolled in the Doctor of Physical Therapy Program at Seton Hall University beginning in the Fall 2002, 2003 and 2004 will be analyzed. This is a sample of convenience.

19. How will subjects be recruited once they are identified (e.g., mail, phone, classroom presentation)?
Include copies of recruitment letters, flyers, or advertisements, or copy of script of oral request at time of recruitment.

__X___No recruitment necessary, a retrospective study using already established data, that will be ascertained from the registrars office of SHU. (see procedure on how this data would be obtained_____

1. Where will research be conducted? (be specific) ___

This study does not require a lab to work in, since it is a retrospective study. When the data is obtained,

it will be entered into a SPSS program (version 13.0 for statistical analysis). The data will be analyzed

in the Primary Investigators research office.

21. Will deception be used? YES ___ NO _X__ If YES, provide the rationale for the deception: _

_____

22. Please explain debriefing procedures, if any, to be used in this study:
_____N/A_____

23. What methodology will be taken to insure the anonymity of the subjects and the confidentiality of the data (i.e., coding system, how and where data will be stored and secured, how data will be analyzed, who will have access to data, what will happen to data after the study is completed)? If data is going to be stored electronically, what technology (i.e., firewalls) and software are being used to ensure confidentiality? Cite the strength of these. Note that researchers should retain all data collected for at least 3 years after project completion.

23 (continued)

The Director of the DPT program will give the Primary Investigator only information that is pertinent to the study. Demographic information that will not be available to the Primary Investigator would be the subjects' (students), name , address, marital status, race, religious orientation, ethnic background and social security number in order to maintain anonymity and confidentiality.

The subjects will be coded by number by the Director and only the following information will be available to the Primary Investigator: age, gender, degree status, pre-cumulative GPA, prerequisite or key course GPA and PTGPA after year one in the basic sciences, plus individual course grades during year one in the Doctor of Physical Therapy Program. The individual course grades in the basic sciences that students are studying in their first year of the Doctoral Program are needed in order to calculate the dependent variable,(i.e. the PTGPA after year one in the basic sciences).

After the study is completed, the Primary Investigator will maintain and secure all data in a locked cabinet. The Primary Investigator will be the only person having the key as well as

access to this cabinet. After three years have passed since the completion of the project, the Primary

Investigator will shred and discard all data that have been used in the study and/or has been stored

under lock and key.

24. Is a subject follow-up anticipated? YES ____ NO __X__ If Yes, for what reason? ___

25. Describe the design and methodology, including all statistics, IN DETAIL. What exactly will be done to the subjects?

Methods

This study is retrospective. The Program Director of the DPT Program has provided both verbal

and written confirmation to have access to the necessary data needed on each subject to complete this

study. Upon receipt of IRB approval, the Primary Investigator will contact the Director requesting the above

mentioned information: age, gender, degree status, pre-cumulative GPA, prerequisite or key course GPA,

and the PTGPA after year one in the DPT Program of the basic sciences (including all individual course

grades in the first year as well).

The Director of the Physical Therapy program will then forward the above needed information to

the Primary Investigator in the form of an Excel spreadsheet in order to maintain confidentiality.

25 (continued)

DESIGN

This is a retrospective study, as well as a correlation/regression study. A sample of convenience will be

used in the study, consisting of approximately 75 subjects (students) from three consecutive classes of

students entering the Doctoral of Physical Therapy Program in the Fall 2002, 2003 and 2004. The

independent variables or the predictors are age, gender, degree status, pre-cumulative grade point average

(GPA),prerequisite or key course GPA. The dependent variable or the criterion variable is the PTGPA after

year one of the basic sciences in the Doctor of Physical Therapy Program

DATA ANALYSIS

SPSS (version 13.0) software will be used for statistical analysis of the data. Since the DPT class

size is low in numbers, the data from the three consecutive DPT classes will be analyzed as a group.

Correlation coefficients between the independent variables, as well as the independent variables and the

dependent variable will be analyzed . The independent variables are age, gender, degree status, pre-

cumulative GPA, prerequisite or key course GPA, while the dependent variable is the PTGPA after year 1 in

the basic sciences. In addition, descriptive statistics will also be available from the data received from the

Director.

Due to the small sample size, non-parametric statistics will be used. The Spearman –Rho test

will be used to determine significant correlations between the independent variables and significant

correlations between each independent variable with the dependent variable. Both variables are outlined in

the Design section above..

To determine the predictors of academic success, correlation coefficients found to be statistically

significant will be placed in a multiple regression analysis.

26

Indicate how hypothesis/question of research fit methodology and design.

Hypothesis - Students who do not hold a degree, but have completed 3 years of

concentrated coursework, prior to starting the Doctor of Physical Therapy (DPT) program will perform

academically the same as those students who have a Bachelors Science or Bachelors Arts degree

prior to beginning the DPT program.. This will be measured by the PTGPA after year one in the basic

sciences (advanced anatomy, human physiology, kinesiology and neuroscience).

26 (continued)

This hypothesis fits the methodology, since the information that will be received after IRB approval from the Director will be the pre-cumulative GPA, prerequisite or key course GPA, degree status, age , gender and PTGPA after year one in the basic sciences. In order to determine the PTGPA after year one i in the basic sciences, the individual grades that each subject(student) received in each course in Year 1 of the program is required for this study. From this information, the Private Investigator will calculate the PTGPA after year one of the basic sciences, which is the dependent variable.

The study is a retrospective study.

The sample that is being used is a sample of convenience. All students enrolled in the DPT for the Fall 2002, 2003 and 2004 will be used in this research study. Minimal requirements for students to be enrolled in this study include a 3.0 pre-cumulative GPA and a minimum GPA of a 3.0 in the prerequisite or key coursework.

The design is a retrospective, correlation study. As the hypothesis states, the purpose of this study is to determine, if there are any significant correlations between the predictor variables (age, gender, degree status, pre-cumulative GPA and key course GPA or prerequisite course GPA and the dependent variable, the PTGPA after year one in the basic sciences.

27. Give power analysis to justify number of subjects.

By combining the Fall 2002, 2003 and 2004 samples together, 85 subjects would be needed in order to have a power of .80 or 80%. If 85 subjects were available, the Pearson Product Moment Correlation would be the parametric statistics of choice.

However, since there are only, at maximum 75 subjects (students) when analyzing the data from all three classes together, the power analysis would be less than 80%.

The correlation coefficient is r=.30 and alpha =.05. Therefore, the Pearson Product Moment correlation analysis of statistical study cannot be used.

In this study, because of the low sample size, a non- parametric correlation statistic needs to be used. The chance of committing a Type II error is then reduced. It would be appropriate to use a

non-parametric statistic test called The Spearman- Rho Correlation test. This test is used for correlation

studies that, as in this study, have a relatively small sample size.

Question 27 (Continued)

This information on power analysis is adapted from Table 2.4.1 in Cohen J. Statistical Analysis for the

Behavioral Sciences, ed. 2, Hillsdale, NJ: Lawrence Erlbaum Associates, 1988, This is found in

Appendix C. Foundations of Clinical Research, (Leslie Gross Portney, Mary P. Watkins),

Prentice Hall Health; Upper Saddle River, New Jersey 07458

28. Give reliability, validity and norming information on all instruments.

Not applicable

29. Describe any equipment that will come in contact with the subject. Brand name and model, as well as description of its function. If electrical equipment is connected directly to the subjects, as with GSR and EFF measures, assurances concerning the safety of the equipment (technician should certify that equipment was checked within the last month) should be included.

Not applicable

ATTACH ADDITIONAL SHEETS IF NECESSARY.

Include the necessary copies of any test instruments, questionnaires, etc.

DO NOT ATTACH COPIES OF SECTIONS OF GRANT PROPOSALS, DISSERTATIONS OR CLASS PROJECTS TO ANSWER THIS ITEM.

June 29, 2005

Gerald Ruscingno
1375 River Road, Unit 4-j
Edgewater, NJ 07020

Dear Dr Ruscingno,

The Seton Hall University Institutional Review Board has reviewed and approved as submitted under exempt review your research proposal entitled "Admission Variables and Academic Success in a Doctor of Physical Therapy Program". The IRB reserves the right to recall the proposal at any time for full review.

Enclosed for your records is the signed Request for Approval form.

The Institutional Review Board approval of your research is valid for a one-year period from the date of this letter. During this time, any changes to the research protocol must be reviewed and approved by the IRB prior to their implementation.

According to federal regulations, continuing review of already approved research is mandated to take place at least 12 months after this initial approval. You will receive communication from the IRB Office for this several months before the anniversary date of your initial approval.

Thank you for your cooperation.

Mary F. Ruzicka, Ph.D.
Professor
Director, Institutional Review Board

cc Dr Genevieve Pinto-Zipp

Office of Institutional Review Board
Presidents Hall
Tel: 973.313.6314 • Far. 973.275.2978
400 South Orange Avenue • South Orange, New Jersey 07079-2641

Appendix B

Definitions

DEFINITIONS

1. Commission on Accreditation for Physical Therapy Education (CAPTE)
   The accrediting body that licenses physical therapy programs.

2. Dual degree programs- (a.k.a. '3 plus' dual degree programs) These are academic programs where a student will earn two degrees; an undergraduate baccalaureate degree, as well as a graduate degree at the master's or doctoral level.

3. Grade Point Average (GPA)
   The average of all the courses a student has completed.

4. Licensing Exams
   Exams that must be passed for one to practice the profession they have earned a degree in.

   Specific Licensing Exams:
   a. National Council Licensing Exam (NCLEX)-
      Students who have graduated from an accredited baccalaureate level nursing program, must pass this exam in order to begin practicing (McKinney et al., 1988; Foti & De Young, 1991).

   b. National Physical Therapy Licensing Examination (NPTE)
      Graduates from physical therapy school must pass this exam in order to begin practicing (Dockter, 2001).

5. Master's Physical Therapy Grade Point Average (MPTGPA)
   This is the overall grade point average of an applicant at the completion of a master's level physical therapy program.

6. Normative Model of Physical Therapist Professional Education Version 2004
   This model suggest guidelines that all physical therapy programs should adhere to. One of the guidelines suggested is that all applicant applying to physical therapy programs should hold a bachelor's degree.

7. Pre-cumulative GPA
   The average of all the courses a student has completed prior to entering a specific program of study.

8. Prerequisite course GPA (a.k.a. prerequisite science GPA or key course GPA)
   The average of a selected group of courses that may be used as an admission variable, which is indicative of success in a program of study.

9. Standardized tests
   Tests that may be used as an admission variable to enter either specific universities or specific programs of study

   Specific Standardized Tests:

   a. Allied Health Professional Aptitude Test (AHPAT)
      This test is considered to be the second most important admission criteria when selecting applicants to baccalaureate allied health professional programs (Balogun et al., 1986). It consists of 12 different subcategories as defined by Templeton et al. 1994 as outlined in Chapter II, p. 31 (Review of Literature).

   b. Chiropractic College Admission Test (CCAT)
      This test is comprised of 90 questions in the basic sciences to determine the applicant's ability to retain knowledge in these sciences (Subba Reddy, 1994).

   c. Medical College Admission Test (MCAT)
      This is the medical school entrance exam (Scott et al., 1988).

   d. National Board of Medical Examiner's Part I and II (NBME Parts I and II).
      Students in medical school must pass this board prior to beginning their residency program (Scott et al., 1988; Hojat et al., 1990).

   e. Nursing league for Nursing baccalaureate achievement test (NLN)
      This is a predictor that is used to correlate how a students' performance on this test is indicative of the students' potential to perform on the nursing licensing exam (NCLEX) (McKinney et al., 1988; Foti & De Young, 1991).

f. Watkins-Glaser Critical Thinking Appraisal Test
This was used as an admission criteria for baccalaureate PT programs to measure the problem solving ability of the applicant (Seymour et al., 1982).

10. Statistics
A means of interpreting the data collected in a research study (Munro, 2001).

Specific Statistics Used in this Study:

a. Spearman's Correlation Coefficient Test a.k.a. Spearman's rho
A non-parametric correlative statistical test which may be used when sample size of subjects is too small for the study being considered (Portney & Watkins, 2000).

b. Regression Analysis
If correlations are established in the Spearman's rho correlative test, the significant admission variables will be placed in a regression analysis. From this information, a prediction equation can be derived thus enabling the researcher to make predictions on the dependent variable (Y) based on any predictor or independent variable (x) (Portney & Watkins, 2000).

11. Vision 2020
One of the important aspects of Vision 2020 is the concept that by the year 2020 all physical therapy will be provided by therapists who are doctors of physical therapy. Physical Therapists will be recognized by other health care professionals as practitioners of choice.

Appendix C

SPSS Statistical Analyses

Descriptive Statistics

Frequency Statistics

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20.00	4	6.3	6.3	6.3
	21.00	20	31.7	31.7	38.1
	22.00	8	12.7	12.7	50.8
	23.00	13	20.6	20.6	71.4
	24.00	5	7.9	7.9	79.4
	25.00	1	1.6	1.6	81.0
	26.00	2	3.2	3.2	84.1
	27.00	2	3.2	3.2	87.3
	28.00	1	1.6	1.6	88.9
	30.00	2	3.2	3.2	92.1
	33.00	2	3.2	3.2	95.2
	40.00	2	3.2	3.2	98.4
	42.00	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	16	25.4	25.4	25.4
	2.00	47	74.6	74.6	100.0
	Total	63	100.0	100.0	

Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	26	41.3	41.3	41.3
	2.00	37	58.7	58.7	100.0
	Total	63	100.0	100.0	

Pre-cumulative GPA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.51	1	1.6	1.6	1.6
	2.58	1	1.6	1.6	3.2
	2.72	2	3.2	3.2	6.3
	2.73	2	3.2	3.2	9.5
	2.77	1	1.6	1.6	11.1
	2.81	1	1.6	1.6	12.7
	2.84	1	1.6	1.6	14.3
	2.89	1	1.6	1.6	15.9
	2.90	1	1.6	1.6	17.5
	2.94	1	1.6	1.6	19.0
	2.97	3	4.8	4.8	23.8
	2.99	1	1.6	1.6	25.4
	3.00	4	6.3	6.3	31.7
	3.01	2	3.2	3.2	34.9
	3.03	1	1.6	1.6	36.5
	3.05	1	1.6	1.6	38.1
	3.06	1	1.6	1.6	39.7
	3.07	1	1.6	1.6	41.3
	3.08	3	4.8	4.8	46.0
	3.10	2	3.2	3.2	49.2
	3.11	1	1.6	1.6	50.8
	3.13	1	1.6	1.6	52.4
	3.14	1	1.6	1.6	54.0
	3.16	2	3.2	3.2	57.1
	3.17	1	1.6	1.6	58.7
	3.22	1	1.6	1.6	60.3
	3.24	1	1.6	1.6	61.9
	3.26	1	1.6	1.6	63.5
	3.27	1	1.6	1.6	65.1
	3.30	1	1.6	1.6	66.7
	3.31	2	3.2	3.2	69.8
	3.32	1	1.6	1.6	71.4
	3.33	1	1.6	1.6	73.0
	3.35	1	1.6	1.6	74.6
	3.45	1	1.6	1.6	76.2
	3.49	1	1.6	1.6	77.8
	3.53	1	1.6	1.6	79.4
	3.56	1	1.6	1.6	81.0
	3.57	1	1.6	1.6	82.5
	3.58	1	1.6	1.6	84.1
	3.60	1	1.6	1.6	85.7
	3.62	1	1.6	1.6	87.3
	3.65	1	1.6	1.6	88.9
	3.68	1	1.6	1.6	90.5
	3.69	1	1.6	1.6	92.1
	3.70	1	1.6	1.6	93.7
	3.71	1	1.6	1.6	95.2
	3.81	1	1.6	1.6	96.8
	3.86	1	1.6	1.6	98.4
	3.98	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

Prerequisite GPA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.70	1	1.6	1.6	1.6
	2.80	4	6.3	6.3	7.9
	2.82	1	1.6	1.6	9.5
	2.83	1	1.6	1.6	11.1
	2.86	1	1.6	1.6	12.7
	2.88	1	1.6	1.6	14.3
	2.90	5	7.9	7.9	22.2
	2.91	1	1.6	1.6	23.8
	2.97	1	1.6	1.6	25.4
	3.00	7	11.1	11.1	36.5
	3.01	2	3.2	3.2	39.7
	3.02	1	1.6	1.6	41.3
	3.06	1	1.6	1.6	42.9
	3.07	1	1.6	1.6	44.4
	3.08	1	1.6	1.6	46.0
	3.09	1	1.6	1.6	47.6
	3.10	4	6.3	6.3	54.0
	3.20	6	9.5	9.5	63.5
	3.23	1	1.6	1.6	65.1
	3.30	5	7.9	7.9	73.0
	3.32	1	1.6	1.6	74.6
	3.35	1	1.6	1.6	76.2
	3.38	2	3.2	3.2	79.4
	3.48	1	1.6	1.6	81.0
	3.50	2	3.2	3.2	84.1
	3.51	1	1.6	1.6	85.7
	3.53	1	1.6	1.6	87.3
	3.60	1	1.6	1.6	88.9
	3.65	1	1.6	1.6	90.5
	3.72	1	1.6	1.6	92.1
	3.74	1	1.6	1.6	93.7
	3.75	1	1.6	1.6	95.2
	3.78	1	1.6	1.6	96.8
	3.86	1	1.6	1.6	98.4
	3.88	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

PTGPA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.28	1	1.6	1.6	1.6
	2.33	1	1.6	1.6	3.2
	2.89	2	3.2	3.2	6.3
	2.96	1	1.6	1.6	7.9
	3.00	2	3.2	3.2	11.1
	3.04	1	1.6	1.6	12.7
	3.08	1	1.6	1.6	14.3
	3.09	1	1.6	1.6	15.9
	3.11	2	3.2	3.2	19.0
	3.14	1	1.6	1.6	20.6
	3.18	2	3.2	3.2	23.8
	3.19	1	1.6	1.6	25.4
	3.21	2	3.2	3.2	28.6
	3.25	3	4.8	4.8	33.3
	3.29	1	1.6	1.6	34.9
	3.33	2	3.2	3.2	38.1
	3.36	2	3.2	3.2	41.3
	3.38	1	1.6	1.6	42.9
	3.39	1	1.6	1.6	44.4
	3.42	2	3.2	3.2	47.6
	3.46	1	1.6	1.6	49.2
	3.50	4	6.3	6.3	55.6
	3.55	1	1.6	1.6	57.1
	3.57	1	1.6	1.6	58.7
	3.60	1	1.6	1.6	60.3
	3.61	2	3.2	3.2	63.5
	3.67	1	1.6	1.6	65.1
	3.71	2	3.2	3.2	68.3
	3.75	3	4.8	4.8	73.0
	3.80	1	1.6	1.6	74.6
	3.82	1	1.6	1.6	76.2
	3.83	1	1.6	1.6	77.8
	3.86	3	4.8	4.8	82.5
	3.89	2	3.2	3.2	85.7
	3.92	2	3.2	3.2	88.9
	4.00	7	11.1	11.1	100.0
	Total	63	100.0	100.0	

Spearman rho Correlation Coefficient

Correlations

			age	gender	degree	precumGPA	prereqGPA	PTGPA
Spearman's rho	age	Correlation Coefficient	1.000	.085	.531**	-.256*	-.081	-.206
		Sig. (2-tailed)	.	.507	.000	.043	.527	.105
		N	63	63	63	63	63	63
	gender	Correlation Coefficient	.085	1.000	.103	-.041	-.094	.010
		Sig. (2-tailed)	.507	.	.420	.749	.462	.938
		N	63	63	63	63	63	63
	degree	Correlation Coefficient	.531**	.103	1.000	-.309*	-.070	-.075
		Sig. (2-tailed)	.000	.420	.	.014	.585	.557
		N	63	63	63	63	63	63
	precumGPA	Correlation Coefficient	-.256*	-.041	-.309*	1.000	.615**	.441**
		Sig. (2-tailed)	.043	.749	.014	.	.000	.000
		N	63	63	63	63	63	63
	prereqGPA	Correlation Coefficient	-.081	-.094	-.070	.615**	1.000	.183
		Sig. (2-tailed)	.527	.462	.585	.000	.	.152
		N	63	63	63	63	63	63
	PTGPA	Correlation Coefficient	-.206	.010	-.075	.441**	.183	1.000
		Sig. (2-tailed)	.105	.938	.557	.000	.152	.
		N	63	63	63	63	63	63

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	precumGPA (a)	.	Enter
2	age(a)	.	Enter
3	prereqGPA(a)	.	Enter
4	degree(a)	.	Enter
5	gender(a)	.	Enter

a All requested variables entered.
b Dependent Variable: PTGPA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.425(a)	.181	.167	.35884
2	.481(b)	.231	.206	.35053
3	.483(c)	.233	.194	.35306
4	.497(d)	.247	.195	.35292
5	.501(e)	.251	.185	.35499

a Predictors: (Constant), precumGPA
b Predictors: (Constant), precumGPA, age
c Predictors: (Constant), precumGPA, age, prereqGPA
d Predictors: (Constant), precumGPA, age, prereqGPA, degree
e Predictors: (Constant), precumGPA, age, prereqGPA, degree, gender

ANOVA(f)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.734	1	1.734	13.468	.001(a)
	Residual	7.855	61	.129		
	Total	9.589	62			
2	Regression	2.217	2	1.108	9.020	.000(b)
	Residual	7.372	60	.123		
	Total	9.589	62			
3	Regression	2.234	3	.745	5.974	.001(c)
	Residual	7.355	59	.125		
	Total	9.589	62			
4	Regression	2.365	4	.591	4.747	.002(d)
	Residual	7.224	58	.125		
	Total	9.589	62			
5	Regression	2.406	5	.481	3.818	.005(e)
	Residual	7.183	57	.126		
	Total	9.589	62			

a Predictors: (Constant), precumGPA
b Predictors: (Constant), precumGPA, age
c Predictors: (Constant), precumGPA, age, prereqGPA
d Predictors: (Constant), precumGPA, age, prereqGPA, degree
e Predictors: (Constant), precumGPA, age, prereqGPA, degree, gender
f Dependent Variable: PTGPA

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.852	.442		4.193	.000
	precumGPA	.506	.138	.425	3.670	.001
2	(Constant)	2.333	.495		4.712	.000
	precumGPA	.494	.135	.415	3.665	.001
	age	-.019	.009	-.224	-1.981	.052
3	(Constant)	2.421	.551		4.397	.000
	precumGPA	.549	.200	.462	2.744	.008
	age	-.019	.009	-.224	-1.963	.054
	prereqGPA	-.084	.222	-.063	-.377	.708
4	(Constant)	2.225	.583		3.819	.000
	precumGPA	.619	.211	.521	2.929	.005
	age	-.022	.010	-.263	-2.187	.033
	prereqGPA	-.120	.225	-.091	-.534	.595
	degree	.104	.101	.131	1.024	.310
5	(Constant)	2.109	.620		3.399	.001
	precumGPA	.618	.213	.519	2.903	.005
	age	-.022	.010	-.263	-2.176	.034
	prereqGPA	-.111	.226	-.084	-.492	.624
	degree	.099	.102	.125	.964	.339
	gender	.059	.104	.066	.572	.570

a Dependent Variable: PTGPA

Excluded Variables(e)

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics: Tolerance
1	age	-.224(a)	-1.981	.052	-.248	.998
	prereqGPA	-.067(a)	-.389	.698	-.050	.459
	degree	.034(a)	.274	.785	.035	.904
	gender	.071(a)	.606	.547	.078	.994
2	prereqGPA	-.063(b)	-.377	.708	-.049	.459
	degree	.120(b)	.957	.342	.124	.814
	gender	.078(b)	.682	.498	.088	.993
3	degree	.131(c)	1.024	.310	.133	.794
	gender	.076(c)	.658	.513	.086	.990
4	gender	.066(d)	.572	.570	.075	.983

a Predictors in the Model: (Constant), precumGPA
b Predictors in the Model: (Constant), precumGPA, age
c Predictors in the Model: (Constant), precumGPA, age, prereqGPA
d Predictors in the Model: (Constant), precumGPA, age, prereqGPA, degree
e Dependent Variable: PTGPA