AN EXAMINATION OF THE LIKELIHOOD OF PERSISTENCE OF STUDENTS WITH DISCREPANT HIGH SCHOOL GRADES AND STANDARDIZED TEST SCORES

by

ANNE OSER EDMUNDS

A DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
in the Department of Educational Leadership,
Policy and Technology Studies
in the Graduate School of
The University of Alabama

TUSCALOOSA, ALABAMA

2010

ABSTRACT

Tuition dependency, federal accountability measures, and desire for the prestige associated with college rankings all necessitate institutional attention to admission, retention, and graduation rates. The need to maintain institutional enrollment compels admissions officers to consider an applicant's likelihood of persistence in the admissions decision. Admitting students most likely to persist takes advantage of one of the earliest opportunities to affect institutional retention rates. Admissions officers consider high school grades and standardized test scores as the two primary factors in admissions decisions because research has demonstrated they are the two strongest predictors of student persistence in college. Using Astin's I-E-O model as a conceptual framework, this study used quantitative methodology to consider the influence of high school grades and standardized test scores as inputs on the outcomes of persistence to the sophomore year and four-year graduation at a single institution. Research demonstrates that students with high grades in high school and high standardized test scores are more likely to persist in college, and students with low grades in high school and low standardized test scores are less likely to persist in college. However, little research exists that examines the persistence rates of students who have discrepant high school grades and standardized test scores, those either with high grades in high school and low standardized test scores or with low grades in high school and high standardized test scores. Tests of proportions and logistic regressions were employed to investigate the likelihood of persistence to the sophomore year and four-year graduation of students with discrepant high school grades and standardized test scores compared

to students with nondiscrepant high school grades and standardized test scores. This study found that the rates of persistence and graduation for students with discrepant high school grades and standardized test scores were lower than, and significantly different from, the same rates for students with nondiscrepant high school grades and standardized test scores. In addition, high school grades were found to be a stronger predictor than standardized test scores of both persistence and graduation, a finding which is consistent with the literature.

DEDICATION

"The best dissertation is a done dissertation". This quote from my mentor and former supervisor, Dr. Kathy Baugher, propelled me through the dissertation process. On my first official day on the job at Belmont University, Kathy asked me when I was going to pursue my doctorate, to which I quickly responded "never". Yet, eleven years later, here I am achieving what once appeared to be an unimaginable goal. Her wisdom and guidance gave me the confidence that I was more than capable of accomplishing this goal. For her encouragement, support, advice, and love, I hereby dedicate this dissertation to Dr. Kathy Baugher.

ACKNOWLEDGEMENTS

Writing this dissertation was an important reminder to me that no one accomplishes anything significant on her own. Taking the advice I often give students, I reached out to many others for assistance during this process, and was grateful for their gracious willingness to help. Through great faith and much prayer, God's love and peace carried me through this entire process. Without His support, along with the support of those listed below, I would not have been able to write a dissertation in order to realize my goal of earning a doctorate.

- To my chair, Dr. Jennifer Jones, whose support and advice helped me tell the story of my dissertation.
- To my mentor, Dr. Bonnie Daniel, who believed in my ability to pursue a doctorate before I did.
- To my professor, Dr. Michael Harris, who nurtured the beginning stages of this dissertation, despite its quantitative methodology.
- To Dr. Cali Davis and Dr. David Hardy, for kindly helping me navigate through the methodology.
- To Dr. Kathy Baugher, Dr. Paula Gill, and Mr. Steve Reed, for their constant support and encouragement, both personally and professionally.
- To the Belmont University administration, for supporting me professionally during this process and for allowing me to use institutional data for this research.

- To my colleagues in the Office of Admissions, without whose support and hard work I could not have accomplished this goal.
- To Dr. Ike Ikenberry, for being a sounding board, and, along with the help of Mrs. Lisa Malone, extracting the data for this research.
- To Dr. Jennifer Kobrin, Dr. Emily Shaw, and their colleagues at the College Board, for their research that inspired my study and for answering questions that helped me develop my research.
- To my parents, Dr. J. Ollie Edmunds. Jr. and Mrs. Karen Edmunds, for their unconditional love and constant support of my educational endeavors.
- To my great friends, Dr. Kelly Moore, Ms. Katherine Wagner, and Mr. Matt Wilson, for their love and support, their willingness to listen to me go on and on about graduate school, and for providing moments of sanity completely unrelated to higher education.
- To Cohort 3, for their endless support and laughter that have sustained me through this process. 11 in 11 out!

Thanks to the above named individuals, and many others, this dissertation is done!

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

CONTEXT OF THE PROBLEM

Maintaining enrollment is critical for a college's survival in the competitive higher education marketplace (Penn, 1999). Tuition dependency, federal accountability measures, and desire for prestige all necessitate institutional attention to admission, retention, and graduation rates. Therefore, higher education administrators closely monitor the entrance, progression, and exit of students through their institutions. Student persistence in college requires satisfactory academic performance (Amenkhienan & Kogan, 2004). The best predictor of future academic success is previous academic success (Williford, 2009). The ability to predict the academic success of potential students at the point of admission can help improve an institution's ability to admit those students most likely to persist, thereby helping the institution maintain its enrollment of students from matriculation to graduation (Willingham, Lewis, Morgan, & Ramist, 1990).

Background of the Problem

Until the late 19th Century, very few American citizens pursued higher education, and college entrance requirements were minimal (Thelin, 2004). College administrators merely used a checklist to verify applicants had taken the necessary courses in high school. Colleges admitted applicants who had completed the required courses without evaluating the quality of those courses or the applicants' mastery of the course content. The admissions process did not consider whether or not the applicants had the potential to succeed in college. However, at the end of the 19th Century, when a growing number of students arrived on campus less

academically prepared than others, colleges realized that all high schools were not equally preparing students for college (Wechsler, 1977). Administrators at Dartmouth expressed the need for a process other than the "first come, first served" method that they and their peer institutions were employing. Administrators wanted to identify in the admissions process the students capable of college success.

Columbia University President Nicholas Butler recognized the need for significant change in how students were admitted to college (Wechsler, 1977). At the National Education Association's annual convention in 1892, Butler encouraged the creation of The Committee of Ten to better align high school curriculum to college readiness. Butler and his fellow Ivy League college presidents later agreed upon the need for a common entrance examination for college, initiating the creation of The College Entrance Examination Board in 1899. The Board's goal was to develop a standardized test that could help compare applicants from different high school backgrounds by identifying the most intelligent students who could benefit from college. The first standardized test designed for college entrance, now known as the SAT, has evolved over the past century, but remains the most widely used standardized test in college admissions today (College Board, 2008). In 1908, the Carnegie unit of credit for high school course work was created to standardize the college preparatory course requirements recorded on high school transcripts, however the course content was not standardized (Henderson, 1998). As the volume of applicants increased throughout the 20th Century, colleges had less time to spend evaluating applicants' high school transcripts and began to rely more heavily on standardized tests to determine applicant quality. Institutions began to conduct validity studies to determine the correlation between standardized tests and student success in college. By helping predict which

students were likely to succeed in college, standardized tests facilitated comparison of applicants, solidifying their future role in college admissions decisions (Zwick, 2007).

With the addition of standardized tests as entrance requirements, the practice of college admissions slowly grew in complexity (Levine, 1986). A slight increase in the demand for college after World War I enabled some universities to become more selective in their admissions standards and choose the particular students they wanted (Synnott, 1979). Rather than merely exclude the unqualified applicants, colleges began to select students most likely to be successful. Colleges began to consider the strength of the relationship between success in college and precollege characteristics, such as high school grades and standardized test scores; thus, the period after World War I became the "heyday of the correlation coefficient" (Wechsler, 1977, p. 247). Limited classroom capacity, "high attrition rates and increased demand for higher education prompted the adoption of admissions policies designed to assure that those admitted were the ones most likely to succeed" (Wechsler, 1977, p. 245). This shift marked the turning point toward today, where many college admissions officers evaluate the academic potential of an applicant in order to predict the student's likelihood of success in college (Wechsler, 1977).

Most students who pursued college prior to World War II were admitted to their desired institution (Henderson, 1998). However a substantial increase in demand for college after World War II increased the volume of applicants, and therefore the selective nature of college admissions at some institutions. The Servicemen's Readjustment Act of 1944, commonly referred to as the GI Bill of Rights, was intended to address the potential economic crisis of a large labor influx after the war by providing tuition assistance to veterans (Thelin, 2004). Widely considered a watershed moment in American higher education, the introduction of the GI Bill is credited with the expansion of higher education in the United States. From 1940 to 1950,

enrollment in American higher education grew from roughly 1.5 to 2.7 million students (Thelin, 2004). In the 1972 Reauthorization of the Higher Education Act, the federal government established the Basic Educational Opportunity Grant, forerunner to today's Pell Grant, to increase access to higher education and make college more affordable (Heller, 1999). Later, the Baby Boom generation flooded into colleges, further increasing the volume of applicants and compounding the admissions selectivity issue (Thelin, 2004). The "tidal wave" of students entering higher education post-World War II presented American higher education with the dilemma of whether to increase the quantity or the quality of the students on campus (Duffy & Goldberg, 1998). While some institutions were able to increase enrollments by admitting more students, institutions with limited capacity became more selective in their admissions processes. As a consequence of the tidal wave, for some colleges "the primary purpose of admissions became to select students from a surplus of highly qualified applicants" (Duffy & Goldberg, 1998, p. xix).

The college admissions situation changed in the 1980s when a downward trend in the number of high school graduates caused institutions to be concerned about meeting their recruitment and enrollment goals (Paulsen, 2001). The financial implications of tuition dependent institutions not enrolling enough new students prompted some administrators to seek better ways to manage overall institutional enrollment (Duffy & Goldberg, 1998). Fewer new students enrolling created more pressure to retain current students. Since retaining enrolled students is more cost effective than recruiting additional students to take their place, admitting students likely to remain enrolled became a means to ensure tuition revenue (Camara, 2005). Increasingly, admissions decisions were made through the lens of maintaining institutional enrollments. The institutional need for tuition revenue popularized the concept of "enrollment

management" in higher education (Duffy & Goldberg, 1998). Colleges acknowledged "the goal of enrollment now is to secure a tighter cadre of students that matches the institution so they stay enrolled and graduate" (Penn, 1999, p. 2).

Federal regulations brought several changes that further concentrated attention on college student persistence (Casteen, 1998). In 1990, the Student Right-to-Know and Campus Security Act required that institutional graduation rates be published and accessible for consumers to review when making their college choice (U.S. Department of Education, 2009). The 1992 Reauthorization of the Higher Education Act linked graduation rates to the institution's ability to distribute Title IV funds, without which institutions would be hurt financially. Since the retention rate is the most significant predictor of an institution's graduation rate, institutions sought ways to improve retention rates (Levitz, Noel, & Richter, 1999). "The consequence was a new urgency to admit not only the right number of students, but also the right students – those who can succeed" (Casteen, 1998, p. 9). The percentage of students persisting through to graduation was considered a measure of institutional success. The federal government also required institutions receiving federal funds to determine that students have "the ability to benefit" from the education the institution provides (Hannah, 1996). Increased federal regulation also called for an increase in financial accountability, justifying that public taxpayer dollars were spent appropriately. This increased institutional accountability for admitted students further intensified the competitive nature of selective college admissions.

The need to admit students likely to succeed has also been fueled by a desire for the institutional prestige associated with the increasing prevalence of college rankings (Meredith, 2004). As far back as the 1920s, colleges acknowledged that "selective admissions plans were created to project a sense of institutional prestige" (Levine, 1986, p. 145). The increase in

prestige generated more applications, which reinforced the need to differentiate applicants from each other and enabled colleges to be more selective in their admissions decisions. Institutional selectivity increased which further enhanced prestige in a cyclical effect. A consequence of the "plague of multiple applications" (Duffy & Goldberg, 1998, p. 38) for admissions officers was that they had less time to review each application, which forced them to rely more upon standardized test scores to distinguish applicants from one another. In 1959, the College Board published a guidebook that included college admit rates, the percentage of students who applied that were admitted. Until that time, admissions statistics had been kept private by institutions. As admissions selectivity ratings became public, the ratings became perceived as a measure of institutional quality. After *U.S. News & World Report* published its inaugural annual college rankings guide in 1983, the competitiveness of college admissions further intensified in the public's eye. The methodology for the magazine's rankings evolved to include institutional retention rates (U. S. News & World Report, 2009b). High retention rates are perceived as indicators of institutional success (Penn, 1999). Therefore, in order to remain competitive in the *U.S. News & World Report* rankings, colleges paid close attention to institutional retention rates. The introduction of additional college rankings from organizations such as The Princeton Review and *BusinessWeek* further fueled the rankings game (Meredith, 2004). The institutional prestige associated with rankings created additional institutional pressure to admit students who can persist and succeed to graduation. The same pressures exist to not admit those students who may negatively impact retention rates.

During the past several decades, admissions officers have responded to the shifting numbers of applicants by admitting students based upon the capacity to perform academically (Perfetto, Escandon, Graff, Rigol, & Schmidt, 1999). "Most colleges and universities strive to

admit those applicants who are most likely to succeed" (Williford, 2009, p. 30). Predicting the academic success of applicants has become more important for colleges due to increased financial pressures and the use of institutional retention rates in accountability measures and rankings.

Belmont University

Belmont University is one such institution that has intentionally focused on improving its retention rates as a means to manage enrollment and seek national prominence. Located in Nashville, Tennessee, Belmont's 75 acre campus is located on the site of the former Belle Monte Estate, built as a summer home in 1850 by Joseph and Adelicia Acklen (Gabhart, 1989). The original Belmont Mansion, the centerpiece of the antebellum estate, has sat at the heart of several educational institutions. In 1890, Ida E. Hood and Susan L. Heron purchased the Acklens' estate and founded Belmont Junior College to educate young women. In 1913, Belmont Junior College and Ward Seminary, another local school for women, merged to address their mutual need for additional facilities. The merger established Ward-Belmont Junior College for Women, the first junior college to receive full accreditation by the Southern Association of Colleges and Schools (SACS). Ward-Belmont gained national prominence for educating elite young ladies, but in the late 1930s began to suffer financial difficulty, resulting in severe debt. In 1951, the Tennessee Baptist Convention (TBC), part of the Southern Baptist Convention, provided the school much needed funding and established Belmont College as a coeducational four-year college with an initial enrollment of 186 students. By 1959, Belmont College received its accreditation from the SACS with an enrollment of 425 students. Belmont took advantage of its location adjacent to Music Row to become nationally renowned for distinctive programs related to the music industry. After the addition of several graduate programs, the institution changed its name to

Belmont University in 1991. Enrollment at the turn of the 20th Century hovered at around 3,000 students (Ikenberry, 2010).

Belmont's more recent history is one of significant growth in enrollment, facilities, and national prominence. A new president arrived in 2000, implementing an aggressive enrollment growth plan and an integrated strategic marketing plan. The university created an innovative general education curriculum for undergraduates and established new academic programs, including entrepreneurship, songwriting, pharmacy, and law. Shortly after moving from the National Association of Intercollegiate Athletics to the National Collegiate Athletic Association (NCAA) Division I, Belmont received national recognition from appearances in the NCAA men's basketball tournament three years in a row from 2006 to 2008. Belmont and the TBC parted ways in November of 2007, however the institution identifies itself as a Christian school with a Baptist heritage. Enrollment goals were reached ahead of schedule, inspiring higher enrollment goals to be established. Increased tuition revenue from Belmont's enrollment growth provided funding for significant facilities improvement. During the last ten years, the university has opened a new student center, an event center, three residence halls, an academic building, and will open another residence hall and academic building in August 2010. In October of 2008, Belmont hosted the Town Hall Presidential Debate in these facilities, garnering national attention. By the fall of 2009, enrollment was a record 5,424 students, roughly 4,400 of whom were undergraduates (Ikenberry, 2010). The retention rate during this time increased from 73% in 2000 to 82% in 2008.

Belmont University has grown tremendously from its inception as a junior college for women in 1890 to national prominence today as a top 10 institution, according to *U.S. News & World Report* (U. S. News & World Report, 2009a). In the *U.S. News & World Report* 2010

Best College rankings, Belmont was ranked number 7 in the Southern Master's Universities Category, moving up from the number 19 spot in 2005. In addition, the university was named by *U.S. News &World Report* as one of the top two "schools to watch" for the second year in a row. During this past decade, the university's general undergraduate admissions parameters have not changed; Belmont still seeks to admit students with above-average academic backgrounds. Belmont's national reputation has attracted more qualified students, as determined by high school grades and standardized test scores. This aspirational institution has successfully managed to increase its enrollment while at the same time increase national prestige, partly by climbing in the *U.S. News & World Report* rankings. As the institution continues on its trajectory of growth in size and stature, additional research regarding which students are more likely to persist will help the institution make more informed admissions decisions. Admitting those students most likely to persist will help Belmont manage its enrollment and ensure its future success.

Statement of the Problem

Research clearly demonstrates that students with both high grades in high school and high standardized test scores are more likely to persist in college than students with low grades in high school and low standardized test scores (Astin & Oseguera, 2005). Less research, however, has considered the outcomes of students whose high school grades and standardized test scores are discrepant: those either with high grades in high school and low standardized test scores, or with low grades in high school and high standardized test scores. Additional research regarding the likelihood of persistence for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test

scores can enable admissions officers to better identify which applicants are more likely to persist.

Purpose

The purpose of this study was to examine the likelihood of persistence for students with discrepant high school grades and standardized test scores compared to those with nondiscrepant high school grades and standardized test scores so that admissions officers can identify in the admissions process students more likely to persist, both to the sophomore year and to four-year graduation. This study aimed to add to the volume of predictive validity literature regarding precollege characteristics.

Research Questions

The following six research questions guided this study.

1) Do significant differences exist in the rate of persistence to the sophomore year for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?
2) Do significant differences exist in the rate of four-year graduation for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?
3) What influence do high school grades and standardized test scores have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
4) What influence do high school grades and standardized test scores have on the likelihood of four-year graduation for students with discrepant high school grades and standardized

test scores as compared to students with nondiscrepant high school grades and standardized test scores?

5) What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
6) What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?

Significance of the Study

Admitting students most likely to persist takes advantage of one of the earliest opportunities to affect institutional retention rates (Bean, 1986). Institutions can strategically aim to increase the percentage of students who persist because "admitting students who have academic and social characteristics appropriate for an institution may do more to reduce attrition than any postmatriculation program" (Bean, 1986, p. 48). Research regarding the likelihood of student persistence based upon precollege characteristics can help institutions identify which students are likely to persist (Willingham et al., 1990). Such information can help admissions officers make admissions decisions that will help the institution manage its enrollment.

Operational Definitions

To clarify some of the terms used in this study, some operational definitions are provided. A *first-time full-time freshman* is a student who enrolls at an institution in either the summer or fall semester for their first full-time postsecondary experience (U.S. Department of Education,

2009). This definition includes a student who earned college-level credit before he or she graduated from high school. For the purpose of this study, *persistence* is defined as a student's ability to enter as a first-time full-time freshman, continue his or her enrollment through the spring term, and return to the institution for the fall term of his or her sophomore year. The student persistence rate, also referred to as the *institutional retention rate*, is the percentage of first-time full-time freshmen for a particular entering cohort who return to the institution for the fall term of their sophomore year.

Precollege Characteristics

This study considered two primary precollege characteristics: high school grades and standardized test scores. Belmont University calculates a student's *high school grade point average (gpa)* using a standard four-point grading scale, where the letter grade associated with the course grade is assigned a quality point value. A grade of "A" is equal to four quality points; a grade of "B" is equal to three quality points; a grade of "C" is equal to two quality points; a grade of "D" is equal to one quality point; and a grade of "F" is equal to zero quality points.

Standardized tests are commonly used in admissions decisions to "provide information about prospective students and their academic qualifications relative to a national sample" (U.S. Department of Education, 2009). The two most common standardized tests used today in college admissions decisions are the SAT and ACT (Zwick, 2007). Students who take the SAT receive subscores ranging from 200 to 800 on each of three tests in critical reading, math, and writing. The writing test has only been administered since 2005 and is not considered in admissions decisions at Belmont. Therefore, Belmont considers the *SAT composite score* as the sum of the critical reading and math subscores. The standardized test known as the ACT is comprised of four tests in English, math, reading, and science reasoning (ACT, 2007). The score on each of

the four tests ranges from 1 to 36 and is referred to as the subscore for that particular test. The *ACT composite score* is the mathematical average of the four subscores, rounded to the nearest whole number. Beginning in 2005, ACT allowed students to take an optional writing test, which is not currently considered by Belmont in the admissions process and therefore was not considered in this study.

Validity Research

The reader may not be familiar with some of the terms used in predictive validity research. *Predictive validity* is the correlation, or strength of relationship, between the predictor and the criterion (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999). *Differential validity* exists when the strength of relationship between the predictor and criterion varies for different groups. *Differential prediction* is the systematic under- or over-prediction of criterion performance for different groups. *Restriction of range* is a "reduction in the observed score variance of an examinee sample, compared to the variance of the entire examinee population, as a consequence of constraints on the process of sampling examinees" (American Educational Research Association et al., 1999, p. 181).

Limitations

Interpretation of the results of this study should take the following limitations into consideration. Restriction of range is an implicit limitation in such a study because enrolled students are only a sample of the population of applicants considered for admission. This study considered data from a single institution; therefore, the results may not be generalized to other institutions of higher education. The findings of this study are specific to students during a particular time period and may or may not be indicative of future applicants. Precollege

characteristics other than high school grades and standardized test scores are used to make admissions decisions at this institution and may affect student persistence. In addition to precollege characteristics, the institutional environment and individual circumstances also affect the likelihood of student persistence. However, such factors were beyond the scope of this study.

Delimitations

The sample for this study was taken from Belmont University, a medium sized, private, coeducational, comprehensive, Christian university located in Nashville, Tennessee. Belmont is considered to have a very competitive admissions selectivity ranking (Barron's, 2001). In this study, the first-time full-time freshman cohorts from the years 2003 to 2008 were considered.

Conclusion

This dissertation is organized into five different chapters. Chapter One outlined the problem this study considered, and included an introduction, background of the problem, introduction of the site institution, purpose statement, research questions, significance of the study, operational definitions, as well as limitations and delimitations. Chapter Two provides a comprehensive review of the literature regarding selective college admissions, precollege characteristics, admissions validity studies, and student persistence, and concludes by offering a conceptual framework for this study. Chapter Three outlines the methodology for conducting the study, including the research design, site selection, data collection, and data analyses. Chapter Four presents the descriptive statistics, data analyses, and findings. Then, Chapter Five summarizes and discusses the findings, as well as makes recommendations for practice and further research. Essentially, significant pressures exist to maintain and improve institutional retention rates, including financial demands, government regulations, and societal expectations. Careful selection by admissions officers of students likely to persist in college can help an

institution manage its enrollment. Institutions need further research regarding the ability of precollege characteristics, specifically high school grades and test scores, to predict student persistence to help achieve institutional enrollment goals.

CHAPTER 2

LITERATURE REVIEW

Higher education institutions require a steady flow of students through the enrollment pipeline (Duffy & Goldberg, 1998). Recent demographic and societal changes forced institutions to closely examine the progression of students from "cradle to grave, beginning with recruitment, moving on to retention, and ending with graduation" (Dolence, 1998, p. 71). Over the past several decades, institutions have adopted an enrollment management framework to monitor the progression of students (Johnson, 2000). An effective strategic enrollment management plan incorporates both admissions and retention efforts (Johnson, 2000). In the admissions process, multiple decision making models exist (Perfetto et al., 1999). For example, institutions can incorporate a retention perspective in their admissions process by considering an applicant's likelihood of persistence in the admissions decision (Bean, 1986). By admitting the students most likely to persist, institutions can focus their resources on students most likely to benefit from the institution's programs, thus minimizing fluctuations in enrollment (Willingham et al., 1990). Further study, however, is needed regarding the ability the precollege characteristics used in admissions decisions have to predict student persistence. The results of such research can help institutions better identify applicants most likely to persist.

Research supports the use of precollege characteristics as predictors of student persistence, which reinforces their use in college admissions decisions (Astin & Oseguera, 2005; Camara & Echternacht, 2000; Geiser & Santelices, 2007; Murtaugh, Burns, & Schuster, 1999;

Willingham et al., 1990). The "prediction of incoming freshmen at-risk for non-persistence is necessarily based on pre-college data" (Harmston, 2004, p. 2). The ability to predict the likelihood of persistence of potential students at the point of admission can help improve an institution's ability to admit those students most likely to persist. In turn, admitting students likely to persist helps the institution maintain a steady enrollment of students from matriculation to graduation.

The two most common precollege characteristics utilized by colleges in admissions decisions are high school grades and standardized test scores, namely the SAT and ACT (Camara & Kimmel, 2005). Research has considered the ability of high school grades and standardized test scores to predict student success in college, with success defined as college gpa and persistence through to graduation. High school grades and standardized test scores have distinct characteristics that act as strengths and weaknesses as predictors. Used together, they are more effective as predictors (Pike & Saupe, 2002). This study focused on the ability high school grades and standardized test scores have to predict the persistence of college students. Specifically, the purpose of this study was to determine the likelihood of persistence to sophomore year and to graduation in four years of students with discrepant high school grades and standardized test scores compared to those with nondiscrepant high school grades and standardized test scores so the institution can identify in the admissions process the students most likely to persist.

To better understand the issues surrounding this study, this chapter summarizes the literature surrounding the prediction of student persistence in college in a selective admissions setting. Specifically, this chapter introduces selective college admissions and discusses the two most common precollege characteristics used in admissions decisions. A review of the pertinent

research regarding admissions validity studies follows. Lastly, this chapter discusses the literature regarding student persistence in college and offers a conceptual framework for this study.

Selective College Admissions

College admissions experienced significant changes during the last century (Johnson, 2000). In the early 20th Century, college attendance was minimal, as were admissions requirements (Thelin, 2004). An increasing number of underprepared students arriving on campus gave rise to the need for a standardized test designed to help admissions officers identify which students were most prepared for college (Wechsler, 1977). The middle of the century saw significant increases in the volume of individuals desiring to attend college, which presented some institutions the opportunity to select which students to admit from larger applicant pools than had previously been available (Johnson, 2000). This flood of students was followed by a decrease in the number of high school graduates in the 1980s. The subsequent competition for students, and their tuition revenue, increased the need for institutions to develop strategic enrollment management plans. One such institutional effort to maintain enrollment, admitting students based upon their likelihood for academic success, allows institutions to focus their resources on students who are most likely to persist (Willingham et al., 1990). Throughout the last century, the practice of college admissions evolved from an open door policy to gatekeeping (Duffy & Goldberg, 1998).

A selective college admissions process is designed to identify and select "the right students, not just any students", specific to the goals and mission of the institution (Henderson, 1998, p. 16). The profile of 'the right students' varies by institution, therefore applicants are admitted to different institutions for a variety of specific reasons (Perfetto et al., 1999). Some

institutions admit students as a reward for previous academic and personal achievements or as recognition of their potential for success in college (Atkinson & Geiser, 2009; Camara & Kimmel, 2005; Geiser, 2008). Institutions sometimes admit students based upon their potential to contribute to the college community (Perfetto et al., 1999). In some of these cases, students with significant athletic or artistic ability are admitted to meet the particular needs of the institution. Most institutions use a combination of these admissions decision models concurrently. This study considered the model of admitting students with the capacity to perform in college, specifically to persist to sophomore year and to graduation, based upon the student's high school grades and standardized test scores.

In such instances, the admissions process at a selective institution acts as a screening process to identify those students who demonstrate the likelihood to succeed academically (Truell & Woosley, 2008). A dual goal of this screening process is to "reduce at entry the numbers of students who are judged unlikely or less likely to complete their degree programs" (Tinto, 1993, p. 160). Admissions officers use admissions data and the experience of previous students to predict the "dropout proneness" of students with a distinct set of characteristics (Astin, 1975, p. 23). Conversely, the same research can also show that students with certain qualities are more likely to persist at the institution. "Two kinds of errors can occur in the college selection process: the selection of students who don't succeed and the failure to select students who would have succeeded" (Beatty & Linn, 1999, p. 30). Considering student persistence as the measure of success, this study sought to help admissions officers better identify which students are likely to persist in college so the institution can avoid both such errors.

Since previous academic success is the strongest predictor of future academic success, applicants with strong high school grades and high standardized test scores are very likely to be academically successful and graduate from college (Astin & Oseguera, 2005; Camara & Echternacht, 2000). The same research demonstrates that students with low standardized test scores and low high school grades are less likely to graduate from college. Students with low grades in high school and high standardized test scores, as well as those with high grades in high school and low standardized test scores, have lower persistence rates (Astin & Oseguera, 2005). Selective colleges will "admit most of the high-highs and some of the low-highs and high-lows." (Stumpf & Stanley, 2002, p. 1043). The challenge for admissions officers, and the subject of this study in particular, lies in predicting which of the high-lows and low-highs are more likely to persist. Further understanding of the characteristics of high school grades and standardized test scores helps frame this discussion.

Precollege Characteristics

The research categorizes the precollege characteristics used in making admissions decisions as either cognitive or noncognitive (Camara & Kimmel, 2005). Both cognitive and noncognitive factors have been considered predictors of academic success in college (Burton & Ramist, 2001; Murtaugh et al., 1999). Much of the research focuses on the two most common cognitive factors, high school grades and standardized test scores, and their effectiveness at predicting college success (Zwick & Sklar, 2005). While some researchers argue that high school grades reflect both cognitive and noncognitive factors, high school grades are traditionally and consistently referred to as cognitive (Camara, 2005).

In addition to high school grades and standardized test scores, selective institutions also consider noncognitive factors such as race, gender, socioeconomic status, first generation status,

artistic talent, and athletic ability when making admissions decisions (Perfetto et al., 1999). The literature recognizes the increased use of noncognitive factors in admissions decisions (Sedlacek, 2004). A growing amount of research focuses on the effects of noncognitive factors, including demographic characteristics and personality traits, on college success (Mouw & Khanna, 1993; Sedlacek, 2004). Even application date has been shown to have a strong correlation with college persistence, as students who apply earlier in the admissions cycle are more likely to persist (Miller & Herreid, 2008). Noncognitive factors are given more weight in the admissions decision by selective colleges with test-optional admissions policies (Epstein, 2009). While valid reasons to consider noncognitive factors in admissions decisions exist, the research is complex and the results mixed regarding whether noncognitive precollege characteristics are more predictive of collegiate success than traditional cognitive factors (Camara & Kimmel, 2005; Sedlacek, 2004). Therefore, the two most common cognitive precollege characteristics, high school grades and standardized test scores, were the primary factors considered in this study.

High School Grades

High school grades are the strongest and best predictor of college grades (Astin, 1975; Geiser, 2009). Specifically, high school grades have been found to be the best predictor of freshman gpa, cumulative gpa, and four-year graduation rates (Astin, 1993; Atkinson & Geiser, 2009; Geiser, 2008; Geiser & Santelices, 2007; Hoffman & Lowitzki, 2005; Willingham et al., 1990). The strength in the relationship between high school grades and college grades is referred to as method covariance (Geiser & Santelices, 2007). This relationship is likely explained by the fact that high school and college grades are both measuring similar outcomes, that is the "repeated sampling of student performance over time in a variety of academic settings" (Geiser

& Santelices, 2007, p. 17). Research has demonstrated that high school grades are the best predictor of college success, despite having both advantages and limitations as a predictor.

Advantages of Using High School Grades

Research has clearly demonstrated that high school grades are a strong predictor of college success (Astin & Oseguera, 2005). The Cooperative Institutional Research Program (CIRP) has researched college students for over 40 years through their annual nationwide survey administered to 400,000 entering freshmen at over 700 college campuses (Cooperative Institutional Research Program, 2009). Results from recent CIRP respondents found that students with a high school grade average of A are three to four times more likely to graduate from college than students with a high school grade average of C or less (Astin & Oseguera, 2005). When specifically considering four-year graduation rates, students with a high school grade average of A are seven times more likely to graduate than those with a high school grade average of C or less. The study also found the relationship between high school grades and degree completion to be almost linear and as strong as the relationship found in the same study conducted a decade earlier.

The importance of high school grades as an admissions criterion sends an important social message that reinforces students' academic performance in high school (Atkinson & Geiser, 2009). Also, the strength of high school grades as a predictor of academic success in college provides both content validity and face validity for their use in college admissions decisions. An advantage to using high school grades as a predictor of academic success is that they have "less adverse impact than standardized tests on disadvantaged and underrepresented minority students" (Geiser & Santelices, 2007, p. 1).

Limitations of Using High School Grades

While high school grades have consistently been demonstrated to be the strongest predictor of collegiate success, they are sometimes perceived as less reliable than standardized test scores (Geiser & Santelices, 2007). Variance exists in high school grades because of the great diversity of curriculum, academic rigor, and grading scales among high schools, such that high school gpa is not a standardized benchmark across different high schools (Zwick, 2007). The existence of grade inflation also presents challenges for admissions officers who attempt to interpret an applicant's high school grades as a measure of academic performance (Camara, 1998). While most American high schools use Carnegie units of credit for high school coursework, one Carnegie credit does not always equate to the same level of content or academic rigor for each course at each school (Adelman, 2006). Also, grading scales differ across high schools (Camara, 1998). Some high schools give more weight to grades earned in more rigorous courses, for example, Honors, Advanced Placement, or International Baccalaureate courses. However, unweighted high school gpas have been shown to be a stronger predictor of academic success than weighted gpas (Geiser & Santelices, 2007). High school grades are often a measure of how a student performed relative to other students in the class rather than a measure of what the student has learned in the course (Astin, 1993). Nevertheless, despite the variation in grading scales and course rigor, high school grades are still the strongest indicator of student success in college (Atkinson & Geiser, 2009).

Standardized Test Scores

In addition to high school grades, research has considered the extent to which standardized test scores enhance the predictive equation in admissions decisions (Zwick, 2007). The use of standardized test scores is pervasive in college admissions, with nearly all four-year

colleges requiring applicants to submit standardized test scores. To understand the role of standardized tests in admissions decisions, the history of standardized tests and their use in college admissions will be discussed, along with the strengths and weaknesses of standardized test scores as predictors of college success.

History of Standardized Tests

The two standardized tests most commonly used in college admissions are the SAT and ACT (Camara & Kimmel, 2005). While most colleges and universities use these standardized tests interchangeably in admissions decisions, they are not identical instruments (Atkinson & Geiser, 2009). The College Entrance Examination Board, now known as the College Board, was created in 1899 with the intention of developing a standardized test that could help institutions compare applicants from different high school backgrounds (Wechsler, 1977). The test was originally called the Scholastic Aptitude Test and was first administered in 1926 (Zwick, 2007). One of the original goals of the SAT was to identify students who, despite poor academic preparation, had the ability to succeed academically (Lemann, 1999). By 1946, the test had strayed away from its roots as an intelligence test (Lawrence, Rigol, Van Essen, & Jackson, 2003). Now known as the SAT Reasoning Test, or SAT, the test has evolved in nature but still claims to assess "the 'developed' critical thinking and reasoning skills needed for success in college" (Zwick, 2007, p. 6). Students who take the SAT today receive a score for each of three tests in critical reading, math, and writing (College Board, 2008). Even though many changes have been made to the test over the years, the predictive validity of the SAT has remained relatively constant over time (Willingham et al., 1990).

Another standardized test, called the ACT, first appeared in 1959, focusing slightly more on curricular subject matter (Zwick, 2007). ACT was founded by E. F. Lindquist, a statistician

and co-inventor of an electronic scanning device which enabled the mass scoring of test answer sheets. Today, the ACT is comprised of tests in four subjects: English, math, reading, and science reasoning (ACT, 2007). The ACT composite score is the mathematical average of the subscores of the four subject tests. Because of differences in the composition and format of the SAT and ACT, some research findings are specific to one particular test, however studies have found scores on the SAT and ACT to have a very high correlation of .92, which supports their use interchangeably as predictors (Dorans, 1999).

Use of Standardized Test Scores in College Admissions

The use of standardized tests in college admissions is directly related to the ability standardized test scores have to predict the academic success of students, thus aiding admissions officers in making admissions decisions (Linn, 1990; Young, 2001). "One reason why [sic] institutions consider using standardized test scores in making admissions decisions is to increase the proportion of their enrolled students who are academically successful" (Sawyer, 2007, p. 260). Academic success depends upon initial academic skills, which can be measured by standardized test scores (Sawyer, 2007). Standardized tests provide a common metric to apply to students from a wide variety of high school backgrounds (National Association for College Admission Counseling, 2008). Standardized test scores also help institutions "identify as accurately as possible a small but important group: those applicants the college judges to have little chance to succeed and who are likely to make disproportionate demands on its institutional resources" (Willingham et al., 1990, p. 6). In this sense, institutions will choose to not admit a student whose standardized test scores indicate the student is unlikely to succeed.

The degree to which standardized tests are used in admissions decisions varies by institutional mission (Zwick, 2007). Roughly 90% of four-year institutions require standardized

test scores for admissions consideration (Breland, Maxey, Gernand, Cumming, & Trapani, 2002). The annual survey conducted by the National Association for College Admission Counseling (NACAC) found that 89% of responding institutions consider standardized test scores at least moderately important in admissions decisions (Clinedinst, 2008). In 2008, 59% of colleges acknowledged standardized test scores have considerable importance in admissions decisions, an increase from 46% fifteen years earlier (Clinedinst, 2008). Thus, the use of standardized test scores as a factor in college admissions decisions is extensive and worthy of further research.

The use of standardized test scores is increasing in college admissions (Zwick, 2007). The increase in consideration given to standardized test scores in college admissions has been suggested to be related to the increase in the number of applications for admission institutions have received (Clinedinst, 2008). The increase in applications is a result of the recent increase in high school graduates, as well as an increase in the average number of college applications submitted per student. More selective institutions receive, on average, more applications for admission. Increased application volume can compel college admissions officers to rely more heavily on standardized test scores to differentiate among applicants (National Association for College Admission Counseling, 2008). Another reason for the popularity of standardized tests as an evaluative tool is that they are a "highly efficient and cost effective" (Linn, 1990, p. 298) method to distinguish applicants from one another. Also, educational reforms at the elementary and secondary school levels are reinforcing the use of standardized tests as an effective measurement tool in post-secondary education (National Association for College Admission Counseling, 2008).

The increase in popularity of standardized test scores dictates the need to evaluate how institutions use them in admissions decisions (National Association for College Admission Counseling, 2008). The College Board acknowledges that their "basic and most important challenge is to ensure that the SAT is as fair as possible and that it effectively meets the needs of college admissions offices" (Lawrence et al., 2003, p. 11). In order to assess whether standardized test scores are used properly in college admissions, NACAC recently appointed a task force to investigate (National Association for College Admission Counseling, 2008). The decision to appoint a task force was in response to a report by the National Research Council entitled *Myths and Tradeoffs: The Role of Tests in Undergraduate Admissions* (Beatty & Linn, 1999). In 2008, the NACAC Commission on the Use of Standardized Tests in Undergraduate Admission (NACAC Testing Commission) released their report summarizing the key issues related to standardized test score use in college admissions, including recommendations for best practices (National Association for College Admission Counseling, 2008). Among other things, the NACAC Testing Commission encouraged institutions to refer to the *Standards for Educational and Psychological Testing* for ethical guidelines and best practices regarding the appropriate use of standardized tests (American Educational Research Association et al., 1999). Also, since much of the current research regarding the predictive validity of standardized tests has been conducted by the two major testing agencies, a need exists for further independent research to eliminate the potential for researcher bias (National Association for College Admission Counseling, 2008). This concern is one reason the NACAC Testing Commission recommended further institution specific validity research (National Association for College Admission Counseling, 2008). This study followed that recommendation by considering the

predictive validity of standardized test scores, in combination with high school grades, at a single institution, Belmont University.

Validity research regarding the use of standardized testing in college admissions utilizes terms with which the reader may not be familiar. By definition, a standardized test with construct validity can be used to interpret what the standardized test sets out to measure (Sawyer, 2007). This study considered whether the standardized test scores used in college admissions predict student persistence. Predictive validity is the degree to which the predictor, in this case standardized test scores, can accurately predict the criterion in question, in this case, student persistence (American Educational Research Association et al., 1999). The predictive validity of a variable may vary by institution (Murtaugh et al., 1999). For example, one study found college grade predictions based upon ACT scores to be more accurate at private institutions than public, and more accurate at institutions with a low percentage of minority students (Sawyer & Maxey, 1982). This finding supports the use of standardized test scores as a predictor in this study, since the institution in this study is private with a relatively low percentage of minority students. In addition to predictive validity, ensuring standardized tests have face validity is critical, considering how much public and media attention is given to their use in college admissions (Atkinson & Geiser, 2009). The justification for using standardized test scores in admissions decisions is determined by how successfully standardized test scores predict college success (Zwick, 2007).

Support for Using Standardized Test Scores

Many reasons exist for the prevalent use of standardized test scores in admissions decisions. Scores from the SAT have been shown to predict cumulative college grades (Astin, 1993; Burton & Ramist, 2001). A similar relationship was found between SAT scores and four-

year degree completion rates (Astin & Oseguera, 2005). ACT composite scores have also been found to be a strong predictor for varied levels of academic success in college (Noble & Sawyer, 2002a, 2004). Standardized tests are offered at a relatively low cost for students and provide the opportunity for students to demonstrate academic ability, even when their high school grades do not show evidence of academic success (Geiser, 2009). The most significant reason for the use of standardized test scores in college admissions is that "standardized tests are an efficient source of comparative information for which there is currently no substitute" (Beatty & Linn, 1999, p. 1).

Challenges of Using Standardized Test Scores

Standardized tests often appear to have more critics than supporters (Epstein, 2009). While the College Board contends that the SAT helps colleges better select applicants and helps applicants better select colleges, Crouse and Trusheim (1988) argue that the SAT does neither. They claim that the use of standardized test scores in college admissions has an adverse impact on certain minority populations and low-income applicants. Lemann (1999) argues that the reliance on standardized tests in the college admissions process has perpetuated a social meritocracy based upon intelligence. Strong positive correlations exist between socioeconomic status and standardized test scores. Since elite colleges admit students with very high standardized test scores, they enroll fewer minorities and students from lower socioeconomic levels, keeping these students from accessing the pipeline from elite institutions to America's business and political leadership positions (Soares, 2007). Rather than providing equal access to education, research may suggest that the elite institutions are perpetuating a divided social order by using standardized test scores in college admissions.

While studies have proven the ability of standardized test scores to predict college success, many educators express concern regarding the weight given to standardized test scores in the admissions process (Zwick, 2002). A common criticism of standardized tests is that "they place too much emphasis on lower-level skills, require only recognition rather than production, and reward test-taking skills that have little to do with real-world accomplishments" (Linn, 1990, p. 298). Other critics claim the SAT and ACT lack 'diagnostic utility' related to necessary college curriculum (Atkinson & Geiser, 2009). SAT and ACT are both norm-referenced tests as opposed to criterion-referenced, thus they compare students against each other rather than measure students' mastery of knowledge (Geiser, 2009). Another criticism concerns the potential for standardized tests to be susceptible to coaching (Briggs, 2009). Privileged students who had the benefit of test preparation showed an average point increase of 20 to 30 points on the SAT (National Association for College Admission Counseling, 2008). Even with such a small point increase, some educators are concerned that students with access to test preparation may have an unfair advantage over other applicants.

Another concern among educators stems from the fact that the accuracy of the predictive value of standardized test scores varies for different students (Mouw & Khanna, 1993). Prediction suggests that a certain factor is likely to produce a certain result, while public perception often assumes that prediction implies an accurate result (Zwick, 2002). A common misconception of standardized tests is that they are "precisely calibrated scientific measures (akin to scales or thermometers) of something immutable: ability" (Beatty & Linn, 1999, p. 17). Much of the research regarding standardized test scores discusses the differential prediction and differential validity of precollege variables related to academic success (Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008; Linn, 1990; Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008;

Young, 2001; Zwick, 2007). Differential prediction refers to the underprediction and overprediction of certain groups (Young, 2001). For example, freshman gpa is often overpredicted for males, non-traditional aged students, African-Americans, and Hispanics, while underpredicted for females and Asian-Americans (Linn, 1990; Mattern et al., 2008; National Association for College Admission Counseling, 2008; Noble, 2000; Zwick, 2007). Differential validity exists when the correlation coefficients are different for different groups (Young, 2001). Essentially, the standardized test is predictive for all, but predictive to different degrees. Specifically, standardized test scores have been shown to be more predictive for females, Asian-Americans, whites, and academically strong students, while weaker correlations exist for African-American and Hispanic students (Linn, 1990; Mattern et al., 2008).

The presence of differential validity or differential prediction of a standardized test score does not necessarily indicate test bias, but rather that perhaps "the relationship between the test score and freshman gpa varies by subgroup" (Mattern et al., 2008, p. 2). While standardized tests have often been accused of test bias, some researchers have concluded that any errors in the predictive ability of standardized tests may not be produced by test bias, but rather by causes unrelated to the standardized test (Zwick, 2007). The standardized tests themselves may not be biased against specific subpopulations, but rather distinctive characteristics of the subpopulations account for any differences. This conclusion is supported by a predictive validity study of students by gender in a particular course (Wright, Palmer, & Miller, 1996). While there may be differences in standardized test score averages for different groups, the accuracy of prediction for those groups is also important (Zwick, 2002). Much research has centered on the political and social implications of standardized test score use in college admissions because of its correlation with socioeconomic status (SES) and reported bias against minorities. Standardized test scores

"have a more adverse impact on poor and minority applicants than do high school grades, class rank, and other measures of academic achievement" (Geiser, 2009, p. 2). Race, gender, and socioeconomic status are the three most commonly researched student subgroups regarding the differential prediction and differential validity of standardized test scores.

The existence of standardized test score differences among racial minority groups is controversial (Bowen & Bok, 1998). Overall, the "gap between the predictive strength of test scores and high school grades for academic achievement in college widens for several minority groups" (Hoffman & Lowitzki, 2005, p. 457). African-American students' college grades are overpredicted while Hispanic students' college grades are underpredicted (Burton & Ramist, 2001; Nettles, Thoeny, & Gosman, 1986). Standardized tests have been shown to be a stronger predictor of academic success for African-American students who attend an historically black college or university (Fleming & Garcia, 1998). One explanation offered for the differential prediction of college grades among minority students is referred to as the stereotype threat, essentially a fear of proving stereotypes correct (Sackett, Borneman, & Connelly, 2008; Zwick, 2002). The differential prediction and differential validity of standardized test scores by race is a significant reason for the existence of affirmative action in college admissions (Beatty & Linn, 1999; Bowen & Bok, 1998). In 1978, the U.S. Supreme Court ruled in *Regents of the University of California v. Bakke* that race can be used as a factor in college admissions (Hurtado, 2005). More recently in 2003, rulings in *Grutter v. Bollinger* and *Gratz v. Bollinger* clarified that the use of quotas for racial minorities was prohibited, but affirmative action was allowed (Hurtado, 2005). However, state law and federal district court rulings have prohibited the use of affirmative action in several states, including California, Texas, Louisiana, and Arkansas. The political nature of the use of race in college admissions explains why much research has been

devoted to the affects of race in the predictive validity of common precollege characteristics (Linn, 1990; Young, 2001). Essentially, the fact that minority students, on average, score lower than white students causes some to question the validity of standardized test scores as a predictor of college success.

In addition to race, gender differences are another commonly studied area in predictive validity research (Linn, 1990; Stricker, Rock, & Burton, 1993; Wright et al., 1996). While men typically score higher than women on standardized tests, men's freshman college grades are overpredicted and women's grades are underpredicted, despite the fact that there are more women testers (National Association for College Admission Counseling, 2008; Stricker et al., 1993; Zwick, 2007). In addition to different study habits between the genders, research has hypothesized this is because men are more likely to enroll in more difficult courses than women (Burton & Ramist, 2001; Sackett et al., 2008). The correlation between standardized test scores and college success is stronger for women than for men (Willingham et al., 1990; Young, 2001). Some researchers suggest that any such differences are not caused by an inherent gender bias in the standardized test, but rather other factors related to gender differences (Wright et al., 1996).

Additional research has demonstrated that standardized test scores reveal a variety of environmental influences, including socioeconomic status (Zwick, 2002). Standardized test scores from both testing agencies have been found to have a strong positive correlation with socioeconomic status (Geiser, 2009; Geiser & Santelices, 2007; National Association for College Admission Counseling, 2008; Noble, Roberts, & Sawyer, 2006; Zwick, 2007). The link between standardized test scores and socioeconomic status suggests students from lower socioeconomic levels may be disadvantaged in college admissions decisions (National Association for College Admission Counseling, 2008; Zwick, 2007). Students from lower socioeconomic levels have, on

average, lower standardized test scores (Geiser & Santelices, 2007). One possible explanation for this disparity may be the differential access to general standardized test information and test preparation (Briggs, 2009; National Association for College Admission Counseling, 2008). However, a recent study reviewed the extensive research considering the relationship of standardized tests to socioeconomic status only to conclude that, while there does exist a small relationship between SES and standardized test scores, controlling for SES does not dramatically reduce the predictive power of standardized test scores (Sackett, Kuncel, Arneson, Cooper, & Waters, 2009).

As a response to the challenges of standardized test scores outlined here, a growing number of colleges now offer test-optional admissions policies, where submission of scores from the SAT or ACT is optional for admissions consideration (Epstein, 2009). The most prominent organization supporting the test-optional movement in college admissions is Fairtest, The National Center for Fair and Open Testing, which was founded in 1985. Fairtest advocates for the fair use of standardized tests in many arenas and has been an avid supporter of the test-optional movement in college admissions. Fairtest strives to eliminate "the racial, class, gender, and cultural barriers to equal opportunity posed by standardized tests" (The National Center for Fair and Open Testing, 2010).

Educators inside higher education have recognized the challenges of using standardized test scores in college admissions (Epstein, 2009). Mixed findings regarding race, gender, and SES reinforce the fact that standardized tests should be used differently at different institutions, depending upon the characteristics of the student population. In addition, the use of standardized tests should be specific to the mission and purpose of the institution, and according to the predictive validity of standardized test scores at that particular institution.

High School Grades and Standardized Test Scores Combined as Predictors

While high school grades and standardized test scores differ as student assessment tools, each contribute to the predictive equation (Willingham, Pollack, & Lewis, 2002). High school grades assess the mastery of content delivered, which can vary by school, course, and instructor. Test score content is standard for all to whom the standardized test is administered. "Tests can more readily assess cognitive skills, but grades can more readily assess motivational components of achievement" (Willingham et al., 2002, p. 30). While standardized test scores can be compared across schools, high school grades are specific to a particular school. Typically taken during the junior or senior year of high school, standardized test scores represent one sampling of a three to four hour time period (Willingham et al., 2002). Students' academic performance, as evidenced by their high school grades, can vary from year to year. Since high school grades measure both intellectual ability and demonstrated academic achievement they are related to cognitive and noncognitive factors, unlike standardized test scores, which are solely cognitive (Noble & Sawyer, 2002a). Standardized test scores offer a common metric, however they neither capture nor reflect a complete range of cognitive and noncognitive factors (Burton & Ramist, 2001). While standardized test scores were introduced to address some of the limitations of high school grades, the student's academic record is able to address the limitations of standardized test scores (Burton & Ramist, 2001). Standardized test scores are used to "keep grade scales honest [sic] because we do not fully understand or trust grades to be an accurate indicator of educational outcomes; yet, we use grades to demonstrate the validity and fairness of tests and to justify their use" (Willingham et al., 2002, p. 2). Since "the strengths of grades and test scores clearly complement one another" (Willingham et al., 2002, p. 31), using both factors in admissions decisions is considered a best practice.

Research has substantiated the predictive validity of high school grades and standardized test scores used in combination in admissions decisions (Geiser & Santelices, 2007). Institutions often consider multiple factors when making admissions decisions due to the differential validity and differential prediction associated with standardized tests (Tinto, 1993). The combination of standardized test scores and high school grades offers the least differential validity, supporting the combined use of these factors in admissions decisions (Astin, 1970b; Linn, 1990; Mattern et al., 2008). While high school grades and standardized test scores both have strengths and weaknesses, they are the most common predictors used in predictive validity research for college admissions (Young, 2001; Zwick & Sklar, 2005). Research has demonstrated that high school grades are the best predictors of academic success, but that incorporating standardized test scores in admissions decisions improves overall prediction (Linn, 1990; Nettles et al., 1986; Zwick, 2007; Zwick & Sklar, 2005). The combination of standardized test scores and high school grades is "statistically significant and of practical utility to admission officers" (Burton & Ramist, 2001, p. 26). Studies have found standardized test scores and high school grades strongly correlate with freshman gpa (Kobrin et al., 2008; Pike & Saupe, 2002). High school grades and standardized test scores both contribute independently to prediction of degree attainment, but the combination of high school grades and standardized test scores better predicts cumulative college gpa than either high school grades or standardized test scores alone (Burton & Ramist, 2001). Standardized test scores and high school grades are the two most common factors used to predict college gpa, mainly because researchers have not identified any other factors "that would add information of practical significance of predicting college gpa" (Willingham et al., 1990, p. 8).

Admissions Validity Studies

Admissions validity studies have provided much of the research regarding the relationship of precollege characteristics to success in college. Educational researchers, from both the academy and major testing agencies, have examined the predictive value of precollege characteristics with regard to academic success in college (Camara & Echternacht, 2000; Geiser & Santelices, 2007; Noble & Sawyer, 2004; Zwick & Sklar, 2005). Such validity studies consider the "statistical correlation between admission credentials ('predictors') and available measures of success in college ('criteria')" (Burton & Ramist, 2001, p. 2). Research has demonstrated that the combination of high school grades and standardized test scores is more effective at predicting success in college than either variable alone (Geiser & Santelices, 2007). A recent study by Astin and Oseguera (2005) found that including SAT scores in addition to high school grades increased the prediction of both four-year and six-year degree completion. A study considering the factors that affect students' ACT scores found that previous academic achievement in high school was the best predictor of ACT performance (Noble et al., 2006). This conclusion suggests a connection between ACT scores and high school grades, which supports the use of both factors in admissions decisions. This study considered the relationship of high school grades and standardized test scores as predictors and student persistence to the sophomore year and four-year graduation as the criteria of college success.

Validity studies considering the ability of precollege characteristics to predict academic success enable admissions officers to make informed judgments on the likelihood of success of applicants (Burton & Ramist, 2001). Validity studies have helped admissions officers "by providing, through multiple regression equations, a systematic basis for estimating the probable academic performance of prospective students, in the form of a predicted freshman gpa, and to

demonstrate test validity in an 'accountability' context" (Wilson, 1983, p. 1). Precollege characteristics can be used to predict an overall institutional retention or graduation rate (Burton & Ramist, 2001). Correlations of precollege characteristics and academic success for groups are more accurate than for individual students (Stumpf & Stanley, 2002). While an institution cannot forecast exactly how a particular student might perform academically, they can predict with some accuracy how students with that profile are likely to perform. "It is, rather, patterns [institutions] are seeking – consistent patterns that may have policy implications as to how institutions might best allocate their resources in trying to attract and select students" (Willingham, 1985, pp. 82-83). "In college admission, [sic] an institution might use test scores to predict which applicants are likely to be academically successful; the fundamental goal is not accurate prediction *per se*, but the success of its enrolled students" (Sawyer, 2007, p. 259).

Success in college has been widely defined by various constituencies in higher education (Dean & Camp, 1998). Collegiate success is often associated with academic success, which is most widely characterized by gpa (Camara & Kimmel, 2005; Pascarella & Terenzini, 1991). College gpa is most often used to define collegiate academic success for "the simple reason that it is neatly quantified and available" (Willingham, 1985, p. 38). Other ways to define college success include student persistence and degree attainment (Astin, 1971; Willingham, 1974).

Much of the research on the ability of precollege characteristics to predict academic success in college has considered college grades, specifically freshman year gpa, as the criterion measure of academic performance in college (Atkinson & Geiser, 2009; Kobrin et al., 2008; Mattson, 2007; Noble & Sawyer, 2004; Pascarella & Terenzini, 2005; Ramist, Lewis, & McCamley-Jenkins, 1993; Sawyer, 1986; Stricker et al., 1993). The courses taken by freshmen are more similar than those taken by upperclassmen, thus minimizing the disparity for

comparison among students (Camara & Echternacht, 2000). Some studies have also considered the prediction of cumulative gpa, although fewer in part because of the length of time elapsed between the predictor and criterion (Adelman, 2004; Astin, 1993; Burton & Ramist, 2001; Wilson, 1983). One argument against using college grades as a measure of student success asserts that the use of college grades as a criterion is affected by different grading standards at different institutions (Burton & Ramist, 2001).

In addition to predicting college grades, high school grades and standardized test scores have shown to be significant predictors of graduation from college (Cambiano, Denny, & DeVore, 2000; Fleming & Garcia, 1998; Stumpf & Stanley, 2002). In his report for the U.S. Department of Education, Adelman (2006) considered graduation more important than retention as a measure of college success. Completion of the bachelor's degree is the most rigorous possible criterion to relate to input predictors (Astin, 1993). However, correlations between precollege characteristics and graduation are less than those for freshman year gpa due to the length of time between the predictor and criterion (Burton & Ramist, 2001; Camara & Echternacht, 2000). This result is also due in part to the fact that standardized tests were not designed to predict college graduation (Bowen, Chingos, & McPherson, 2009). The predictive validity of graduation varies due to differences in student course selection, major, and cohort year (Geiser & Santelices, 2007). Research also shows that the predictability of graduation of groups of students is stronger than the prediction of graduation for individual students (Stumpf & Stanley, 2002). High school grades better predict graduation rates than standardized test scores. Some studies have considered both cumulative gpa and graduation as the criterion (Atkinson & Geiser, 2009; Geiser & Santelices, 2007; Murtaugh et al., 1999; Zwick & Sklar, 2005). Like

graduation, cumulative gpa is further removed from the predictors, allowing time for other factors to contribute to the outcome (Burton & Ramist, 2001; Camara & Echternacht, 2000).

A review of the literature found validity studies considering the prediction of student persistence to sophomore year (Gillespie & Noble, 1992; Glynn, Sauer, & Miller, 2003). These studies claim that freshman gpa may be too narrow as a criterion, and therefore have considered the relationship of precollege characteristics to student persistence (Cambiano et al., 2000). The ability of a student "to stay in college is a more appropriate measure of his 'success' than is his freshman gpa" (Astin, 1971, p. 14). Persisting students often have higher college gpas than non persisting students (Wilson, 1983). Low college grades are closely related to dropping out, so factors that predict low gpa can also predict dropping out (Astin, 1971). This study considered the ability of high school grades and standardized tests scores to predict the likelihood of both student persistence to the sophomore year and graduation in four years

A basic limitation of predictability research stems from the fact that predictions of future students are based upon the outcomes of previous students (Noble & Sawyer, 2002a). The inability to forecast the future necessitates prediction based upon the past, which assumes the predictive model is based upon cohorts with similar characteristics (Harmston, 2004). However, "changes in the nature of successive entering freshman classes may occur as a result either of modifications in either the applicant pool or admissions practices, or of changes in the college student population itself" (Astin, 1970a, p. 229). Despite the potential for such slight variations, admissions offices continue to draw upon predictive validity research to support the use of high school grades and standardized test scores as predictors of student success in college.

Another inherent limitation of predictive validity studies in college admissions is due to the fact that only a portion of applicants are admitted (Zwick, 2007). By admitting only the

students deemed most likely to succeed, institutions are using up much of the predictive validity of the precollege characteristics, exhibiting a phenomenon known as restriction of range (Kobrin et al., 2008). The "most widely recognized difficulty with correlational studies involving college admissions is restriction of range in the predictors" (Camara & Echternacht, 2000, p. 1). Failure to consider restriction of range can result in an underestimation of predictive validity (Burton & Ramist, 2001; Sackett et al., 2008). Since the range of high school grades and standardized test scores is typically narrower for enrolled students than for the applicant pool, the strength of the relationship between the predictors and criterion is reduced. Students often consider the academic profile of a college's entering class, specifically average high school gpa and standardized test scores, when determining where to apply (Sawyer, 2007). Thus, to a certain extent, students narrow the pipeline as they self select where to apply (Burton & Ramist, 2001). Also, the admissions selection process itself reduces predictive validity since those applicants who show little likelihood of success are generally not admitted (Stumpf & Stanley, 2002). For this reason, the average academic profile of enrolled students is typically higher than that of applicants (Kobrin et al., 2008; Noble & Sawyer, 2002a). This predictive validity study used data from previous students to predict the likelihood of persistence for students at Belmont University.

Student Persistence

College student persistence is one of the most studied areas in higher education (Berger & Lyon, 2005). The body of literature covers the causes of student attrition, the effectiveness of institutional programs and policies designed to improve student retention and graduation rates, and the relationship between precollege characteristics and students' ability to persist (Murtaugh et al., 1999; Seidman, 2005). Despite decades of literature offering suggestions of ways to

enhance the student experience in order to increase student persistence, national persistence rates have remained fairly constant (Seidman, 2004). Broadly applying lessons from persistence research is difficult because students leave institutions for a variety of reasons (Tinto, 1993). Student persistence in college is affected by academic ability, as well as nonacademic factors such as finances, family, and social considerations (Camara & Echternacht, 2000). The fact that retention and graduation rates vary for different student subpopulations complicates the research on this topic (Peltier, Laden, & Myrna, 1999). Research offers a variety of conceptual and theoretical models suggesting why some students persist and others do not, especially with regard to targeted student populations (Adelman, 2006; Astin, 1993; Tinto, 1993). No one model can account for all cases of student persistence or attrition, thus research suggests student persistence models be institution specific (Gillespie & Noble, 1992; Tinto, 1975).

Research suggests institutional retention rates are important for many reasons. Persistence from freshman year to sophomore year is a significant predictor of student graduation (Horn & Carroll, 1998; Levitz et al., 1999). Therefore, students who are likely to persist to sophomore year are more likely to complete their bachelor's degree. Student persistence is used by the federal government to measure institutional effectiveness (Seidman, 2004). The Federal Student Right-to-Know and Campus Security Act of 1990 requires that institutions report degree attainment rates to meet compliance for eligibility to receive federal funding (Astin, 1997). Also, both retention and graduation rates are factors in various annual college rankings guides such as *U.S. News & World Report* (U. S. News & World Report, 2009b).

Conceptual Framework

The research of particular interest to this study concerns how precollege characteristics affect students' persistence in college. Significant research in the 1970s by Vincent Tinto and Alexander Astin stimulated interest in student persistence (Seidman, 2005). Tinto's (1993) theory of student departure considers what factors influence the persistence of students in college. Commonly referred to as the integration model, his theory identifies a three-stage process students experience as they integrate into the college community: separation, transition, and incorporation. Students who do not persist in college, Tinto argues, fail to progress through all three stages of integration. Tinto recognizes the connection between precollege characteristics and student persistence, as well as the potential for the admissions selection process to improve institutional retention rates. However, while Tinto's model considers the precollege characteristics of students, his work focuses on the student's experience at the institution and is therefore less helpful as a framework for this study.

For over 40 years, Astin (1964b, 1993, 2005) has conducted extensive research on college students, including research on college student persistence and graduation. According to Astin, a student's success in college is based upon their personal characteristics prior to entering college, as well as their experiences during college. Many of Astin's findings have come from over 40 years of CIRP data considering the relationships among 146 input variables, 192 environmental variables, and 82 outcome variables of college students (Cooperative Institutional Research Program, 2009). Input variables include age, gender, race, family background, religion, socioeconomic status, high school grades, standardized test scores, and career goals. Environmental variables include choice of major, whether or not the student works, volunteer work, membership in a fraternity or sorority, student involvement in student clubs and

organizations, financial assistance, and place of residence. Output variables include attitudes, beliefs, persistence, and degree completion. Astin articulated a conceptual model to help frame discussions of the impact of college on students, incorporating the components of student inputs (I), the college environment (E), and student outcomes (O) (Astin, 1970a, 1993). Essentially, Astin's I-E-O framework simplifies the complex interactions between student and college. He recognizes that each student enters college with a distinctive set of characteristics and encounters a unique set of experiences specific to the institutional environment. The combination of input characteristics coupled with the collegiate environment shape the student's future outcomes.

Astin's I-E-O model was the first framework articulated for studying the impact of higher education on students (Astin, 1965). His initial conceptual framework has evolved into the model used today (Astin, 1962, 1964a, 1971, 1993). Astin's I-E-O model has been used to consider the interdependence of inputs, environments, and outcomes (Astin & Oseguera, 2005; Snyder, 2008). Specifically, his I-E-O model characterizes the three distinct relationships of input-environment (A), environment-outcome (B), and input-outcome (C) (Astin, 1993). Extensive research regarding relationship B exists, much of which is presented by Pascarella and Terenzini (2005) in their meta-analysis of the impact of college on students. This study focused on relationship C by considering the effect of precollege characteristics (inputs) on student persistence (outcome). This study used Astin's I-E-O model as a framework to specifically focus on the relationship between two input variables, high school grades and standardized test scores, and two outcome variables, persistence to the sophomore year and four-year graduation. By excluding environmental variables, this study used Astin's model in a limited manner. However, Astin's research has demonstrated that student outcomes are more heavily influenced by input characteristics than environmental factors (Astin & Oseguera, 2005).

Considering Astin's model as a framework for this study, the characteristics of students at matriculation have a direct effect on the students' ability to persist in college, and therefore the institutional retention rate. Retention and graduation rates vary according to institutional selectivity (Tinto, 1993). More than half of the variance in institutional retention rates and more than two-thirds of the variance in degree completion rates can be attributed to differences in student inputs as opposed to any institutional influences (Astin, 1997; Astin & Oseguera, 2005). Differences in student outcomes have more to do with student input criteria than with the collegiate environment. Selective institutions control the quality of their student inputs and thereby effect more control over their student outcomes (Astin, 1993). Private colleges and universities, which are typically more selective, tend to have higher institutional retention and four-year graduation rates than publics (Astin & Oseguera, 2002; Peltier et al., 1999). Differences in institutional retention and graduation rates are more likely due to student characteristics than institutional effects; therefore, by controlling inputs, institutions can influence the likelihood of student persistence (Astin & Oseguera, 2005).

The purpose of this study was to consider the relationship between a particular pair of inputs, explicitly high school grades and standardized test scores, and the outcomes of persistence to the sophomore year and four-year graduation. Research has clearly demonstrated that "high achievers in secondary school (input), [sic] tend to be high achievers in college (outcome)" (Astin, 1993, p. 19). Those institutions that admit and enroll high achievers are more likely to have higher persistence rates (Seidman, 2005). However, admissions officers often receive applications from students with high grades in high school and low standardized test scores (overachievers) and students with low grades in high school and high standardized test scores (underachievers) (Stumpf & Stanley, 2002). Two studies found considered the ability of

high school grades and standardized test scores to predict freshman gpa for overachievers and underachievers (Baydar, 1997; Kobrin, Camara, & Milewski, 2002). When the high school grades and standardized test scores are discrepant, when one variable is significantly higher than the other, research is less clear as to which variable is more significant in predicting college success. This study aimed to contribute to the body of research by considering the likelihood of student persistence to the sophomore year and four year graduation (outcomes) for students with discrepant high school grades and standardized test scores (inputs) at a single institution, Belmont University. By controlling student inputs at the point of admission in order to manage student outcomes, this institution can effect more control of its retention and four-year graduation rates to better achieve its enrollment goals (Astin, 1993).

Conclusion

The emphasis on managing enrollments in institutions with selective admissions calls for admitting those students most likely to persist (Willingham et al., 1990). Further research examining the relationship of certain combinations of precollege characteristics and student persistence can help admissions officers identify students most likely to persist. The results of this study can help admissions officers make more informed decisions on which inputs, namely applicants with discrepant high school grades and standardized test scores, are likely to have successful outcomes that will help the institution improve its retention and graduation rates. The next chapter delineates the methodology used in this study to conduct such research at Belmont University.

CHAPTER 3

METHODOLOGY

Institutions can affect their retention and graduation rates by considering an applicant's likelihood of persistence in the admissions process (Bean, 1986). Admissions officers use inputs of students' precollege characteristics to predict the likelihood of a particular outcome such as college success (Astin, 1975). The two most common input characteristics considered in the admission process are high school grades and standardized test scores because these inputs are the strongest predictors of success in college (Camara & Kimmel, 2005). The statistical correlation between the inputs of high school grades and standardized test scores and the outcome of college student persistence can be calculated through admissions validity studies (Burton & Ramist, 2001). The results of such research can help admissions officers make more informed admissions decisions by identifying characteristics of students most likely to persist. Astin's (1965, 1993) extensive research on college students over the past 40 years helped him articulate the relationships between inputs (I), environments (E), and outcomes (O) with regard to the study of college students (Astin, 1965). Research has demonstrated that student outcomes are more heavily influenced by input characteristics than environmental factors, therefore this study considered the input-outcome relationship (Astin, 1970a; Astin & Oseguera, 2005; Snyder, 2008).

This study utilized a quantitative research design to examine the likelihood of persistence to sophomore year and four-year graduation for students with discrepant high school grades and

standardized test scores compared to students with nondiscrepant high school grades and standardized test scores at Belmont University. This chapter outlines the methodology that was used to conduct the study. Specifically, this chapter presents the research design and introduces the site selected. A description of the data collection and data analyses of the study follows.

Research Design

Research Questions

A review of research regarding the ability precollege characteristics have to predict college success uncovered a study conducted by the College Board that "examined the frequency of discrepant HSGPA and SAT performance (difference $\geq$ 1 SD)… and among those with discrepant performance, which measure is more indicative of college performance" (Mattern, Shaw, & Kobrin, 2009). This study, inspired by the College Board study, aimed to address the following research questions:

1. Do significant differences exist in the rate of persistence to the sophomore year for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?
2. Do significant differences exist in the rate of four-year graduation for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?
3. What influence do high school grades and standardized test scores have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?

4. What influence do high school grades and standardized test scores have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
5. What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
6. What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?

Assumptions

This study was based upon the assumption that all data were correct to the best of the researcher's knowledge. This included the specific assumption that the institution's admissions counselors correctly calculated the students' high school gpas and correctly entered the high school gpas into the institution's student information system.

Implicit in predictive validity research is the assumption that predictions of future students can be made based upon the outcomes of previous students (Noble & Sawyer, 2002a). However, the potential exists for precollege characteristics and college success to have a weaker correlation if the academic profile of an entering class changes. Such changes are more related to the "variations in criterion predictability than predictor validity" (Willingham et al., 1990, p. 60). This study must acknowledge some changes in the size and entering characteristics of the

freshman cohorts at this institution. Full-time undergraduate enrollment grew nearly 40% from Fall 2003 to Fall 2008, during which time the size of the freshman class increased by more than 50% (Ikenberry, 2009a). Also during this same time period, the average cumulative high school gpa of incoming freshmen increased from 3.44 to 3.52 while the average ACT and SAT scores increased from 25.08 to 25.86 and 1134 to 1161 respectively. In addition, the institutional retention rate increased from 78.5% for the Fall 2003 cohort to 82.1% for the Fall 2008 cohort. The increase in quantity and academic quality of the cohorts may have affected the results of the study.

Limitations

Interpretation of the results of this study should take the following limitations into consideration. Restriction of range is an implicit limitation in such a study because enrolled students are only a sample of the population of applicants considered for admission. This study considered data from a single institution; therefore, the results may not be generalized to other institutions of higher education. Since population sample size affects the statistical validity of data analyses, the correlation between precollege characteristics and college outcomes will be smaller in a study conducted at a single institution compared to studies of multiple institutions (Zwick, 2007). The findings of this study are specific to students during a particular time period and cannot account for any unforeseen changes that might affect future students.

The rigor of the high school curriculum taken by the students in this study varies, which could affect the accuracy of the results. A student's high school grades may be affected by the rigor of a student's curriculum; however, the strength of a student's high school curriculum was not captured at this institution and therefore could not be considered in this study. Because of the timing of the application cycle for freshman admission with a priority deadline in December

of the senior year of high school, the high school gpa for most students in this study only included grades from six semesters of high school, with most of the remainder of students' high school gpas including grades from seven semesters. Belmont makes admissions decisions based in part upon precollege characteristics other than high school grades and standardized test scores, characteristics which may affect student persistence. In addition to precollege characteristics, the institutional environment also affects student persistence. However, such factors were beyond the scope of this study.

Delimitations

The first-time full-time freshman cohorts from the years 2003 to 2008 were considered. The implementation of a new student information system in 1998, followed by a transition to admissions processes that fully utilized its capacity, made 2003 an appropriate year with which to begin this study. Because international students may be considered for admission without submitting standardized test scores, they were excluded from this study. Any student under the age of 18 at the time the data were collected was excluded from the study to protect their privacy as a minor. This study considered only students with complete applicant records.

Site Selection

The site for this study was Belmont University, a medium-sized, private, coeducational, comprehensive, Christian institution with selective admissions located in Nashville, Tennessee. Belmont is the employer for the researcher and was selected for convenient access to the data with full disclosure and support from the institution's senior administration (See Appendix A).

Data Collection

Data Extraction

The data for this study were extracted electronically from the university's student information system, in collaboration with the Office of Institutional Research, after seeking approval from the Institutional Review Boards from both Belmont University, the site institution, and the University of Alabama, the institution at which the researcher is pursuing her doctoral studies. The data were exported from the student information system and formatted in Excel in order to be imported into Statistical Pack for the Social Sciences (SPSS) Grad Pack version 17.0. The data were reviewed for any potential errors. The university's student identifier was removed from each record and replaced with a randomized numerical value to identify students for the study prior to the data being imported into SPSS.

The data used in this study were collected by the institution as a part of its admissions process and are now a part of official university records. Applicants for freshman admission are required to submit an official high school transcript, showing grades earned in courses taken. Transcripts are considered official only if received directly from the high school. Admissions counselors at this institution use course grades from the official high school transcript to calculate the student's high school gpa based upon a flat four point scale, excluding pluses or minuses, and without giving extra quality points for more rigorous coursework. A grade of "A" is equal to four quality points; a grade of "B" is equal to three quality points; a grade of "C" is equal to two quality points a grade of "D" is equal to one quality point; and a grade of "F" is equal to zero quality points. The student's preliminary cumulative high school gpa includes all coursework taken in high school, including core courses and all elective courses and was represented by the variable HS GPA.

Standardized test scores are considered official if received directly from the respective testing agency or if included on an official high school transcript. Belmont accepts test scores from either ACT or SAT as part of the admissions process since scores from the two tests are highly correlated (Dorans, 1999). The ACT composite score has a range of 1 to 36 (ACT, 2007). This institution considers the SAT composite score as the sum of the subscores from the critical reading and math sections, each of which have a range of 200 to 800, thus the SAT composite score has a range of 400 to 1600 (College Board, 2008). Since this institution does not superscore for either standardized test, a practice that combines subscores from different test dates to calculate a highest composite score, all test scores used in this study were from a single test date. Concordance tables (see Appendix B) established by ACT and the College Board allowed for comparison and conversion between test scores from the ACT and SAT (College Board, 2006). This study used the highest composite test score for each student to simplify the analyses and because students at this institution are considered for admission based upon their highest test score, whether from the ACT or SAT. The highest test score was referred to as Test Score, a variable created for the purpose of this study. For student records with one or more test scores from only the ACT, the highest ACT composite score was considered the student's Test Score. For student records with one or more test scores from only the SAT, the highest SAT composite score was converted to an ACT composite score and considered the student's Test Score. For student records with test scores from both standardized tests, the highest composite SAT score was converted to an ACT composite score and compared with the actual highest ACT composite score. The highest of the two test scores, whether converted from an SAT composite score or the actual highest ACT score, was the student's Test Score.

In addition to high school grades and standardized test scores, the following input characteristics were also among those captured as a part of the application process: gender, race, religion, residency, application date, cohort year, and intended major. The application for admission at Belmont offers limited data regarding socioeconomic status. Since this information is often incomplete on the application, socioeconomic status was not considered as an input in this study.

Data Coding

This study focused on students with discrepant high school grades and standardized test scores, utilizing two different methods to categorize students into discrepant groups. Each categorization method was intended to provide a different perspective from which to consider the research questions. The first categorization split the sample into three Standard Deviation Groups based upon the relationship between the HS GPA and Test Score for each student, specifically whether the HS GPA and Test Score were discrepant from each other. This categorization was based upon the assumption that covariance between high school grades and standardized test scores indicates a greater likelihood of success in college (Kobrin et al., 2002). High school grades and standardized test scores have different scales; the range for the high school gpa in this study is 0 to 4.00, while the range for ACT is 1 to 36 (ACT, 2007). This makes comparison between the two variables challenging. However, variables with different scales can be converted to a standardized scale using *z* scores (Lomax, 2007). Essentially, *z* scores use the distribution of each variable's raw scores to convert the variables to a new score on a standard scale, so that comparisons can be made between the variables. The use of *z* scores assumes that the data are normally distributed. Therefore, students' HS GPA and Test Score were both tested for normality. The assumption for normality was met for Test Score but not for

HS GPA. Therefore, HS GPA was transformed into Normalized HS GPA for the purpose of this categorization. Both Test Score and HS GPA were transformed using z scores, with each cohort treated separately. Then, the difference between the *z* scores for both Normalized HS GPA and Test Score were used to categorize the students into one of three Standard Deviation Groups. The Consistent group included students whose Normalized HS GPA and Test Score were within one standard deviation of each other. The High School Grades Higher group was comprised of students whose Normalized HS GPA was one standard deviation or more above their Test Score. The Test Score Higher group included students whose Test Score was one standard deviation or more above their Normalized HS GPA. While the Normalized HS GPA was used to categorize students into Standard Deviation Groups, the raw data for HS GPA were used in all other analyses in this study.

The second categorization split the sample into four Bottom 25th Percentile Groups based upon whether the student's HS GPA or Test Score was at or below the 25th percentile of their cohort, a characteristic which indicates the student is less likely to persist (Stumpf & Stanley, 2002). Students were categorized as discrepant based upon whether their HS GPA or Test Score was discrepant from the mean HS GPA or mean Test Score for the student's cohort. Students with neither HS GPA nor Test Score at or below the 25th percentile were included in the Neither Low group. The High School Grades Low group included students with a HS GPA at or below the 25th percentile and a Test Score above the 25th percentile. The Test Score Low group included students with a HS GPA above the 25th percentile and a Test Score at or below the 25th percentile. The Both Low group included students with both a HS GPA and Test Score at or below the 25th percentile.

The data were also coded based upon the additional input variables of application date, because research has demonstrated this to have an influence on persistence, and intended major (Miller & Herreid, 2008). The date the student submitted the application for admission to the institution was considered the application date. For purposes of comparison, students were classified into three groups based upon application date. For the Fall 2003 to 2005 admission cycles, the priority application deadline was December 15, while for the Fall 2006 to 2008 admission cycles the priority application deadline was December 1. Students that met the December priority deadline for freshman admission for their respective cohort were considered Early applicants. Students who applied between the December priority deadline for their respective cohort and May 1 were considered Regular applicants. Students who applied after May 1 were considered Late applicants.

Belmont offers over 75 undergraduate major programs. In most cases, intended majors in departments or schools were aggregated for the purpose of this study. Categories included students whose intended major was one of the six majors in the School of Religion (Religion), one of the four majors in the College of Entertainment and Music Business (Music Business), one of the nine majors in the School of Music (Music), one of the 17 majors in the School of Sciences (Science), one of the seven majors in the School of Humanities (Humanities), one of the five majors in the School of Education (Education), one of the 11 majors in the School of Social Sciences (Social Science), and one of the ten majors in the College of Business Administration (Business). Additional categories included the four majors in the Department of Art (Art), one major the Department of Theatre and Drama (Theatre), and two majors in the College of Health Sciences & Nursing (Nursing). The last category included students who applied to Belmont as Undeclared (Undeclared).

Students had the option to self disclose their religion on the application. For the purpose of this study, student religious preference was categorized into four groups. Since Belmont is formerly a Baptist institution, Baptist students were considered one group. Students who self-identified as Catholic, Church of Christ, Christian, Episcopal, Lutheran, Methodist, Nazarene, Non-Denominational, Presbyterian, or Protestant were categorized as Christian. Belmont's Christian identity has attracted mostly Christian students to the institution. Therefore, because of the small sample size, students who self-identified as Buddhist, Hindu, Jewish, Moslem, and Other were categorized together as Non-Christian. The last category, called Unknown, included those students who indicated no religious preference on their application.

Variables

The variables used in this study were selected based upon an extensive literature review regarding predicting student success in college.

Independent Variables

Astin's ongoing CIRP research considers 146 input variables (Cooperative Institutional Research Program, 2009). The literature identified the two most common input variables that predict persistence in college as high school grades and standardized test scores (Zwick & Sklar, 2005). Therefore, HS GPA and Test Score were the primary independent variables considered in this study. Since research has considered the influence of gender and race on both high school grades and standardized test scores, this study incorporated gender and race as input variables as well. This study also considered application date, religion, residency, cohort year, and intended major as secondary input variables.

Dependent Variables

Persistence to the sophomore year is a desired student outcome at Belmont and was one of the two dependent variables in this study. Persistence is a dichotomous variable with possible values of Persist and Not Persist. For the purpose of this study, a student who persists was defined as a first-time full-time freshman who continued his or her full-time enrollment through the spring term, and returned as a full-time student for the following fall term, regardless of the credit hours completed or college gpa earned. Four-year graduation, another desired student outcome was the second dependent variable in this study, yet was only available for the first three cohorts. The two possible values of the dichotomous variable four-year graduation are Graduate and Not Graduate. Table 1 presents both the independent and dependent variables considered in this study.

Table 1

Variables Considered

Variables	Variable type	Description
Independent		
HS GPA	Continuous	Range: 0 – 4.0
Test Score	Discrete	Range: 1 – 36
Gender	Dichotomous	Male or Female
Race	Categorical	White, Black, African American American Indian or Alaska Native Asian or Pacific Islander, Hispanic Multiethnic, Unknown
Residency	Dichotomous	In-State or Out-of-State
Religion	Categorical	Baptist, Christian, Non-Christian, Unknown
Application Date	Categorical	Early, Regular, Late
Intended Major	Categorical	Art, Business, Education, Humanities, Music Business, Music, Nursing, Religion, Sciences, Social Sciences, Theatre, Undeclared
Cohort Year	Categorical	Fall 2003, Fall 2004, Fall 2005, Fall 2005, Fall 2007, Fall 2008
Dependent		
Persistence	Dichotomous	Persist or Not Persist
Four-Year Graduation	Dichotomous	Graduate or Not Graduate

Data Analysis

A retrospective study such as this is considered *ex post facto* research. Essentially, this study used the data from previously enrolled students to determine the likelihood of persistence of future Belmont students at the time of application for admission. The entire dataset was used in all data analyses. Research questions one and two asked whether any differences existed in

the persistence and graduation rates, respectively, of discrepant students compared to nondiscrepant students. These questions were answered by conducting binomial tests of proportions, used to test whether any significant differences existed in two proportions from independent samples (Lomax, 2007). A proportion is considered the percentage of cases that fall into a particular category. In this study, the proportions tested were the percentages of students who persisted and the percentage of students who graduated.

Research questions three through four asked what influence the independent variables had on the likelihood of both persistence and graduation. Regression analyses provide a statistical model to describe a relationship between an outcome, in this case persistence or graduation, and a set of independent variables, in this case high school grades and standardized test scores (Hosmer & Lemeshow, 1989). Logistic regression is a statistical methodology that transforms nonlinear relationships into linear relationships by changing the coefficients from probabilities to logged odds (Pampel, 2000). Traditional linear regressions use the least squares method, which is not appropriate for a dichotomous variable such as persistence. Rather, logistic regression is based upon the maximum likelihood procedure, which "chooses the parameters that maximize the likelihood of observing sample values" (Pampel, 2000, p. 53). Normality of the data is not required for logistic regression, however the presence of multicollinearity can be a problem for this method of data analysis.

Logistic regression is a common research design for predictive validity studies of student persistence because of the dichotomous nature of persistence as the dependent variable (Geiser & Santelices, 2007; Noble & Sawyer, 2002b; Tinto, 1975). The results from a study considering the statistical alternatives for studying student persistence by Dey and Astin (1993) showed logistic, probit, and linear regression techniques as "very similar in their ability to predict

retention in the confirmation sample" (p. 577). However, the use of linear regression with a dichotomous variable violates several assumptions, specifically normality, linearity, and homogeneity, which could lead to biased results (Dey & Astin, 1993). Thus, researchers more often choose logistic regression over the other traditional linear regression models for its theoretical advantages, rather than for its practical advantages.

Initially, descriptive statistics were run on each independent and dependent variable. Then, the students were categorized into discrepant groups by two different methods. Students were categorized into one of three Standard Deviation Groups and one of four Bottom 25th Percentile Groups. To answer research questions one and two, tests of proportions were conducted to determine whether any significant differences existed in the persistence and graduation rates, respectively, of discrepant students compared to nondiscrepant students. Next, the independent variables were checked for multicollinearity prior to running the logistic regressions used to address research questions three through six, which considered the influence of the independent variables on persistence and graduation. Separate logistic regressions were run for each group of students with respect to research questions three through six. The logistic regression models for the discrepant students were each compared to the models for the nondiscrepant students for the respective categorization for each research question.

Conclusion

Chapter Three presented the methodology for this study to consider the likelihood of persistence for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores. Specifically, this chapter reintroduced the research questions to be considered and outlined the assumptions, limitations, and delimitations. The site for this study was identified and the data

extraction and data coding were explained. Lastly, this chapter described the variables considered and the data analyses that were conducted.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

The purpose of this study was to examine the likelihood of persistence for students with discrepant high school grades and standardized test scores compared to those with nondiscrepant high school grades and standardized test scores. Specifically, this study considered whether differences existed in the rates of persistence to the sophomore year and four-year graduation for discrepant students compared to nondiscrepant students. In addition, this study considered the influence of several independent variables, namely high school grades, standardized test scores, gender, race, application date, religion, residency, intended major, and cohort year, to predict two dependent variables, persistence to the sophomore year and four-year graduation at Belmont University. This chapter presents a summary of the methodology, the demographic analysis, the categorization of the students, and the data analyses.

The following six questions guided this research.

1. Do significant differences exist in the rate of persistence to the sophomore year for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?
2. Do significant differences exist in the rate of four-year graduation for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?

3. What influence do high school grades and standardized test scores have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
4. What influence do high school grades and standardized test scores have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
5. What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
6. What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?

Summary of Methodology

The entire dataset was used in all data analyses. Initially, descriptive statistics were run on all of the independent variables considered, namely high school grades, standardized test scores, gender, race, application date, religion, residency, intended major, and cohort year. Next, two different methods were used to categorize students as discrepant or nondiscrepant. Then, tests of proportions were conducted to answer the first two research questions which asked whether any significant differences existed between the persistence and graduation rates for

students in the discrepant groups compared to students in the nondiscrepant groups. Finally, this study utilized logistic regression analyses to answer the remaining four research questions, specifically to determine the influence of the independent variables considered to predict the likelihood of the dependent variables persistence and graduation for students in the discrepant groups compared to students in the nondiscrepant groups. The researcher conducted a meta-analysis of multiple models predicting the likelihood of student persistence and graduation. Both within-model and between-model comparisons of the influence of the independent variables were considered.

Demographic Analysis

This section outlines the steps taken to obtain and prepare the dataset, including the identification of the primary independent variables, high school grades and standardized test scores. Then, descriptive statistics are presented for the primary independent variables, followed by descriptive statistics for the remaining independent variables.

The population for this study was the first-time full-time freshman cohorts from 2003 to 2008 at Belmont University. The original sample, which was extracted from Belmont's student information system, included 4,593 students. The dataset was reviewed for errors and all students with incomplete data were removed from the sample. A review of the data found no minor students under the age of 18 that needed to be excluded from the sample. Since international applicants are not required to submit standardized test scores, all non U.S. citizens were removed, leaving the researcher with a total sample of 4,514 students. Of those, 2,064 students in Cohorts 2003 to 2005 comprised the sample when four-year graduation was considered as the dependent variable. Prior to importing the data into Statistical Pack for the

Social Sciences (SPSS) Grad Pack version 17.0, the institutional student identifier was replaced with a random numerical identifier to maintain confidentiality of the data.

The variable for high school grades, referred to in this study as HS GPA, represented the student's preliminary cumulative high school gpa. Since students may apply to Belmont with scores from either the SAT or ACT, this study calculated a variable called Test Score to represent the student's standardized test score. Test Score was calculated using the concordance tables (see Appendix B) established by ACT and the College Board that allow for comparison and conversion between test scores from the ACT and SAT (College Board, 2006). For student records with one or more test scores from only the ACT, the highest ACT composite score was considered the student's Test Score. For student records with one or more test scores from only the SAT, the highest SAT composite score was converted to an ACT composite score and considered the student's Test Score. For student records with test scores from both standardized tests, the highest composite SAT score was converted to an ACT composite score and compared with the actual highest ACT composite score. The highest of the two test scores, whether converted from an SAT composite score or the actual highest ACT score, was considered the student's Test Score.

Descriptive Statistics of Primary Variables by Cohort

Initially, descriptive statistics were run for the two dependent variables, persistence to the sophomore year and four-year graduation by cohort, as shown in Table 2. The persistence rate for the entire sample was 80%. The four-year graduation rate for the Fall 2003 to 2005 cohorts was 52.1%. Descriptive statistics for each cohort were also run on the two primary independent variables, HS GPA and Test Score, and are displayed in Table 3. For the entire sample, the mean HS GPA was 3.51 and the mean Test Score was 25.58. Only slight variations in the means

existed for both variables when examined by cohort. Since there was no intentional change in Belmont's admissions parameters during this time, the slight increase over time in mean HS GPA and mean Test Score can be explained by the institution's increased recruiting efforts in targeting more highly qualified students. Since research has demonstrated that HS GPA and Test Score are predictors of persistence in college, the increase over time in mean HS GPA and mean Test Score explains the increase over time in the persistence rate (Geiser & Santelices, 2007).

Table 2

Persistence and Four-Year Graduation Rates by Cohort

Cohort	*n*	Persistence Rate	Graduation Rate
Fall 2003	586	78.5%	51.5%
Fall 2004	708	80.1%	51.3%
Fall 2005	770	78.4%	53.2%
Fall 2006	750	79.5%	na
Fall 2007	788	80.3%	na
Fall 2008	912	82.1%	na
Total	4,514	80.0%	52.1%

Table 3

Descriptive Statistics of HS GPA and Test Score by Cohort

		HS GPA			Test Score		
			Percentiles			Percentiles	
Cohort	*n*	*M*	25th	75th	*M*	25th	75th
Fall 2003	586	3.44	3.17	3.80	25.08	23	28
Fall 2004	708	3.51	3.24	3.83	25.32	23	28
Fall 2005	770	3.50	3.24	3.83	25.59	23	28
Fall 2006	750	3.55	3.31	3.85	25.79	23	28
Fall 2007	788	3.50	3.21	3.80	25.67	23	28
Fall 2008	912	3.52	3.25	3.83	25.86	24	28
Total	4,514	3.51	3.24	3.83	25.58	23	28

Descriptive Statistics of Remaining Independent Variables

Next, descriptive statistics for the entire sample were calculated for all of the other independent variables, namely gender, race, application date, religion, residency, and intended major. Table 4 displays the frequencies and respective percentages for each independent variable, in addition to their respective persistence and graduation rates. The sample was roughly 59% female and 90% white. Two of the race categories, American Indian or Alaska Native and Multiethnic comprised only 0.5% of the entire dataset. Therefore, the 16 American Indian or Alaska Native students and six Multiethnic students were included in the Unknown Race category for the purpose of this study. Over 60% of the students were Christian. Just over a third (37.4%) of the students remained in their home state of Tennessee to attend Belmont. Nearly 70% of the students were coded as having an Early Application Date, because they applied for admission by the December priority deadline. The intended major of over half of the students was either Music Business or Music, with 38.7% and 17.6%, respectively, of students pursuing one of these two majors.

Table 4

Frequencies, Persistence, and Graduation Rates for Independent Variables

Variable	*n*	Sample %	Persistence Rate%	Graduation Rate%
Gender				
Female	2,653	58.8	79.7	54.2
Male	1,861	41.2	80.3	48.8
Race				
American Indian or Alaska Native	16	0.4	87.5	45.5
Black or African American	129	2.9	86.8	54.0
Hispanic	89	2.0	80.9	47.1
Multiethnic	6	0.1	83.3	50.0
Unknown	114	2.5	78.1	55.6
White	4,061	90.0	79.7	52.0
Asian or Pacific Islander	99	2.2	81.8	58.6
Religion				
Baptist	927	20.5	81.8	54.7
Christian	1,829	40.5	82.1	56.3
Non-Christian	266	5.9	78.6	48.4
Unknown	1,492	33.1	76.5	47.7
Residence				
In-state	1,689	37.4	81.3	52.7
Out-of-state	2,825	62.6	79.2	51.7
Application Date				
Early	3,133	69.4	82.8	57.8
Regular	1,280	28.4	74.4	41.7
Late	101	2.2	63.4	32.4
Intended Major				
Art	89	2.0	80.9	56.3
Business	330	7.3	82.1	50.6
Education	158	3.5	79.1	44.3
Humanities	85	1.9	72.9	48.7
Music Business	1,747	38.7	79.0	53.6
Music	795	17.6	83.1	52.3
Nursing	215	4.8	84.2	53.4
Religion	78	1.7	78.2	56.8
Science	346	7.7	81.2	51.5
Social Science	282	6.2	74.1	53.2
Theatre	53	1.2	77.4	43.8
Undeclared	336	7.4	78.6	46.8

Categorization of Students into Discrepant Groups

This study used two different methods of categorizing students as having discrepant high school grades and standardized test scores. Both categorizations will be presented, followed by the persistence and graduation rates of students by discrepant group. The first method categorized students into three Standard Deviation Groups based upon whether the student's HS GPA and Test Score were discrepant from each other. The choice to categorize students in this way was based upon the assumption that covariance of high school grades and standardized test scores indicates a student is more likely to be successful in college (Kobrin et al., 2002). The second method categorized students into four Bottom 25th Percentile Groups based upon whether one, both, or neither of the student's HS GPA or Test Score were discrepant from the mean HS GPA or mean Test Score for the student's respective cohort. Students were categorized as discrepant in this way because research has shown that students with a HS GPA or Test Score in the bottom 25th percentile of their cohort are less likely to persist (Stumpf & Stanley, 2002). Essentially, the researcher desired to consider students as discrepant through two different lenses, as each categorization method provided a different perspective from which to consider the research questions.

Standard Deviation Groups

Students were categorized into Standard Deviation Groups based upon whether their high school grades and standardized test scores were discrepant from each other. Since HS GPA and Test Score each have different scales, this categorization required the standardization of HS GPA and Test Score through the use of *z* scores (Lomax, 2007). First, HS GPA and Test Score were both tested for normality, as the assumption for normality must be met to transform data using *z*

scores. This assumption was met for Test Score, as the distribution of Test Score was found to be normal, as evidenced in Figure 1.

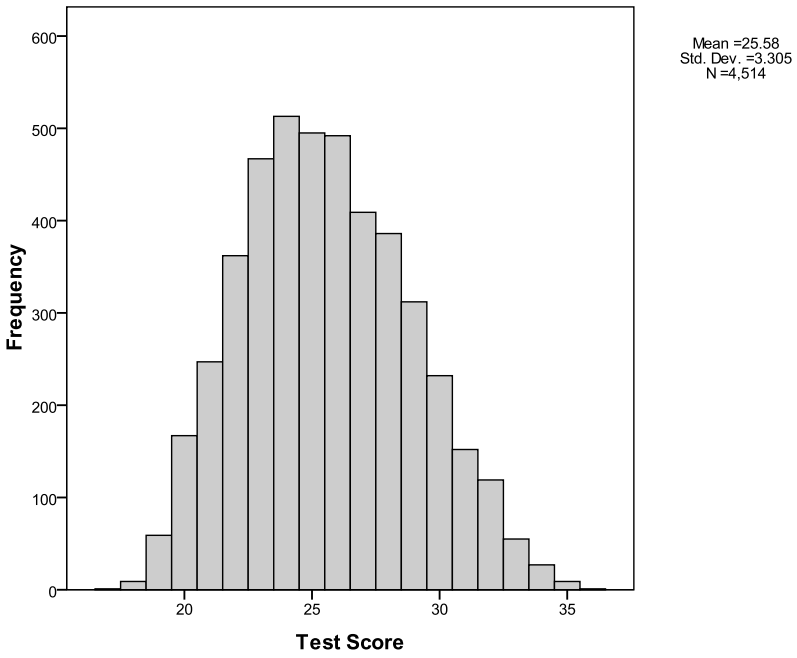

Figure 1. Histogram of Test Score for all students.

However, HS GPA was found to be negatively skewed (-.547), as evidenced in Figure 2, therefore the assumption for normality was not met in this case. Since transformation by *z* scores requires the data to be normal, several normalization techniques were tested in order to find the appropriate transformation for HS GPA. The reflect and inverse transformation of HS GPA into the variable Normalized HS GPA was found to be the best fit, as shown in Figure 3, with the Kolmogorov-Smirnov test for normality found to be significant ($p < .001$).

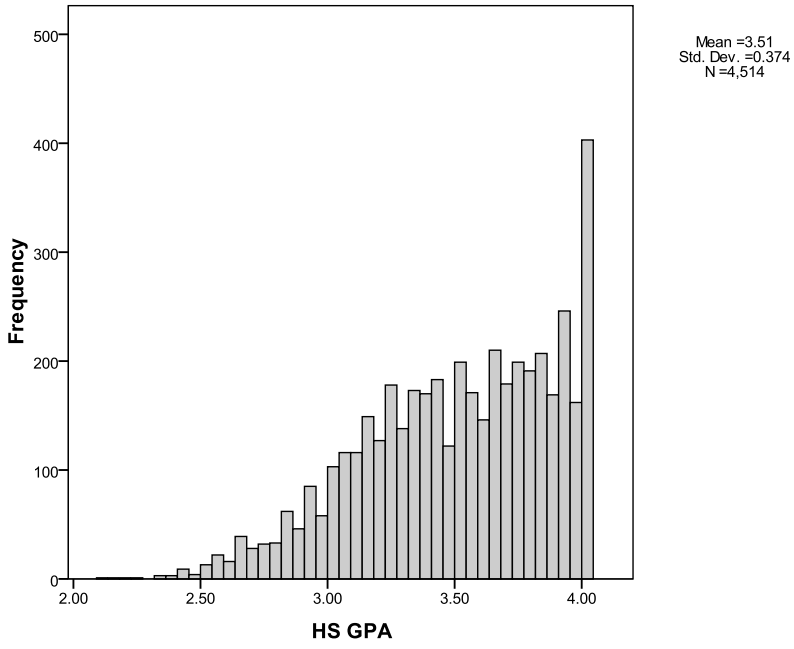

Figure 2. Histogram of HS GPA for all students.

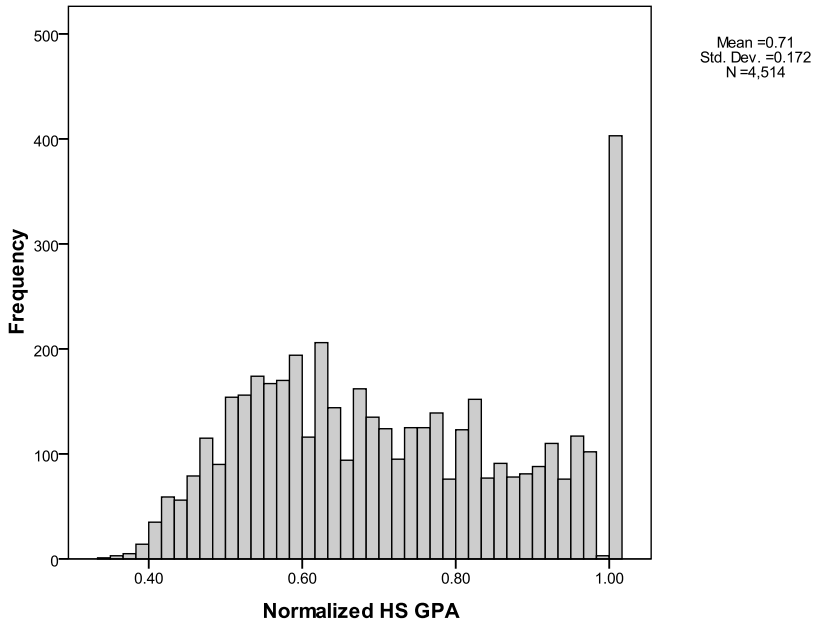

Figure 3. Histogram of Normalized HS GPA for all students.

Since the assumption of normality was met for both Test Score and Normalized HS GPA, both variables were then converted to *z* scores by cohort year, after which all students were categorized into one of three Standard Deviation Groups. The nondiscrepant students in the Standard Deviation Group categorization were called Consistent students, as their Test Score and Normalized HS GPA were within one standard deviation of each other. Students were categorized into the High School Grades Higher group if their Normalized HS GPA was one standard deviation or greater than their Test Score. Students were categorized as Test Score Higher if their Test Score was one standard deviation or greater than their Normalized HS GPA. The categorization of students by Standard Deviation Group is displayed in Table 5. Nearly two-thirds (64.5%) of all students were in the Consistent group. Of the remaining third, 17.9% were in the High School Grades Higher group and 17.6% were in the Test Score Higher group. While the Normalized HS GPA was used to categorize students into Standard Deviation Groups, the raw scores for HS GPA were used in all other analyses for this study.

Table 5

Categorization of Cohorts by Standard Deviation Group

Cohort	*n*	Consistent	High School Grades Higher	Test Score Higher
Fall 2003	586	391	97	98
Fall 2004	708	455	121	132
Fall 2005	770	486	141	143
Fall 2006	750	490	132	128
Fall 2007	788	497	154	137
Fall 2008	912	596	161	155
Total	4,514	2,915	806	793

Bottom 25th Percentile Groups

Next, students were categorized into one of four Bottom 25th Percentile Groups based upon whether the student's HS GPA or Test Score was in the bottom 25th percentile of their respective cohort, as this characteristic would indicate they are less likely to persist (Stumpf & Stanley, 2002). This method of categorization considered whether the student's HS GPA and Test Score were discrepant from the mean HS GPA or mean Test Score for their respective cohort. The nondiscrepant students for this categorization were called Neither Low students, as neither their HS GPA nor their Test Score were in the bottom 25th percentile for their cohort. Students in the High School Grades Low group had a HS GPA at or below the 25th percentile and a Test Score above the 25th percentile. Students in the Test Scores Low group had a Test Score at or below the 25th percentile and a HS GPA above the 25th percentile. The remaining students were included in the Both Low group, as both their HS GPA and Test Score were at or below the 25th percentile. Table 6 displays the categorization of students by Bottom 25th Percentile Group. Over half of the sample (55.5%) was found to be in the Neither Low group. Of the remaining students, 12.9% were in the High School Grades Low group, 19.3% were in the

Test Score Low group, and 12.3% were in the Both Low group. Within each cohort, the distribution of students among the discrepant groups was roughly similar to that of the entire sample.

Table 6

Categorization of Cohorts by Bottom 25th Percentile Group

Cohort	*n*	Neither Low	High School Grades Low	Test Score Low	Both Low
Fall 2003	586	317	66	123	80
Fall 2004	708	383	88	148	89
Fall 2005	770	440	104	138	88
Fall 2006	750	442	99	119	90
Fall 2007	788	459	117	129	83
Fall 2008	912	464	110	215	123
Total	4,514	2,505	584	872	553

Persistence and Four-Year Graduation Rates by Discrepant Group

This study examined whether significant differences existed in the persistence and graduation rates for discrepant students compared to nondiscrepant students. Therefore, rates of persistence to the sophomore year and four-year graduation were calculated by discrepant group, as shown in Table 7. The persistence and graduation rates for Consistent and High School Grades Higher students were similar and both higher than the respective rates for Test Score Higher students. Not surprisingly, the Neither Low students had the highest persistence and graduation rates among the Bottom 25th Percentile Groups as neither their HS GPA nor Test Score was in the bottom 25th percentile. Persistence and graduation rates for students in the High School Grades Low and Both Low groups were lower than for students in the Test Score Low group. These results correspond with the research that found students with high grades in high school are more likely to persist in college, since students with higher high school grades would

be likely be categorized in the High School Grades Higher, Consistent, and Neither Low groups (Astin & Oseguera, 2005).

Table 7

Persistence and Four-Year Graduation Rates by Discrepant Group

Cohort	*n*	Persistence Rate %	*n*	Graduate Rate %
Consistent	2,915	80.5	1,332	53.1
High School Grades Higher	806	80.8	359	56.0
Test Score Higher	793	77.2	373	44.8
Neither Low	2,505	83.7	1,140	61.8
High School Grades Low	584	72.6	258	31.8
Test Score Low	872	77.9	409	46.0
Both Low	553	74.0	257	38.9

Thus far, the sample of students for this study has been described with respect to all of the independent and dependent variables to be considered. Two different methods were used to categorize the students into discrepant groups based upon whether the student's HS GPA and Test Score were either discrepant from each other or whether they were discrepant from the mean HS GPA and mean Test Score for their cohort. The analyses that follow consider all six of the research questions with regard to both categorizations of students.

Data Analysis

Tests of proportions and logistic regressions were the main data analyses used in this study. First, tests of proportions were conducted to determine whether a significant difference existed in the persistence and graduation rates of students in the discrepant groups compared to the students in the nondiscrepant groups. Next, logistic regression analyses were conducted to determine the influence of the independent variables to predict the likelihood of persistence and

graduation for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores. Logistic regression is used to create a statistical model to describe the relationship between inputs, high school grades and standardized test scores, and an outcome, either persistence to the sophomore year or four-year graduation (Hosmer & Lemeshow, 1989). Since the presence of multicollinearity, the existence of high intercorrelation among independent variables, creates a problem for logistic regressions, a check for multicollinearity was conducted to determine whether multicollinearity existed among the independent variables considered in this study (Mertler & Vannatta, 2005). The use of logistic regression has gained popularity in education research over the last two decades, however a commonly accepted format for reporting the results of logistic regression analyses does not yet exist (Peng, So, Stage, & John, 2002). Therefore, the researcher chose to present the information most helpful in the analyses of the research questions asked in this study. Each statistical analysis in this study was tested against a level of significance α of 0.05 that a Type I error was not made.

As described earlier in this chapter, students were categorized into discrepant groups by two different methods. All students were categorized into one of three Standard Deviation Groups, namely Consistent, High School Grades Higher, or Test Score Higher, based upon whether their HS GPA and Test Score were discrepant from each other. Students were also categorized into one of four Bottom 25th Percentile Groups, namely Neither Low, High School Grades Low, Test Score Low, or Both Low, based upon whether their HS GPA or Test Score were discrepant from the mean HS GPA or mean Test Score for their cohort. Separate logistic regressions were run for each group of students for research questions three through six to determine the influence of the independent variables on persistence and graduation. To ease the

reader in following the analyses, Table 8 presents the naming convention for the logistic regressions used to address research questions three through six.

Table 8

Logistic Regressions for Research Question X

Research Question X by Standard Deviation Group Logistic Regression X.1a: Analysis of Dependent Variable of Consistent Students Logistic Regression X.1b: Analysis of Dependent Variable of High School Grades Higher Students Logistic Regression X.1c: Analysis of Dependent Variable of Test Score Higher Students Research Question X by Bottom 25th Percentile Group Logistic Regression X.2a: Analysis of Dependent Variable of Neither Low Students Logistic Regression X.2b: Analysis of Dependent Variable of High School Grades Low Students Logistic Regression X.2c: Analysis of Dependent Variable of Test Score Low Students Logistic Regression X.2d: Analysis of Dependent Variable of Both Low Students

Research Questions One and Two

Research questions one and two asked whether differences existed in the persistence and graduation rates, respectively, of students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores. To answer these two questions, binomial tests of proportions were run for each discrepant group with the test proportion set as the persistence or graduation rate for the respective nondiscrepant group. The researcher observed that the persistence and graduation rates of the Test Score Low students were higher than the respective rates for the High School Grades Low and Both Low students. Therefore, additional tests of proportions were conducted to determine whether significant differences existed in the persistence and graduation rates of the

Test Score Low students compared to the High School Grades Low and Both Low students, with the test proportion set as the persistence or graduation rate for the Test Score Low group.

Test Proportions Used

To test whether any differences existed between the persistence rates for High School Grades Higher and Test Score Higher students compared to nondiscrepant students, the test proportion used was .805, as that was the persistence rate for Consistent students. When determining whether any differences in the persistence rates existed between High School Grades Low, Test Score Low, and Both Low students compared to nondiscrepant students, the test proportion was set at .837, the persistence rate for Neither Low students. To test whether any differences existed between the graduation rates for High School Grades Higher and Test Score Higher students compared to nondiscrepant students, the test proportion used was .531, as that was the graduation rate for Consistent students in Cohorts 2003 to 2005. When determining whether any differences in the graduation rates existed between High School Grades Low, Test Score Low, and Both Low students compared to nondiscrepant students, the test proportion was set at .618, the graduation rate for Neither Low students in Cohorts 2003 to 2005.

Further investigation considered whether any significant differences existed in the persistence and graduation rates of the Test Score Low group compared to the High School Grades Low and Both Low groups, since the persistence and graduation rates were both higher for Test Score Low students than for High School Grades Low and Both Low students. The test proportion was set at .779, the persistence rate for Test Score Low students, to determine whether any differences existed in the persistence rates for High School Grades Low and Both Low students compared to Test Score Low students. Then, the test proportion was set at .460, the graduation rate for Test Score Low students, to determine whether any differences existed

between the graduation rates for High School Grades Low and Both Low students compared to Test Score Low students in Cohorts 2003 to 2005.

Tests of Proportions Results

A statistically significant difference was found between the persistence rate of Test Score Higher students ($p = .011$) compared to Consistent students. In addition, statistically significant differences existed in the persistence rates of students in the High School Grades Low ($p < .001$), Test Score Low ($p < .001$) and Both Low ($p < .001$) groups compared to the persistence rate of students in the Neither Low group. Significant differences also existed in the graduation rates of Test Score Higher students ($p = .001$) compared to Consistent students, as well as in the graduation rates for students in the High School Grades Low ($p = .019$), Test Score Low ($p < .001$), and Both Low ($p < .001$) groups compared to the graduation rate of the students in the Neither Low group. Overall, the results showed significant differences in persistence and graduation rates for students in all discrepant groups except High School Grades Higher. The finding that High School Grades Higher students persist and graduate at a rate that is not statistically different from Consistent students is not surprising. High school grades are the strongest predictor of persistence and graduation, so the low test scores of the High School Grades Higher students were offset by the strength of the students' high school grades with regard to their likelihood to persist and graduate (Geiser & Santelices, 2007).

In addition, statistically significant differences existed in the persistence rates of students in the High School Grades Low ($p < .001$) and Both Low ($p = .016$) groups compared to the persistence rate of students in the Test Score Low group. Significant differences also existed in the graduation rates of students in the High School Grades Low ($p < .001$) and Both Low ($p = .013$) groups compared to the graduation rate of the students in the Test Score Low group. These

findings are also not surprising given that the Test Score Low students have higher high school grades than High School Grades Low and Both Low students, a factor which indicates they have a greater likelihood of persistence and graduation (Astin & Oseguera, 2005).

Multicollinearity Check

Before conducting the logistic regression analyses for this study, a multiple linear regression was conducted to check for multicollinearity, the existence of high intercorrelation of independent variables, since logistic regression is sensitive to multicollinearity among the predictor variables (Mertler & Vannatta, 2005). Table 9 shows the Collinearity Statistics for all independent variables considered. All tolerance statistics were above 0.1 and all VIF values were below 10, showing no evidence of multicollinearity. Therefore, all independent variables were considered in the analyses.

Table 9

Collinearity Statistics for all Independent Variables Considered

Variable	Tolerance	VIF
Test Score	.793	1.262
HS GPA	.776	1.289
Gender	.916	1.092
Race	.967	1.034
Residency	.985	1.015
Intended Major	.989	1.011
Religion	.954	1.048
Application Date	.927	1.079
Cohort Year	.955	1.047

Research Question Three

The third research question asked what influence high school grades and standardized test scores have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores. Three logistic regressions were conducted on the students in each of the three Standard Deviation Groups to determine how well the two primary independent variables, HS GPA and Test Score, predict the dependent variable Persistence. Then, four logistic regressions were conducted on the students in each of the four Bottom 25th Percentile Groups to determine how well the two primary independent variables, HS GPA and Test Score, predict the dependent variable Persistence.

Research Question Three Considered by Standard Deviation Group

The Logistic Regression 3.1 Series considered research question three by Standard Deviation Group. Logistic Regression 3.1a was conducted on the 2,915 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Consistent. Logistic Regressions 3.1b and 3.1c were conducted on the students with discrepant high school grades and standardized test scores, specifically the 806 High School Grades Higher students and 793 Test Score Higher students.

Logistic Regression 3.1a.

The model for Logistic Regression 3.1a was statistically significant, χ^2 (2, N = 2,915) = 51.783, $p < .001$, indicating that the model was able to determine which Consistent students persisted to the sophomore year. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 2,915) = 10.187, $p = .252$. Only HS GPA made a

significant contribution to the model for Consistent students, with each one point increase in HS GPA indicating a student was almost twice as likely to persist, if Test Score was held constant.

Logistic Regression 3.1b.

The model for Logistic Regression 3.1b was not statistically significant, χ^2 (2, N = 806) = 3.505, p = .173, indicating that the model was not able to determine which High School Grades Higher students persisted to the sophomore year. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model a good fit with a χ^2 (8, N = 806) = 4.832, p = .775.

Logistic Regression 3.1c.

The model for Logistic Regression 3.1c was statistically significant, χ^2 (2, N = 793) = 19.154, p < .001, indicating that the model was able to determine which Test Score Higher students persisted to the sophomore year. In addition, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit a χ^2 (8, N = 793) = 5.476, p = .706. Only HS GPA was found to be significant predictor in this model, with each one point increase in HS GPA indicating a student was more than twice as likely to persist, if Test Score was held constant.

Regression coefficients for Logistic Regressions 3.1a, 3.1b, and 3.1c are displayed in Tables 10, 11, and 12, respectively.

Table 10

Logistic Regression 3.1a: Analysis of Persistence of Consistent Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.042	.025	2.721	1	.099	1.043	.992	1.096
HS GPA	.634	.218	8.474	1	.004*	1.885	1.230	2.889
Constant	-1.838	.460	15.926	1	.000	.159		

* The odds ratio is significant at the .05 level.

Table 11

Logistic Regression 3.1b: Analysis of Persistence of High School Grades Higher Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.093	.058	2.561	1	.110	1.098	.979	1.230
HS GPA	-.410	.717	.327	1	.567	.664	.163	2.704
Constant	.838	1.928	.189	1	.664	2.312		

Table 12

Logistic Regression 3.1c: Analysis of Persistence of Test Score Higher Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.047	.052	.821	1	.365	1.048	.947	1.160
HS GPA	.796	.362	4.832	1	.028*	2.217	1.090	4.508
Constant	-2.617	.989	6.995	1	.008	.073		

* The odds ratio is significant at the .05 level.

Comparison of models for Logistic Regression Series 3.1.

Only the models predicting persistence for the Consistent and Test Score Higher students were found to be significant, thus they were the only Standard Deviation Group models that could be compared. In both models, HS GPA was found to be a significant contributor to the

model, as expected from the research that demonstrated high school grades are the strongest predictor of persistence (Astin & Oseguera, 2005).

Research Question Three Considered by Bottom 25th Percentile Group

The Logistic Regression 3.2 Series considered research question three by Bottom 25th Percentile Group. Logistic Regression 3.2a was conducted on the 2,505 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Neither Low. Logistic Regressions 3.2b, 3.2c, and 3.2d were conducted on the students with discrepant high school grades and standardized test scores, specifically the 584 High School Grades Low students, 872 Test Score Low students, and 553 Both Low students, respectively.

Logistic Regression 3.2a.

The model for Logistic Regression 3.2a was statistically significant, χ^2 (2, N = 2,505) = 17.756, p < .001, indicating that the model was able to determine which Neither Low students persisted to the sophomore year. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 2,505) = 10.186, p = .252. Both HS GPA and Test Score were found to be significant contributors to the model to predict the persistence of Neither Low students, with HS GPA found to be a stronger predictor of persistence than Test Score.

Logistic Regression 3.2b.

The model for Logistic Regression 3.2b was not statistically significant, χ^2 (2, N = 584) = 3.130, p = .209, indicating that the model was not able to determine which High School Grades Low students persisted to the sophomore year. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 584) = 3.717, p = .882.

Logistic Regression 3.2c.

The model for Logistic Regression 3.2c was not statistically significant, χ^2 (2, N = 872) = .367, p = .832, indicating that the model was not able to determine which Test Score Low students persisted to the sophomore year. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 872) = 12.035, p = .150.

Logistic Regression 3.2d.

The model for Logistic Regression 3.2d was statistically significant, χ^2 (2, N = 553) = 6.600, p = .037, indicating that the model was able to determine which Both Low students persisted to the sophomore year. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 553) = 10.316, p = .244. HS GPA was found to be a significant predictor in the model for Both Low students, with the odds ratio indicating that for each one point increase in HS GPA a student was more than three times as likely to persist, if Test Score was held constant.

Regression coefficients for Logistic Regressions 3.2a, 3.2b, 3.2c, and 3.2d are displayed in Tables 13, 14, 15, and 16, respectively.

Table 13

Logistic Regression 3.2a: Analysis of Persistence of Neither Low Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.061	.023	6.752	1	.009*	1.063	1.015	1.113
HS GPA	.562	.240	5.488	1	.019*	1.755	1.096	2.809
Constant	-2.111	.926	5.194	1	.023	.121		

* The odds ratio is significant at the .05 level.

Table 14

Logistic Regression 3.2b: Analysis of Persistence of High School Grades Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.034	.048	.508	1	.476	1.035	.941	1.138
HS GPA	.719	.455	2.496	1	.114	2.053	.841	5.011
Constant	-2.088	1.809	1.333	1	.248	.124		

Table 15

Logistic Regression 3.2c: Analysis of Persistence of Test Score Low Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.032	.063	.250	1	.617	1.032	.912	1.168
HS GPA	.118	.393	.090	1	.764	1.125	.521	2.429
Constant	.142	1.890	1	.940	1.153			

Table 16

Logistic Regression 3.2d: Analysis of Persistence of Both Low Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	-.026	.071	.139	1	.709	.974	.848	1.118
HS GPA	1.150	.447	6.616	1	.010*	3.159	1.315	7.589
Constant	-1.806	1.990	.824	1	.364	.164		

* The odds ratio is significant at the .05 level.

Comparison of models for Logistic Regression Series 3.2.

Only the models for Neither Low and Both Low students were found to be statistically significant, allowing only these two Bottom 25th Percentile Group models to be compared with regard to predicting persistence. HS GPA was shown to be a significant contributor in both

models. Test Score was significant for Neither Low students, but the odds ratio indicated Test Score had only a small amount of influence.

Research Question Four

The fourth research question asked what influence high school grades and standardized test scores have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores. Three logistic regressions were conducted on the students in each of the three Standard Deviation Groups to determine how well the two primary independent variables, HS GPA and Test Score, predict the dependent variable Graduation. Then, four logistic regressions were conducted on the students in each of the four Bottom 25th Percentile Groups to determine how well the two primary independent variables, Test Score and HS GPA, predict the dependent variable Graduation.

Research Question Four Considered by Standard Deviation Group

The Logistic Regression 4.1 Series considered research question four by Standard Deviation Group for Cohorts 2003 to 2005. Logistic Regression 4.1a was conducted on the 1,332 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Consistent. Logistic Regressions 4.1b and 4.1c were conducted on the students with discrepant high school grades and standardized test scores, specifically the 359 High School Grades Higher students and 373 Test Score Higher students.

Logistic Regression 4.1a.

The model for Logistic Regression 4.1a was statistically significant, χ^2 (2, N = 1,332) = 98.804, $p < .001$, indicating that the model was able to determine which Consistent students graduated in four years. The Hosmer and Lemeshow Goodness of Fit Test showed the model

was a good fit with a χ^2 (8, N = 1,332) = 7.658, p = .468. Both Test Score and HS GPA were shown to contribute significantly to the model, with the odds ratios indicating that HS GPA was a stronger influence on graduation than Test Score.

Logistic Regression 4.1b.

The model for Logistic Regression 4.1b was statistically significant, χ^2 (2, N = 359) = 8.638, p = .013, indicating that the model was able to determine which High School Grades Higher students graduated in four years. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 359) = 5.164, p = .740. In addition, neither Test Score nor HS GPA was found to contribute significantly to the model for High School Grades Higher students.

Logistic Regression 4.1c

The model for Logistic Regression 4.1c was statistically significant, χ^2 (2, N = 373) = 33.766, p < .001, indicating that the model was able to determine which Test Score Higher students graduated in four years. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 373) = 3.396, p = .907. HS GPA was a significant contributor to the model for the Test Score Higher group, with the odds ratio indicating that for every one point increase in HS GPA a student was seven times more likely to graduate in four years, if Test Score was held constant.

Regression coefficients for Logistic Regressions 4.1a, 4.1b, and 4.1c are displayed in Tables 17, 18, and 19, respectively.

Table 17

Logistic Regression 4.1a: Analysis of Graduation of Consistent Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.124	.030	16.764	1	.000*	1.132	1.067	1.201
HS GPA	.522	.261	4.004	1	.045*	1.685	1.011	2.810
Constant	-4.814	.559	74.233	1	.000	.008		

* The odds ratio is significant at the .05 level.

Table 18

Logistic Regression 4.1b: Analysis of Graduation of High School Grades Higher Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.121	.074	2.695	1	.101	1.129	.977	1.304
HS GPA	.148	.882	.028	1	.866	1.160	.206	6.541
Constant	-3.087	2.258	1.869	1	.172	.046		

Table 19

Logistic Regression 4.1c: Analysis of Graduation of Test Score Higher Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	-.051	.067	.584	1	.445	.950	.833	1.083
HS GPA	2.011	.478	17.659	1	.000*	7.467	2.924	19.072
Constant	-5.157	1.270	6.478	.000	.006			

* The odds ratio is significant at the .05 level.

Comparison of models for Logistic Regression Series 4.1.

All three models predicting graduation for the Standard Deviation Groups were found to be statistically significant. While mixed results were found with regard to the influence of Test Score and HS GPA as predictors of graduation, HS GPA was the stronger predictor when found significant.

Research Question Four Considered by Bottom 25th Percentile Group

The Logistic Regression 4.2 Series considered research question four by Bottom 25th Percentile Group. Logistic Regression 4.2a was conducted on the 1,140 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Neither Low. Logistic Regressions 4.2b, 4.2c, and 4.2d were conducted on the students with discrepant high school grades and standardized test scores, specifically the 258 High School Grades Low students, 409 Test Score Low students, and 257 Both Low students, respectively.

Logistic Regression 4.2a.

The model for Logistic Regression 4.2a was statistically significant, χ^2 (2, N = 1,140) = 28.821, $p < .001$, indicating that the model was able to determine which Neither Low students graduated in four years. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 1,140) = 11.491, $p = .175$. Nevertheless, both variables were significant contributors to the model, with HS GPA found to be a stronger predictor of graduation than Test Score.

Logistic Regression 4.2b.

The model for Logistic Regression 4.2b was statistically significant, χ^2 (2, N = 258) = 6.509, $p = .039$, indicating that the model was able to determine which High School Grades Low students graduated in four years. The Hosmer and Lemeshow Goodness of Fit Test showed the

model was a good fit with a χ^2 (8, N = 258) = 5.827, p = .667. HS GPA was shown to be a significant contributor to the model, such that each one point increase in HS GPA indicated a student was five times more likely to graduate in four years, if Test Score was held constant.

Logistic Regression 4.2c.

The model for Logistic Regression 4.2c was not statistically significant, χ^2 (2, N = 409) = 5.307, p = .070, indicating that the model was not able to determine which Test Score Low students graduated in four years. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 409) = 14.881, p = .061.

Logistic Regression 4.2d.

The model for Logistic Regression 4.2d was not statistically significant, χ^2 (2, N = 257) = 2.849, p = .241, indicating that the model was not able to determine which Both Low students graduated in four years. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 257) = 10.857, p = .210.

Regression coefficients for Logistic Regressions 4.2a, 4.2b, 4.2c, and 4.2d are displayed in Tables 20, 21, 22, and 23, respectively.

Table 20

Logistic Regression 4.2a: Analysis of Graduation of Neither Low Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.089	.026	11.573	1	.001*	1.093	1.039	1.151
HS GPA	.811	.269	9.126	1	.003*	2.251	1.330	3.811
Constant	-4.964	1.066	21.694	1	.000	.007		

* The odds ratio is significant at the .05 level.

Table 21

Logistic Regression 4.2b: Analysis of Graduation of High School Grades Low Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.020	.068	.088	1	.766	1.021	.892	1.167
HS GPA	1.670	.690	5.865	1	.015*	5.313	1.375	20.529
Constant	-6.245	2.639	5.599	1	.018	.002		

* The odds ratio is significant at the .05 level.

Table 22

Logistic Regression 4.2c: Analysis of Graduation of Test Score Low Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.082	.077	1.127	1	.288	1.086	.933	1.263
HS GPA	.948	.486	3.796	1	.051	2.580	.994	6.694
Constant	-5.297	2.324	5.196	1	.023	.005		

Table 23

Logistic Regression 4.2d: Analysis of Graduation of Both Low Students in Cohorts 2003 to 2005

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	.061	.095	.406	1	.524	1.063	.882	1.280
HS GPA	.937	.608	2.377	1	.123	2.552	.776	8.399
Constant	-4.514	2.735	2.724	1	.099	.011		

Comparison of models for Logistic Regression Series 4.2.

Only the models for Neither Low and High School Grades Low students were statistically significant with regard to predicting graduation among the Bottom 25th Percentile

Groups, thus these were the only two models that could be compared. HS GPA was found to be a significant contributor in both models, indicating HS GPA was a significant predictor of graduation. Test Score was found to be significant for Neither Low students but to have little influence as a predictor of graduation.

Research Question Five

The fifth research question asked what additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores. Three logistic regressions were conducted on the students in each of the three Standard Deviation Groups to determine how well all of the independent variables considered predict the dependent variable Persistence. Then, four logistic regressions were conducted on the students in each of the four Bottom 25th Percentile Groups to determine how well all of the independent variables considered predict the dependent variable Persistence. The tables reporting the regression coefficients for the logistic regressions used to answer research question five are very large and few of the independent variables were found to have any significance. Therefore, for the ease of the reader, the tables for this section can be found in Appendix C.

Research Question Five Considered by Standard Deviation Group

The Logistic Regression 5.1 Series considered research question five by Standard Deviation Group. Logistic Regression 5.1a was conducted on the 2,915 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Consistent. Logistic Regressions 5.1b and 5.1c were conducted on the students with discrepant

high school grades and standardized test scores, specifically the 806 High School Grades Higher students and 793 Test Score Higher students.

Logistic Regression 5.1a.

The model for Logistic Regression 5.1a was statistically significant, χ^2 (29, N = 2,915) = 110.749, p < .001, indicating that the model was able to determine which Consistent students persisted. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 2,915) = 7.403, p = .494. HS GPA was found to have a significant influence, with each one point increase in HS GPA indicating a student was almost twice as likely to persist, assuming all other variables were held constant. The Religion variable was found to be significant for Christians, Baptists, and Non-Christians, however the odds ratios indicated that religion had little effect on persistence. In addition, Application Date was found to be significant, with the odds ratios indicating that Regular and Late students were two to three times more likely to persist than Early students, assuming all other variables were held constant.

Logistic Regression 5.1b.

The model for Logistic Regression 5.1b was not statistically significant, χ^2 (29, N = 806) = 37.382, p = .137, indicating that the model was not able to determine which High School Grades Higher students persisted. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (1, N = 806) = 9.414, p = .309.

Logistic Regression 5.1c.

The model for Logistic Regression 5.1c was statistically significant, χ^2 (29, N = 793) = 74.368, p < .001, indicating that the model was able to determine which Test Score Higher students persisted. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 793) = 4.806, p = .778. The Unknown Race variable was found to be

significant and strong, with the odds ratio indicating these students were ten times more likely to persist than White students, assuming all other variables were held constant. The Early Application Date characteristic was also found to have a significant influence on persistence. Lastly, the Non-Christian Religion characteristic was found to be significant, but to not have much strength as a predictor of persistence.

Regression coefficients for Logistic Regressions 5.1a, 5.1b, and 5.1c are displayed in Tables C1, C2, and C3, respectively, and can be found in Appendix C.

Comparison of models for Logistic Regression Series 5.1.

Only the models for predicting persistence for the Consistent and Test Score Higher groups were significant and could therefore be compared. Interestingly, of the two primary independent variables for this study, HS GPA was found to be significant in only one model and Test Score was not significant in either model. The Consistent students had more characteristics with significance than the discrepant groups. However since so few variables were found to have any significance between the two models, comparison of the influence of the independent variables on Consistent students compared to Test Score Higher students was difficult.

Research Question Five Considered by Bottom 25th Percentile Group

The Logistic Regression 5.2 Series considered research question five by Bottom 25th Percentile Group. Logistic Regression 5.2a was conducted on the 2,505 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Neither Low. Logistic Regressions 5.2b, 5.2c, and 5.2d were conducted on the students with discrepant high school grades and standardized test scores, specifically the 584 High School Low students, 872 Test Score Low students, and 553 Both Low students, respectively.

Logistic Regression 5.2a.

The model for Logistic Regression 5.2a was statistically significant, χ^2 (29, N = 2,505) = 56.130, p = .002, indicating that the model was able to determine which Neither Low students persisted. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 2,505) = 5.230, p = .733. Both Test Score and HS GPA were found to be significant, with the odds ratios indicating that HS GPA was a stronger predictor of persistence. Application Date was found to be significant with the odds ratios of both Regular and Late students indicating they were twice as likely to persist as Early students, assuming all other variables were held constant. The Baptist Religion characteristic was found to be significant, although with little influence as a predictor of persistence.

Logistic Regression 5.2b.

The model for Logistic Regression 5.2b was statistically significant, χ^2 (29, N = 584) = 57.271, p = .001, indicating that the model was able to determine which High School Grades Low students persisted. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 584) = 9.943, p = .269. In-state Residency was found to be significant with the odds ratio indicating that Tennessee students were twice as likely to persist as out-of-state students, assuming all other variables were held constant. The Early Application Date characteristic was found to be significant. In addition, the Non-Christian Religion characteristic was found to be significant, with the odds ratio indicating Non-Christians were more than twice as likely to persist as Christians, assuming all other variables were held constant.

Logistic Regression 5.2c.

The model for Logistic Regression 5.2c was not statistically significant, χ^2 (29, N = 872) = 36.506, p = .159, indicating that the model was not able to determine which Test Score Low students persisted. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 872) = 13.046, p = .110.

Logistic Regression 5.2d.

The model for Logistic Regression 5.2d was statistically significant, χ^2 (29, N = 553) = 47.730, p = .016, indicating that the model was able to determine which Both Low students persisted. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 553) = 6.687, p = .571. HS GPA was significant for this model, with a one point increase in HS GPA indicating a student was more than three times as likely to persist, assuming all other variables were held constant. The Early and Regular Application Date characteristics were also found to be significant, with the odds ratios indicating that Regular students were three times as likely to persist as Early students, assuming all other variables were held constant. The Fall 2007 Cohort Year was found to be significant, with the odds ratio indicating that students in the Fall 2007 cohort were less likely to persist than students in the Fall 2003 Cohort.

Regression coefficients for Logistic Regressions 5.2a, 5.2b, 5.2c and 5.2d are displayed in Tables C4, C5, C6, and C7, respectively, and can be found in Appendix C.

Comparison of models for Logistic Regression Series 5.2.

Only the models predicting persistence for the Neither Low, High School Grades Low, and Both Low students were significant. The Application Date variable was significant for all three of these models. HS GPA did appear to influence the likelihood of persistence for the

Neither Low and Both Low groups, while Test Score was found to be a predictor only for the Neither Low group. However, since the vast majority of the variables did not show significance, comparing the Neither Low group with the High School Grades Low and Both Low groups was difficult.

Research Question Six

Research question six asked what additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores. Three logistic regressions were conducted on the students in each of the three Standard Deviation Groups in Cohorts 2003 to 2005 to determine how well all of the independent variables considered predict the dependent variable Graduation. Then, four logistic regressions were conducted on the students in each of the four Bottom 25th Percentile Groups in Cohorts 2003 to 2005 to determine how well all of the independent variables considered predict the dependent variable Graduation. The tables reporting the regression coefficients for the logistic regressions used to answer research question six are very large and few of the independent variables were found to have any significance. Therefore, for the ease of the reader, the tables for this section can be found in Appendix C.

Research Question Six Considered by Standard Deviation Group

The Logistic Regression 6.1 Series considered research question six by Standard Deviation Group. Logistic Regression 6.1a was conducted on the 1,332 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Consistent. Logistic Regressions 6.1b and 6.1c were conducted on the students with discrepant

high school grades and standardized test scores, specifically the 359 High School Grades Higher students and 373 Test Score Higher students.

Logistic Regression 6.1a.

The model for Logistic Regression 6.1a was statistically significant, χ^2 (26, N = 1,332) = 128.727, p < .001, indicating that the model was able to determine which Consistent students graduated. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 1,332) = 9.460, p = .305. Test Score was found to have significance but to have little influence as a predictor of graduation. The Early and Regular Application Date characteristics were found to have significance, with the odds ratios indicating that Regular students were twice as likely to graduate as Early students, assuming all other variables were held constant.

Logistic Regression 6.1b.

The model for Logistic Regression 6.1b was statistically significant, χ^2 (26, N = 359) = 45.376, p = .011, indicating that the model was able to determine which High School Grades Higher students graduated. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 359) = 9.340, p = .314. The Christian and Unknown Religion characteristics were found to have significance, with the odds ratio indicating that Unknown Religion students were less likely to graduate than Christians. In addition, the Humanities Intended Major characteristic was found to have significance, with students who majored in Humanities less likely to graduate than Undeclared students.

Logistic Regression 6.1c.

The model for Logistic Regression 6.1c was statistically significant, χ^2 (26, N = 373) = 68.188, p < .001, indicating that the model was able to determine which Test Score Higher

students graduated. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 373) = 9.090, p = .335. HS GPA was found to be significant and a strong predictor, with a one point increase in HS GPA indicating a student was nine times more likely to graduate, assuming all other variables were held constant. The Early Application date characteristic was found to be significant. The Christian, Baptist, and Unknown Religion characteristics were also found to be significant. The odds ratios indicated that Baptist students were twice as likely as Christian students to graduate and that Unknown Students were nearly three times as likely as Christians to graduate, assuming all other variables were held constant.

Regression coefficients for Logistic Regressions 6.1a, 6.1b, and 6.1c are displayed in Tables C8, C9, and C10, respectively, and can be found in Appendix C.

Comparison of models for Logistic Regression Series 6.1.

All three models predicting graduation for the Standard Deviation Groups were found to be significant. Test Score and HS GPA were both found to be significant in one model each, but not in the same model. Religion influenced graduation in some cases. Application Date also influenced graduation, especially for the Early students. However, so few variables were found to have significance among the three models that comparing the influence of the independent variables on graduation for Consistent students to High School Grades Higher and Test Score Higher students was difficult.

Research Question Six Considered by Bottom 25th Percentile Group

The Logistic Regression 6.2 Series considered research question six by Bottom 25th Percentile Group. Logistic Regression 6.2a was conducted on the 1,140 students with nondiscrepant high school grades and standardized test scores, in this case categorized as Neither Low. Logistic Regressions 6.2b, 6.2c, and 6.2d were conducted on the students with discrepant

high school grades and standardized test scores, specifically the 258 High School Low students, 409 Test Score Low students, and 257 Both Low students, respectively.

Logistic Regression 6.2a.

The model for Logistic Regression 6.2a was statistically significant, χ^2 (26, N = 1,140) = 55.476, p = .001, indicating that the model was able to determine which Neither Low students graduated. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 1,140) = 2.492, p = .962. Test Score and HS GPA were both found to have significance in this model, with HS GPA having a stronger influence than Test Score on a student's likelihood to graduate. The Early Application Date characteristic was found to have significance. In addition, the Baptist Religion characteristic was found to have significance, although not much influence as a predictor of graduation for Neither Low students.

Logistic Regression 6.2b.

The model for Logistic Regression 6.2b was statistically significant, χ^2 (26, N = 258) = 46.917, p = .007, indicating that the model was able to determine which High School Grades Low students graduated. The Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 258) = 12.210, p = .142. HS GPA was found to be significant, with a one point increase in HS GPA resulting in a student being five times more likely to graduate, assuming all other variables were held constant. The Early Application Date characteristic was found to be significant. The Baptist Religion characteristic was found to have significance, with Baptist students twice as likely to graduate as Christians, assuming all other variables were held constant.

Logistic Regression 6.2c.

The model for Logistic Regression 6.2c was not statistically significant, χ^2 (26, N = 409) = 31.387, p = .214, indicating that the model was not able to determine which Test Score Low students graduated. However, the Hosmer and Lemeshow Goodness of Fit Test showed the model was a good fit with a χ^2 (8, N = 409) = 5.969, p = .651.

Logistic Regression 6.2d.

The model for Logistic Regression 6.2d was not statistically significant, χ^2 (26, N = 257) = 24.970, p = .521, indicating that the model was not able to determine which Both Low students graduated. In addition, the Hosmer and Lemeshow Goodness of Fit Test showed the model was not a good fit with a χ^2 (0, N = 257) = 16.366, p = .037.

Regression coefficients for Logistic Regressions 6.2a, 6.2b, 6.2c, and 6.2d are presented in Tables C11, C12, C13, and C14, respectively, and can be found in Appendix C.

Comparison of models for Logistic Regression Series 6.2.

Only the models predicting graduation for Neither Low and High School Grades Low students in the Bottom 25th Percentile Groups were found to be significant. HS GPA was found to be a strong predictor of graduation in both models. In addition, being Baptist and having an Early Application Date had a significant influence on graduation in both models. However, since most of the independent variables were not found to be significant, comparing the influence of these variables on graduation for the Neither Low students to the High School Grades High students was difficult.

Conclusion

This chapter presented the results of the study conducted to determine the likelihood of persistence for students with discrepant high school grades and standardized test scores

compared to students with nondiscrepant high school grades and standardized test scores using the first-time full-time freshman cohorts from the years 2003 to 2008 at Belmont University. Descriptive statistics for all variables considered were presented. The methods used to categorize the students into discrepant groups were explained. Tests of proportion demonstrated that significant differences existed between the persistence and graduation rates for students in discrepant groups compared to students in nondiscrepant groups. Results from logistic regressions found HS GPA to consistently contribute significantly to the model to predict both persistence and graduation for students, regardless of discrepant group. In addition, the Application Date variable appeared to have a significant influence as a predictor of both persistence and graduation. Chapter 5 interprets and discusses the findings presented in this chapter, and offers recommendations for further research.

CHAPTER 5

DISCUSSION OF FINDINGS AND RECOMMENDATIONS

The purpose of this study was to examine the likelihood of persistence of students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores. The sample for this study was comprised of the first-time full-time freshman cohorts for the years 2003 to 2008 at Belmont University. This study employed quantitative research methods to examine the relationship between two primary student inputs, high school grades and standardized test scores, and two student outcomes, persistence to the sophomore year and four-year graduation. The focus on the input-outcome relationship in this study was based upon Astin's (1970a, 1993) I-E-O model, a framework for studying the relationship of student inputs (I), the college environment (E), and student outcomes (O), which was the conceptual framework used in this study. This study focused exclusively on inputs and outcomes because Astin's research found that differences in the student outcomes of persistence and graduation rates could be attributed to student inputs more so than to the institutional environment (Astin, 1997; Astin & Oseguera, 2005).

Specifically, this study addressed the following six research questions.

1. Do significant differences exist in the rate of persistence to the sophomore year for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?

2. Do significant differences exist in the rate of four-year graduation for students with discrepant high school grades and standardized test scores compared to students with nondiscrepant high school grades and standardized test scores?
3. What influence do high school grades and standardized test scores have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
4. What influence do high school grades and standardized test scores have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
5. What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of persistence to the sophomore year for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?
6. What additional influence, if any, do gender, race, application date, religion, residency, intended major, and cohort year have on the likelihood of four-year graduation for students with discrepant high school grades and standardized test scores as compared to students with nondiscrepant high school grades and standardized test scores?

This study categorized students as being discrepant by two different methods to enable the researcher to consider the above research questions through two different lenses. The first method classified students into Standard Deviation Groups based upon whether the student's high school gpa and test score were discrepant with each other; these three groups were called

Consistent, High School Grades Higher, and Test Score Higher. The second method classified students into Bottom 25th Percentile Groups based upon whether one, both, or neither of the student's high school gpa or test score were discrepant with the mean high school gpa or mean test score for their cohort; these four groups were labeled High School Grades Low, Test Score Low, Both Low, and Neither Low. This chapter will summarize the results of this study and discuss the significant findings. Implications for practice and recommendations for further research are presented, along with the limitations of this study.

Summary of Results

This study examined the likelihood of persistence and graduation for discrepant and nondiscrepant students. The finding of significant differences in the persistence and graduation rates of discrepant students compared to nondiscrepant students was followed by the investigation of the influence of the independent variables as inputs on the outcomes of persistence and graduation. The results of each of the six research questions are presented with respect to the Standard Deviation Groups and Bottom 25th Percentile Groups.

Research Question One

Research question one asked whether significant differences existed in the rates of persistence to the sophomore year for discrepant students compared to nondiscrepant students.

Research Question One by Standard Deviation Group

Test Score Higher students persisted at a rate that was both lower than, and significantly different from, Consistent students. This finding was consistent with the literature, since Test Score Higher students have lower high school grades, a characteristic which indicates they would be less likely to persist (Hoffman & Lowitzki, 2005). While High School Grades Higher

students persisted at a slightly lower rate than the Consistent students, the difference in the persistence rates between these two groups was not statistically significant.

Research Question One by Bottom 25th Percentile Group

All three of the discrepant Bottom 25th Percentile Groups had lower and significantly different rates of persistence than the Neither Low group. Since the discrepant students had lower academic profiles than the nondiscrepant students, this finding was consistent with the literature that states that students with lower high school grades and lower standardized test scores are less likely to persist than students with higher high school grades and higher standardized test scores (Astin & Oseguera, 2005). This study also found that the persistence rate for Test Score Low students was higher than, and statistically different from, the persistence rates for High School Grades Low and Both Low students.

Research Question Two

Research question two asked whether significant differences existed in the rates of four-year graduation for discrepant students compared to nondiscrepant students. The results for research question two corresponded to the results found in research question one.

Research Question Two by Standard Deviation Group

Test Score Higher students graduated at a rate that was both lower than, and significantly different from, Consistent students. High School Grades Higher students graduated at a rate that was slightly lower than, but not significantly different from, Consistent students.

Research Question Two by Bottom 25th Percentile Group

Students in all three of the discrepant Bottom 25th Percentile Groups graduated at a rate that was lower than, and statistically different from, the Neither Low students. In addition, Test

Score Low students graduated at a rate that was higher than, and statistically different from, High School Grades Low and Both Low students.

Research Question Three

Research question three considered the influence of high school grades and standardized test scores on the likelihood of persistence to the sophomore year for discrepant students compared to nondiscrepant students.

Research Question Three by Standard Deviation Group

High school grades were found to significantly predict persistence for both discrepant and nondiscrepant students. However, standardized test scores were not found to predict persistence for either the discrepant or nondiscrepant students.

Research Question Three by Bottom 25th Percentile Group

High school grades were found to predict persistence for nondiscrepant students and Both Low students. Standardized test scores were found to be predictors of persistence for nondiscrepant students, however they were not as strong of a predictor as high school grades.

Research Question Four

Research question four considered the influence of high school grades and standardized test scores on the likelihood of four-year graduation for discrepant students compared to nondiscrepant students.

Research Question Four by Standard Deviation Group

High school grades predicted graduation for nondiscrepant and discrepant students, with a very significant influence on the likelihood of graduation for Test Score Higher students. Standardized test scores were significant for nondiscrepant students, but were not as strong of a predictor of graduation as high school grades.

Research Question Four by Bottom 25th Percentile Group

High school grades were predictors of graduation for nondiscrepant students and had a very significant influence on graduation for High School Grades Low students. Standardized test scores were only found to be significant for nondiscrepant students, with little influence on graduation.

Research Question Five

Research question five considered the additional influences of gender, race, application date, religion, residency, intended major, and cohort year on the likelihood of persistence to the sophomore year for discrepant students compared to nondiscrepant students. Little significance, if any, was found with regard to most of the variables, with the exceptions noted below.

Research Question Five by Standard Deviation Group

High school grades were significant only for the nondiscrepant students and standardized test scores were not significant for any students. Mixed results with regard to the influence of religion were found. Application date was found to have a significant influence on persistence for discrepant and nondiscrepant students.

Research Question Five by Bottom 25th Percentile Group

High school grades and standardized test scores both predicted persistence, with high school grades found to be a stronger predictor than standardized test scores. Mixed results were found with regard to the influence of religion on persistence. Again, application date significantly influenced the likelihood of persistence for both discrepant and nondiscrepant students.

Research Question Six

Research question six considered the additional influences of gender, race, application date, religion, residency, intended major, and cohort year on the likelihood of four-year graduation for discrepant students compared to nondiscrepant students. As seen in research question five, most of the variables were not found to significantly predict graduation. The exceptions are noted below.

Research Question Six by Standard Deviation Group

High school grades were found to be significant predictors of graduation for Test Score Higher students, while standardized test scores predicted graduation for Consistent students. Religion showed some significance as a predictor of graduation, as did application date, especially for Early students.

Research Question Six by Bottom 25th Percentile Group

High school grades were found to be a strong predictor of graduation for nondiscrepant students and High School Grades Low students. Being Baptist and having an Early application date were shown to significantly influence graduation.

Discussion of Findings

Several main themes emerged from the results of this study and are discussed here.

Discrepant Students are Less Likely to Persist than Nondiscrepant Students

Students with discrepant high school grades and standardized test scores were found to be less likely to persist and less likely to graduate than students with nondiscrepant high school grades and standardized test scores. However, should the same methodology used in this study be applied to an institution with a different academic profile, the differences in persistence and graduation rates may not necessarily be statistically significant. For example, an institution with

an average high school gpa and average test score that are higher than Belmont's would be expected to have a higher retention rate than Belmont's, since high school grades and standardized test scores have been found to predict institutional retention rates (Burton & Ramist, 2001). Consider a highly selective institution that only admits students with the highest high school grades and standardized test scores. Students with very high standardized test scores and high school grades are very likely to persist in college (Astin & Oseguera, 2005). The academic profile of the institution determines the academic profile of students in its Bottom 25th Percentile Groups. Therefore, one might not expect to find significant differences in the persistence and graduation rates for discrepant Bottom 25th Percentile Group students compared to nondiscrepant students at this institution. Thus, the results of this study with regard to the Bottom 25th Percentile Group students should take into consideration Belmont's academic profile.

High School Grades are a Stronger Predictor of Persistence than Standardized Test Scores

Several findings of this study reiterated that high school grades were a stronger predictor of persistence and graduation than standardized test scores for both discrepant and nondiscrepant students. The strength of high school grades over standardized test scores as a predictor both of persistence and graduation has been consistently reported in the literature (Astin & Oseguera, 2005; Camara, 2005; Geiser & Santelices, 2007). First, high school grades were the one variable found most often to have a significant influence on the likelihood of persistence and graduation for both discrepant and nondiscrepant students. In addition, when found significant, high school grades were found to be a stronger predictor of both persistence and graduation.

Differences found in the persistence and graduation rates of discrepant students supported this theme as well. For example, Test Score Low students persisted and graduated at a higher

and significantly different rate than High School Grades Low and Both Low students. This finding suggests that the high school grades of Test Score Low students appeared to be more influential than their standardized test scores in their likelihood of persistence and graduation. Similarly, no significant difference existed between the persistence and graduation rates of High School Grades High students compared to Consistent students. This finding suggests that the higher high school grades of the High School Grades Higher students offset their lower standardized test scores, which reinforces the strength of high school grades as a predictor of student persistence.

Standardized test scores were found to be a predictor of persistence and graduation for some nondiscrepant students in this study, but they were not found to be a significant predictor for any discrepant students. This finding is inconsistent with the literature, as research has found that incorporating standardized tests in admissions decisions helps contribute to the prediction of persistence (Zwick, 2007). This is also an interesting finding because standardized tests were created to compare applicants from different high school backgrounds. Belmont draws applicants from hundreds of high schools across the country, so its admissions counselors are not always familiar with the academic rigor of an applicant's high school. Thus, despite the diversity of academic rigor that exists among high schools in this sample, high school grades were still found to be a stronger predictor of persistence than standardized test scores. This is an example of how the predictive validity of admissions variables may vary by institution (Murtaugh et al., 1999). The National Association for College Admission Counseling (2008) has encouraged institution-specific validity research with regard to standardized tests to determine the extent to which standardized test scores are predictive for students at a particular institution.

The results of such research, like the results of this study, can be used to make more informed admissions decisions.

Lack of Influence of Additional Independent Variables

The inclusion of the additional independent variables of gender, race, application date, religion, residency, intended major, and cohort year resulted in very little significant findings. Gender was not found to be significant and race only appeared significant for one group of students in one model. These findings were surprising considering the vast amounts of research related to the influence of gender and race on standardized test scores (Hoffman & Lowitzki, 2005; Linn, 1990). The researcher also expected to find some significant differences with regard to the student's intended major, based upon her knowledge of the institution, and was surprised to find very little. Overall, only two of the additional independent variables, application date and religion, were found to have a statistically significant impact on both persistence and graduation in enough models that they warranted discussion, and neither of these variables are currently used in making admissions decisions at Belmont.

Further Investigation Needed Regarding the Influence of Application Date

The descriptive statistics demonstrated that differences existed in the persistence and graduation rates for students based upon whether their application date was categorized as Early, Regular, or Late. Students who submitted an application earlier in the admissions cycle persisted and graduated at higher rates than those who submitted an application later in the admissions cycle. The results of the regression analyses showed that the application date variable was a significant predictor of persistence and graduation in several cases. The finding that application date was a significant and influential predictor of both persistence and graduation rates for both discrepant and nondiscrepant students was consistent with the literature (Miller & Herreid,

2008). However, the odds ratios showed that Regular and Late students were, in some cases, two to three times more likely to persist or graduate than Early students, assuming all other variables remained constant. This finding ran counter to the descriptive statistics for application date. The categorization of the student's application date into three possible options may have had an influence on the results. More investigation into this discrepancy is warranted.

Implications for Practice

Managing institutional enrollment in today's competitive higher education marketplace can be challenging. Significant pressures exist to admit students that are likely to be successful, specifically those who will persist from matriculation to graduation (Casteen, 1998). Admissions officers are looking for combinations of input characteristics that suggest whether or not a student is likely to persist (Willingham et al., 1990). This study offers several such recommendations for the practice of college admissions with regard to making admissions decisions for discrepant and nondiscrepant students. In addition, this study has implications beyond the practice of admissions for currently enrolled and future students.

First, the finding that discrepant students persist and graduate at rates that are lower than nondiscrepant students suggests that admissions officers may want to consider whether an applicant is discrepant in the admissions process. In a selective admissions setting, an institution may choose not to admit a discrepant student in order to ensure that the students they do admit are only those most likely to be retained from matriculation to graduation. Since recruiting a new student is more costly than retaining a student, an institution may not wish to take a risk on admitting a student who may need to be replaced sooner rather than later if the institution is trying to maintain its enrollment (Camara, 2005).

Second, the finding of lower persistence and graduation rates for students in the discrepant groups should be taken in context with other factors, such as high school grades and standardized test scores, when making admissions decisions. For example, consider the finding that Test Score Higher students had lower persistence and graduation rates than Consistent and High School Grades Higher students. When an institution desires to increase its prestige through national rankings such as those of *U.S. News & World Report*, this knowledge regarding Test Score Higher students presents an institutional dilemma. Students who are less likely to persist may have a negative impact on the institution's retention and graduation rates, both of which are factors used in rankings. However, students with high standardized test scores may positively affect the institution's rankings, since standardized test scores are another factor used in the rankings. An institution must weigh the risk of admitting a student whose standardized test score may positively impact the rankings in the following year against the risk that the student may not persist, which would negatively impact the rankings in a future year. The methodology used to categorize students into the Standard Deviation Groups is relative to a particular cohort of students. For example, the high school grades of a Test Score Higher student may be high enough to indicate the student is likely to persist. However, the low test score of a High School Grades Higher student may place the student in the Test Score Low Bottom 25th Percentile Group, which, according to this study, indicates the student may be less likely to persist. Some institutions rely heavily on the tuition revenue generated by student enrollment for survival. These institutions must balance their desire for the prestige associated with rankings with their need for tuition revenue. Thus, categorization of a student into a particular discrepant group should be considered in conjunction with other factors when considering the student's likelihood of persistence.

Third, the finding that high school grades are a stronger predictor than standardized test scores of persistence and graduation for both discrepant and nondiscrepant students emphasizes the research findings that suggest admissions officers should give more weight to a student's high school grades than to standardized test scores when making an admissions decision (Geiser & Santelices, 2007). High school grades reflect both the cognitive and noncognitive factors that contribute to a student persisting in college (Noble & Sawyer, 2002a). Students who have done well academically in high school are likely to continue to do well in college, a factor which is necessary for them to persist (Amenkhienan & Kogan, 2004).

Fourth, that standardized test scores were not found to be significant predictors of persistence for any of the discrepant groups in this study should remind institutions of the need to conduct their own validity studies to determine the extent to which standardized test scores predict persistence for their students (National Association for College Admission Counseling, 2008). Research has demonstrated that models to predict persistence and graduation should be institution-specific (Gillespie & Noble, 1992). Thus, this study is an example of a way in which such research can be conducted.

Lastly, the findings of this study have implications beyond admissions, namely for institutional retention efforts. In some cases, an institution may admit and enroll discrepant students, despite their increased risk for attrition. The opportunity exists to reach out to these students for possible intervention. The knowledge that a student has discrepant high school grades and standardized test scores can signal a student as one who may benefit from institutional retention efforts, especially when combined with other factors indicating a student may be less likely to persist.

Recommendations for Further Research

Based upon the findings of this study, recommendations for further research are presented, including suggestions for future studies and other variables that could be considered.

Future Studies

The finding of significant differences in the persistence and graduation rates of discrepant students compared to nondiscrepant students suggests the need for further predictive validity research. Belmont could use this study as an impetus to engage in ongoing institutional research related to the research questions considered in this study. First, the regression coefficients in the models identified in this study could be applied to future cohorts of Belmont students to test their validity. Second, stepwise logistic regression procedures could be used to develop a predictive model to predict persistence and graduation for Belmont applicants. In addition, the model could be applied to currently enrolled students to identify students at risk for attrition. Third, this research could continue annually to capture the graduation rates of Cohorts 2006 to 2008, as well as the persistence and graduation rates of future Belmont cohorts, to see whether or not the results would differ. The longitudinal nature of such institutional research would provide Belmont's admissions officers with extensive information from which they can make more informed admissions decisions.

Further analyses could be conducted with regard to the categorization of students into a specific discrepant group. This study conducted separate logistic regressions for each discrepant group because the research questions considered the influence of the independent variables on students in a particular discrepant group. A future study could incorporate the student's discrepant group, for example whether the student was Consistent or High School Grades Higher, as an independent variable in a regression analysis for all students. The results of such a

study would provide insight into the influence being categorized into a particular discrepant group had on persistence and graduation. In addition, an independent variable representing combinations of the two categorizations could be considered, for example students in both the Test Score Higher and High School Grades Low groups, in order to determine whether students in a particular combination of discrepant groups are less likely to persist.

The categorization of students by Standard Deviation Group and Bottom 25th Percentile Group provided different perspectives. However, future studies should take into consideration the limitations of each categorization. A Consistent student could have very high grades in high school and very high standardized test scores, which would suggest the student is more likely to persist. Yet, a Consistent student could also have lower high school grades and lower standardized test scores, in which case the student may overlap with the Both Low group and be less likely to persist. One quarter of the students will always be in the bottom 25th percentile of their cohort, regardless of the institution's academic profile. Thus, the Bottom 25th Percentile Groups could be more or less helpful in identifying which students are likely to persist, depending upon the institution's academic profile. In this study, the biggest differences between persistence and graduation rates existed within the Bottom 25th Percentile Groups. However, the Standard Deviation Groups may be more useful in admissions decisions based upon the expectation of admissions officers that a student's high school grades correlate with their standardized test scores.

Beyond Belmont, this study could be conducted at other institutions to see whether similar results could be replicated. The results of other institutions may differ based upon the academic profile of the institution. In addition, similar research could be conducted with a

consortium of institutions that attract a significant number of the same applicants, with institution included as a variable.

The finding that high school grades were a stronger predictor of persistence than standardized test scores suggests the need for further research on the influence of gender and race on high school grades. Since standardized tests were not as influential in predicting persistence for students in this study, the influence of gender and race is likely being captured in the student's high school grades. If standardized test scores are not as predictive for some students as they are for others, then admissions officers may need to consider how gender and race both affect a student's high school grades, especially if that institution is going to give significant weight to high school grades in admissions decisions.

Other Variables to Consider

This study considered nine independent variables as student inputs and two dependent variables as student outcomes, compared to the several hundred variables that Astin's (1993) research considered. However, future studies could include a number of other variables, such as those that follow.

Input Variables to Consider

Other precollege characteristics commonly used in admissions decisions, such as class rank and strength of curriculum, could be incorporated in a future study. While the composite standardized test score was used in this study, a future study could include subscores from the ACT or SAT as independent variables. In addition, students could be categorized by having discrepant subscores, for example high math and low critical reading subscores on the SAT, to determine whether this discrepancy affects their likelihood of persistence and graduation.

In addition, since research has suggested that a correlation exists between socioeconomic status (SES) and standardized test scores, one could identify an appropriate proxy variable for SES. The student's home zip code is one possibility, as zip codes have been demonstrated to be related to SES (Geronimus, Bound, & Neidert, 1996). The Expected Family Contribution (EFC), as determined by the Free Application for Federal Student Aid, is another possibility. However, EFC as a proxy for SES has limited use, since most admissions officers would not have access to the student's EFC when making an admissions decision and since most colleges make admissions decisions without regard to a student's financial need.

The categorical variable application date used in this study was based upon the date that the student submitted the application. A future study could consider a continuous variable representing the length of time that the student took to complete the application process. For example, one student may have submitted all necessary application documents within five days while another took three months. Whether the number of days a student takes to complete their application influences their likelihood of persistence is a question for another study.

Environmental Variables to Consider

This study focused exclusively on student input and outcome variables, thus excluding the influence of the college environment in Astin's (1993) I-E-O model. Further research could consider institutional characteristics, such as institutional type, control, and size, to determine what influence they have on the likelihood of persistence and graduation of students with discrepant high school grades and standardized test scores. Working off campus has been shown to be the environmental factor with the most significant negative effect on retention, while campus involvement has a positive effect on retention (Astin, 1993). Institutional research has demonstrated that smoking cigarettes and drinking beer in college have been negatively

associated with student persistence at Belmont (Ikenberry, 2009b). The results of a study considering these environmental variables would not necessarily be helpful for admissions officers, as an applicant will not have yet been exposed to the institutional environment. However, the findings could be used to monitor the progress of enrolled students in particular discrepant groups, since this study has found discrepant students to be at risk for attrition.

A study using qualitative methods, such as interviews or focus groups of currently or previously enrolled students, could provide more insight as to the reasons students with discrepant high school grades and standardized test scores either persisted or did not persist in college, enriching the quantitative data found in this study. Some students may be unaware of how their high school grades and standardized test scores compare to those of the students in their cohort. Thus, the researcher could inform the student of their categorization into a particular discrepant group and ask whether the student felt that this categorization had any impact on their likelihood to persist.

Outcome Variables to Consider

This study considered the outcomes of persistence to the sophomore year and four-year graduation. Many admissions validity studies have considered freshman year gpa or cumulative gpa at graduation as outcome variables, both of which could be dependent variables in a future study. In addition, further research showing the college gpa at the time of departure for discrepant students who did not persist might provide insight into whether their departure was possibly related to academic difficulty.

Limitations

The site selected and variables considered resulted in limitations that should be taken into consideration when interpreting the findings of this study. The choice of Belmont as the site

institution may have affected the results of this study for three reasons. First, the vast majority (90%) of students in this study were white. The extensive research demonstrating connections between race and standardized test scores would suggest that a student sample with greater racial diversity than Belmont's might expect more variance with regard to standardized test scores, a factor which may affect the influence of standardized test scores as a predictor of persistence (Bowen & Bok, 1998). Second, the average high school gpa and average test score for the students in this study are above the respective national averages for entering college freshman (Pryor, Hurtado, Saenz, Santos, & Korn, 2007). Therefore, the results of this study may have limited applicability to institutions with similar academic profiles. Finally, during the time period in which the students included in this study enrolled, Belmont experienced significant increases in the size of its freshman class, average high school gpa, average test score, retention rates, and graduation rates. These increases may have impacted the results of this study, as changes in successive cohorts can affect the results of predictive validity research (Harmston, 2004).

Lastly, this study focused on the relationship between student inputs and student outcomes, rather than the influence of institutional environmental characteristics, which Astin (1993) also found to have an impact on student outcomes. The increased exposure of students over time to environmental characteristics is more likely to affect the outcome of graduation than persistence (Camara & Echternacht, 2000). Nevertheless, this study did not incorporate any institutional characteristics which may have contributed to the likelihood of persistence and graduation for discrepant and nondiscrepant students alike.

Conclusion

This study contributed to the admissions predictive validity literature by demonstrating that students with discrepant high school grades and standardized test scores have rates of persistence to the sophomore year and four-year graduation that are lower than, and significantly different from, those for students with nondiscrepant high school grades and standardized test scores. This finding suggests admissions officers should incorporate whether or not a student has discrepant high school grades and standardized test scores with other factors when making admission decisions, a finding that supports Astin's (1993) theory that the combination of student input characteristics directly influences the student outcome. High school grades were found to be a stronger predictor than standardized test scores of both persistence to the sophomore year and four-year graduation, a finding which was also consistent with the literature (Astin & Oseguera, 2005). This finding was true for both students with discrepant high school grades and standardized test scores and nondiscrepant high school grades and standardized test scores. These findings have direct implications for enrollment managers in their admission and retention efforts. Improvement in the ability of admissions officers to identify in the admissions process those students most likely to persist can ensure the institution is taking advantage of the earliest opportunity to affect its retention and graduation rates. Knowledge that discrepant students are less likely to persist can help institutions further target retention efforts on enrolled students least likely to persist. Implementation of these research findings into the practice of enrollment management will help the institution maintain its enrollment of students from matriculation to graduation.

REFERENCES

ACT. (2007). *The ACT technical manual*. Iowa City: ACT, Inc.

Adelman, C. (2004). *Principal indicators of student academic histories in postsecondary education, 1972-2000*. Washington, D.C.: Institute of Education Sciences: U.S. Department of Education.

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, D.C.: U.S. Department of Education.

Amenkhienan, C. A., & Kogan, L. R. (2004). Engineering students' perceptions of academic activities and support services: Factors that influence their academic performance. *College Student Journal, 38*(4), 523-540.

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington, D. C. : American Educational Research Association.

Astin, A. W. (1962). An empirical characterization of higher education institutions. *Journal of Educational Psychology, 53*(5), 224-235.

Astin, A. W. (1964a). Personal and environmental factors associated with college dropouts among high aptitude students. *Journal of Educational Psychology*, *55*(4), 219-227.

Astin, A. W. (1964b). Some characteristics of student bodies entering higher education institutions. *Journal of Educational Psychology, 55*(5), 267-275.

Astin, A. W. (1965). Effect of different college environments on the vocational choices of high aptitude students. *Journal of Counseling Psychology, 12*(1), 28-34.

Astin, A. W. (1970a). The methodology of research on college impact, Part One. *Sociology of Education, 43*(3), 223-254.

Astin, A. W. (1970b). The methodology of research on college impact, Part Two. *Sociology of Education, 43*(4), 437-450.

Astin, A. W. (1971). *Predicting academic performance in college: Selectivity data for 2300 American colleges*. New York: Collier-Macmillan Limited.

Astin, A. W. (1975). *Preventing students from dropping out*. San Francisco: Jossey-Bass.

Astin, A. W. (1993). *What matters in college?: Four critical years revisited*. San Francisco: Jossey-Bass.

Astin, A. W. (1997). How "good" is your institution's retention rate? *Research in Higher Education, 38*(6), 647-658.

Astin, A. W. (2005). Making sense out of degree completion rates. *Journal of College Student Retention, 7*(1-2), 5.

Astin, A. W., & Oseguera, L. (2002). *Degree attainment rates at American colleges and universities*. Los Angeles: Higher Education Research Institute, UCLA.

Astin, A. W., & Oseguera, L. (2005). *Degree attainment rates at American colleges and universities, Revised Edition*. Los Angeles: Higher Education Research Institute, UCLA.

Atkinson, R., & Geiser, S. (2009). *Reflections on a century of college admissions tests*. Paper presented at the American Educational Research Association.

Barron's (Ed.). (2001). *Barron's profiles of American colleges* (24th ed.). New York.

Baydar, N. (1997). *Students with discrepant high school GPA and SAT scores* (No. RS-1). New York: College Board.

Bean, J. P. (1986). Assessing and reducing attrition. In D. R. Hossler (Ed.), *Managing college enrollments*. San Francisco: Jossey-Bass.

Beatty, A., & Linn, R. L. (1999). *Myths and tradeoffs: The role of tests in undergraduate admissions*. Washington, D. C. : National Academy Press.

Berger, J. B., & Lyon, S. C. (2005). A historical look at retention. In A. Seidman (Ed.), *College student retention: Formula for student success*. Westport, CT: Praeger.

Bowen, W. G., & Bok, D. (1998). *The shape of the river*. Princeton: Princeton University Press.

Bowen, W. G., Chingos, M. M., & McPherson, M. S. (2009). *Crossing the finish line: Completing college at America's public universities*. Princeton: Princeton University Press.

Breland, H., Maxey, J., Gernand, R., Cumming, T., & Trapani, C. (2002). *Trends in college admission 2000: A report of a survey of undergraduate admissions policies, practices, and procedures*: ACT, Inc., Association for Institutional Research, The College Board, Educational Testing Service, and the National Association for College Admission Counseling.

Briggs, D. C. (2009). *Preparation for college admission exams*. Arlington, VA: National Association for College Admission Counseling.

Burton, N. W., & Ramist, L. (2001). *Predicting Success in College: SAT studies on classes graduating since 1980* (No. 2001-2). New York: College Board.

Camara, W. J. (1998). *High school grading policies*. New York.

Camara, W. J. (2005). Broadening criteria of college success and the impact of cognitive predictors. In W. J. Camara & E. W. Kimmel (Eds.), *Choosing students: Higher education admissions tools for the 21st Century* (pp. 53-80). Mahwah, N.J.: L. Erlbaum Associates.

Camara, W. J., & Echternacht, G. (2000). *The SAT-I and high school grades: Utility in predicting success in college*. New York: College Board.

Camara, W. J., & Kimmel, E. W. (Eds.). (2005). *Choosing students: Higher education admissions tools for the 21st Century*. Mahwah, N.J.: L. Erlbaum Associates.

Cambiano, R. L., Denny, G. S., & DeVore, J. B. (2000). College student retention at a Midwestern university. *Journal of College Admission, 166*, 22-29.

Casteen, J. (1998). Perspectives on Admissions. In C. C. Swann & S. E. Henderson (Eds.), *Handbook for the College Admissions Profession*. Washington, DC: American Association of Collegiate Registrars and Admissions Officers.

Clinedinst, M. E. (2008). *State of College Admission*. Alexandria, VA: National Association for College Admission Counseling.

College Board. (2006). Concordance study by ACT and the College Board. Retrieved September 7, 2009, from http://professionals.collegeboard.com/data-reports-research/sat/sat-act

College Board. (2008). *The SAT program handbook, 2008-09*. New York: College Board.

Cooperative Institutional Research Program. (2009). CIRP overview. Retrieved May 21, 2009, from http://www.gseis.ucla.edu/heri/cirpoverview.php

Crouse, J., & Trusheim, D. (1988). *The case against the SAT*. Chicago: The University of Chicago Press.

Dean, A. M., & Camp, W. G. (1998). *Defining and achieving student success: University faculty and student perspectives*. Paper presented at the American Vocational Association Convention. from http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED428180&site=ehost-live

Dey, E. L., & Astin, A. W. (1993). Statistical alternatives for studying college student retention: A comparative analysis of logit, probit, and linear regression. *Research in Higher Education, 34*(5), 569 - 581.

Dolence, M. G. (1998). Strategic enrollment management. In C. C. Swann & S. E. Henderson (Eds.), *Handbook for the college admissions profession* (pp. 71-91). Washington, DC: American Association of College Registrars and Admissions Officers.

Dorans, N. J. (1999). *Correspondences between ACT and SAT I Scores*. New York: College Entrance Examination Board.

Duffy, E. A., & Goldberg, I. (1998). *Crafting a class: College admissions and financial aid, 1955-1994*. Princeton, NJ: Princeton University Press.

Epstein, J. P. (2009). Behind the SAT-optional movement: Context and controversy. *Journal of College Admission, 204*, 8-19.

Fleming, J., & Garcia, N. (1998). Are standardized tests fair to African Americans?: Predictive validity of the SAT in black and white institutions. *The Journal of Higher Education, 69*(5), 471-495.

Gabhart, H. C. (1989). *Work: The soul of good fortune*. Nashville: Broadman Press.

Geiser, S. (2008, August 4-6, 2008). *Back to the basics: In defense of achievement (and achievement tests) in college admissions.* Paper presented at the Center for Enrollment Research, Policy, and Practice: Defining Enrollment in the 21st Century: Understanding Our Students and Our Commitments, University of Southern California.

Geiser, S. (2009). Back to the basics: In defense of achievement (and achievement tests) in college admissions. *Change, 41*(1), 16-23.

Geiser, S., & Santelices, M. V. (2007). *Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes*: University of California - Berkeley.

Geronimus, A. T., Bound, J., & Neidert, L. J. (1996). On the Validity of Using Census Geocode Characteristics to Proxy Individual Socioeconomic Characteristics. *Journal of the American Statistical Association, 91*(434), 529-537.

Gillespie, M., & Noble, J. P. (1992). *Factors affecting student persistence: A longitudinal study*: ACT.

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

Hannah, S. B. (1996). The Higher Education Act of 1992: skills, constraints, and the politics of higher education. *The Journal of Higher Education, 67*, 498-527.

Harmston, M. T. (2004). *Cross-validation of persistence models for incoming freshmen*: AIR Professional File.

Heller, D. E. (1999). The effects of tuition and state financial aid on public college enrollment. *The Review of Higher Education, 23*(1), 65-89.

Henderson, S. E. (1998). A Historical View of an Admissions Dilemma: Seeking Quantity or Quality in the Student Body. In C. C. Swann & S. E. Henderson (Eds.), *Handbook for the College Admissions Profession*. Washington, DC: American Association of College Registrars and Admissions Officers.

Hoffman, J. L., & Lowitzki, K. E. (2005). Predicting college success with high school grades and test scores: Limitations for minority students. *The Review of Higher Education, 28*(4), 455-474.

Horn, L. J., & Carroll, C. D. (1998). *Stopouts or stayouts? Undergraduates who leave college in their first year*. Washington, D.C.: National Center for Educational Statistics.

Hosmer, D. W., Jr., & Lemeshow, S. (1989). *Applied logistic regression*. New York: Wiley & Sons.

Hurtado, A. (2005). Toward a more Equitable society: Moving forward in the struggle for affirmative action. *The Review of Higher Education, 28*(2), 273-284.

Ikenberry, I. (2009a). Belmont University Office of Institutional Research. Retrieved September 7, 2009, from http://www.belmont.edu/instres/

Ikenberry, I. (2009b). *Entering freshmen to graduating seniors: Partnering CIRP entering freshman surveys, graduating senior surveys, and institutional data.* Paper presented at the 5th Symposium on Student Retention, Buffalo, NY.

Ikenberry, I. (2010). Belmont University Office of Institutional Research. Retrieved January 24, 2010, from http://www.belmont.edu/instres/

Johnson, A. L. (2000). The evolution of strategic enrollment management: A historical perspective. *Journal of College Admission*(166), 4 - 11.

Kobrin, J., Camara, W. J., & Milewski, G. B. (2002). *Students with discrepant high school GPA and SAT I scores* (No. RN-15): College Board.

Kobrin, J., Patterson, B. F., Shaw, E. J., Mattern, K. D., & Barbuti, S. M. (2008). *Validity of the SAT for predicting first-year college grade point average* (No. 2008-5). New York: College Board.

Lawrence, I., Rigol, G. W., Van Essen, T., & Jackson, C. A. (2003). *A historical perspective on the content of the SAT* (No. 2003-3). New York: College Board.

Lemann, N. (1999). *The big test: The secret history of the American meritocracy*. New York: Farrar, Straus and Giroux.

Levine, D. O. (1986). *The American college and the culture of aspiration, 1915 -1940*. Ithaca: Cornell University Press.

Levitz, R. S., Noel, L., & Richter, B. J. (1999). Strategic moves for retention success. *New Directions for Higher Education, 108*, 31-49.

Linn, R. L. (1990). Admissions testing: Recommended uses, validity, differential prediction, and coaching. *Applied Measurement in Education, 3*(4), 297-318.

Lomax, R. G. (2007). *An introduction to statistical concepts* (Second ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Mattern, K. D., Patterson, B. F., Shaw, E. J., Kobrin, J. L., & Barbuti, S. M. (2008). *Differential validity and prediction of the SAT* (No. 2008-4). New York: College Board.

Mattern, K. D., Shaw, E. J., & Kobrin, J. L. (2009). *A case for not going test-optional: Students with discrepant SAT and HSGPA performance* Unpublished manuscript.

Mattson, C. E. (2007). Beyond admission: Understanding pre-college variables and the success of at-risk students. *Journal of College Admission, 196*, 9-13.

Meredith, M. (2004). Why do universities compete in the ratings game? An empirical analysis of the effects of the U.S. News and World Report college rankings. *Research in Higher Education, 45*(5), 443-461.

Mertler, C. A., & Vannatta, R. A. (2005). *Advanced and multivariate statistical methods: Practical applications and interpretation* (Third ed.). Glendale, CA: Pyrczak Publishing.

Miller, T. E., & Herreid, C. H. (2008). Analysis of variables to predict frst-year persistence using logistic regression analysis at the University of South Florida. *College & University, 83*(3), 2-11.

Mouw, J. T., & Khanna, R. K. (1993). Prediction of academic success: A review of the literature and some recommendations. *College Student Journal, 27*(3), 328-336.

Murtaugh, P. A., Burns, L. D., & Schuster, J. (1999). Predicting the retention of university students. *Research in Higher Education, 40*(3), 355-371.

National Association for College Admission Counseling. (2008). *Report from the Commission on the Use of Standardized Testing in Undergraduate Admission*.

Nettles, M. T., Thoeny, A. R., & Gosman, E. J. (1986). Comparative and predictive analyses of black and white students' college achievement and experiences. *The Journal of Higher Education, 57*(3), 289-318.

Noble, J. P. (2000). *Effects of differential prediction in college admissions for traditional and nontraditional-aged students* (No. 2000-9): ACT.

Noble, J. P., Roberts, W. L., & Sawyer, R. L. (2006). *Student achievement, behavior, perceptions, and other factors affecting ACT scores* (No. 2006-1): ACT.

Noble, J. P., & Sawyer, R. L. (2002a). *Accuracy of high school grades and college admissions test scores for predicting different levels of academic achievement in college*. Paper presented at the Annual Meeting of the Association for Institutional Research.

Noble, J. P., & Sawyer, R. L. (2002b). *Predicting different levels of academic success in college using high school GPA and ACT composite score* (No. 2002-4): ACT.

Noble, J. P., & Sawyer, R. L. (2004). Is high school GPA better than admission test scores for predicting academic success in college? *College & University, 79*(4), 17-22.

Pampel, F. C. (2000). *Logistic regression: A primer*. Thousand Oaks, CA: Sage Publications.

Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass.

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* San Francisco: Jossey-Bass.

Paulsen, M. B. (2001). Economic Perspectives on Rising College Tuition: A Theoretical and Empirical Exploration. In M. B. Paulsen & J. C. Smart (Eds.), *The Finance of Higher Education: Theory, Research, Policy & Practice* (pp. 193 - 263). New York: Agathon Press.

Peltier, G. L., Laden, R., & Myrna, M. (1999). Student persistence in college: A review of research. *Journal of College Student Retention, 1*(4), 357.

Peng, C.-Y. J., So, T.-S. H., Stage, F. K., & John, E. P. S. (2002). The use and interpretation of logistic regression in higher education journals: 1988-1999. *Research in Higher Education, 43*(3), 259-293.

Penn, G. (1999). *Enrollment management for the 21st Century: Institutional goals, accountability, and fiscal responsibility* (Vol. 26). Washington, D.C.: The George Washington University.

Perfetto, G., Escandon, M., Graff, S., Rigol, G. W., & Schmidt, A. (1999). *Toward a taxonomy of the admissions decision-making process: A public document based upon the first and second College Board Conferences on Admissions Models*. New York: The College Board.

Pike, G., & Saupe, J. L. (2002). Does high school matter? An analysis of three methods of predicting first-year grades. *Research in Higher Education, 43*(2), 187-207.

Pryor, J. H., Hurtado, S., Saenz, V. B., Santos, J. L., & Korn, W. (2007). *The American freshman: Forty year trends*: Cooperative Institutional Research Program, UCLA.

Ramist, L., Lewis, C., & McCamley-Jenkins, L. (1993). *Student group differences in predicting college grades: Sex, language and ethnic groups* (No. 1993-1). New York: College Board.

Sackett, P. R., Borneman, M. J., & Connelly, B. S. (2008). High-stakes testing in higher education and employment: Appraising the evidence for validity and fairness. *American Psychologist, 63*(4), 215-227.

Sackett, P. R., Kuncel, N. R., Arneson, J. J., Cooper, S. R., & Waters, S. D. (2009). Does socioeconomic status explain the relationship between admissions tests and post-secondary academic performance? *Psychological Bulletin, 135*(1), 1-22.

Sawyer, R. L. (1986). Using demographic subgroup and dummy variable equations to predict college freshman grade average. *Journal of Educational Measurement, 23*(2), 131-145.

Sawyer, R. L. (2007). Indicators of usefulness of test scores. *Applied Measurement in Education, 20*(3), 255-271.

Sawyer, R. L., & Maxey, E. J. (1982). *The relationship between college freshman class size and other institutional characteristics and the accuracy of freshman grade predictions*. Iowa City.

Sedlacek, W. E. (2004). *Beyond the big test: Noncognitive assessment in higher education*. San Francisco: Jossey-Bass.

Seidman, A. (2004). Editor's commentary: Defining retention. *Journal of College Student Retention, 6*(2), 129.

Seidman, A. (Ed.). (2005). *College student retention: Formula for student success*. Westport, CT: Praeger.

Snyder, J. A. (2008). *An Exploration of the Effects of Student Characteristics and Engagement Practices on Academic Success for Low-Income College Students.* Bowling Green State University, Bowling Green, OH.

Soares, J. A. (2007). *The power of privilege: Yale and America's elite colleges*. Stanford: Stanford University Press.

Stricker, L. J., Rock, D. A., & Burton, N. W. (1993). Sex differences in predictions of college grades from Scholastic Aptitude Test score. *Journal of Educational Psychology, 85*(4), 710-718.

Stumpf, H., & Stanley, J. C. (2002). Group data on high school grade point averages and scores on academic aptitude tests as predictors of institutional graduation rates. *Educational and Psychological Measurement, 62*(6), 1042-1052.

Synnott, M. G. (1979). *The half-opened door: Discrimination and admissions at Harvard, Yale, and Princeton, 1900-1970*. Westport, CT: Greenwood Press.

The National Center for Fair and Open Testing. (2010). About Fairtest. Retrieved February 14, 2010, from http://www.fairtest.org/about

Thelin, J. R. (2004). *A history of American higher education*. Baltimore: The Johns Hopkins University Press.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125.

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

Truell, A. D., & Woosley, S. (2008). Admission criteria and other variables as predictors of business student graduation. *College Student Journal, 42*(2), 348-356.

U. S. News & World Report. (2009a). Best Colleges 2010. Retrieved January 25, 2010, from http://colleges.usnews.rankingsandreviews.com/college

U. S. News & World Report. (2009b). Undergraduate ranking criteria and weights. Retrieved August 30, 2009, from http://www.usnews.com/articles/education/best-colleges/2009/08/19/methodology-undergraduate-ranking-criteria-and-weights.htm

U.S. Department of Education. (2009). Glossary of Terms. *Integrated Postsecondary Education Data System* Retrieved June 14, 2009, from http://nces.ed.gov/ipeds/glossary/

Wechsler, H. S. (1977). *The qualified student. A history of selective college admission in America*. New York: John Wiley & Sons.

Williford, A. M. (2009). Secondary school course grades and success in college. *College & University, 85*(1), 22-33.

Willingham, W. W. (1974). Predicting success in graduate education. *Science, 183*(4122), 273-278.

Willingham, W. W. (1985). *Success in college: The role of personal qualities and academic ability*. New York: College Entrance Examination Board.

Willingham, W. W., Lewis, C., Morgan, R., & Ramist, L. (1990). *Predicting college grades: An analysis of institutional trends over two decades*. Princeton, N.J.: Educational Testing Service.

Willingham, W. W., Pollack, J. M., & Lewis, C. (2002). Grades and test scores: Accounting for observed differences. *Journal of Educational Measurement, 39*(1), 1-37.

Wilson, K. M. (1983). *A review of research on the prediction of academic performance after the freshman year* (No. 1983-2). New York: College Board.

Wright, R. E., Palmer, J. C., & Miller, J. C. (1996). An examination of gender-based variations in the predictive ability of the SAT. [Feature Article]. *College Student Journal, 30*, 81-84.

Young, J. W. (2001). *Differential validity, differential prediction, and college admission testing: A comprehensive review and analysis* (No. 2001-6). New York: College Board.

Zwick, R. (2002). *Fair game?: The use of standardized admissions tests in higher education*. New York: RoutledgeFalmer.

Zwick, R. (2007). *College admission testing*: National Association for College Admission Counseling.

Zwick, R., & Sklar, J. C. (2005). Predicting college grades and degree completion using high school grades and SAT scores: The role of student ethnicity and first language. *American Educational Research Journal, 42*(3), 439-464.

APPENDIX A

OFFICE *of* THE PROVOST

1900 Belmont Boulevard
Nashville, TN 37212-3757

phone 615-460-6400
fax 615-460-5595

Letter of Approval from Site Institution

Belmont University approves the use of its name and its institutional data in the dissertation by Anne Oser Edmunds entitled "An Examination of the Likelihood of Persistence of Students with Discrepant High School Grades and Standardized Test Scores".

2/22/2010

Dr. Marcia A. McDonald — Date

Provost, Belmont University

www.belmont.edu

APPENDIX B

Concordance between Sum of SAT Critical Reading (CR) and Mathematics (M) Scores and ACT Composite Score

SAT CR+M (Score Range)	ACT Composite Score
1600	36
1540-1590	35
1490-1530	34
1440-1480	33
1400-1430	32
1360-1390	31
1330-1350	30
1290-1320	29
1250-1280	28
1210-1240	27
1170-1200	26
1130-1160	25
1090-1120	24
1050-1080	23
1020-1040	22
980-1010	21
940-970	20
900-930	19
860-890	18
820-850	17
770-810	16
720-760	15
670-710	14
620-660	13
560-610	12
510-550	11

(College Board, 2006)

APPENDIX C

Table C1

Logistic Regression 5.1a: Analysis of Persistence of Consistent Students

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.035	.026	1.735	1	.188	1.035	.983	1.090
HS GPA	.639	.227	7.931	1	.005*	1.895	1.215	2.956
Gender: Male	.067	.104	.413	1	.521	1.069	.872	1.312
Race								
White			7.622	4	.106			
Black	-.206	.284	.524	1	.469	.814	.466	1.421
Hispanic	.736	.467	2.479	1	.115	2.087	.835	5.214
Asian	.206	.481	.183	1	.669	1.228	.479	3.152
Unknown	-.226	.436	.268	1	.605	.798	.340	1.874
Application Date								
Early			21.462	2	.000*			
Regular	1.219	.289	17.736	1	.000*	3.384	1.919	5.968
Late	.942	.293	10.349	1	.001*	2.565	1.445	4.553
Religion								
Christian			11.896	3	.008*			
Baptist	.367	.114	10.426	1	.001*	1.443	1.155	1.803
Non-Christian	.285	.137	4.308	1	.038*	1.330	1.016	1.740
Unknown	.021	.212	.010	1	.922	1.021	.674	1.546
Residency: In-State	.180	.111	2.601	1	.107	1.197	.962	1.489
Intended Major								
Undeclared			7.228	11	.780			
Art	.269	.490	.301	1	.583	1.308	.501	3.417
Business	.338	.589	.330	1	.566	1.403	.442	4.452
Education	.576	.494	1.359	1	.244	1.779	.675	4.686
Humanities	.364	.524	.483	1	.487	1.439	.515	4.017
Music Business	.100	.569	.031	1	.860	1.105	.363	3.369
Music	.170	.467	.133	1	.715	1.186	.475	2.960

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Nursing	.286	.475	.362	1	.547	1.331	.525	3.375
Religion	.219	.508	.186	1	.667	1.245	.460	3.371
Science	.076	.597	.016	1	.898	1.079	.335	3.477
Social Science	.037	.488	.006	1	.940	1.037	.398	2.702
Theatre	.049	.491	.010	1	.920	1.050	.401	2.751
Cohort Year								
Fall 2003			3.247	5	.662			
Fall 2004	-.135	.173	.606	1	.436	.874	.623	1.226
Fall 2005	-.067	.169	.159	1	.690	.935	.671	1.302
Fall 2006	-.108	.165	.428	1	.513	.898	.650	1.240
Fall 2007	-.265	.161	2.721	1	.099	.767	.560	1.051
Fall 2008	-.180	.161	1.250	1	.263	.835	.609	1.145
Constant	-2.993	.750	15.922	1	.000	.050		

* The odds ratio is significant at the .05 level.

Table C2

Logistic Regression 5.1b: Analysis of Persistence of High School Grades Higher Students

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.104	.062	2.839	1	.092	1.110	.983	1.253
HS GPA	-.659	.758	.754	1	.385	.518	.117	2.288
Gender: Male	.227	.222	1.041	1	.308	1.254	.812	1.939
Race								
White			4.655	4	.325			
Black	-1.397	1.051	1.766	1	.184	.247	.032	1.941
Hispanic	-.560	1.141	.241	1	.623	.571	.061	5.342
Asian	-1.455	1.195	1.483	1	.223	.233	.022	2.427
Unknown	-1.506	1.174	1.646	1	.199	.222	.022	2.213
Application Date								
Early			6.538	2	.038*			
Regular	.518	.510	1.029	1	.310	1.678	.617	4.562
Late	.009	.511	.000	1	.986	1.009	.371	2.745

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Religion								
Christian			4.963	3	.175			
Baptist	.021	.242	.008	1	.931	1.021	.636	1.641
Non-Christian	-.290	.253	1.306	1	.253	.749	.455	1.230
Unknown	-.650	.351	3.425	1	.064	.522	.262	1.039
Residency: In-state	-.220	.215	1.045	1	.307	.802	.526	1.224
Intended Major								
Undeclared			11.143	11	.431			
Art	-.015	.719	.000	1	.984	.985	.241	4.035
Business	-.037	.817	.002	1	.964	.964	.194	4.777
Education	-.137	.747	.034	1	.854	.872	.202	3.766
Humanities	-.058	.758	.006	1	.939	.944	.214	4.166
Music Business	1.024	1.261	.660	1	.417	2.785	.235	32.988
Music	-.251	.686	.135	1	.714	.778	.203	2.981
Nursing	.019	.702	.001	1	.979	1.019	.257	4.035
Religion	.984	.850	1.341	1	.247	2.676	.506	14.154
Science	-.065	1.046	.004	1	.951	.937	.121	7.279
Social Science	.037	.731	.003	1	.960	1.038	.247	4.351
Theatre	-.774	.728	1.131	1	.288	.461	.111	1.921
Cohort Year								
Fall 2003			4.549	5	.473			
Fall 2004	.131	.362	.132	1	.717	1.140	.561	2.318
Fall 2005	.153	.348	.193	1	.661	1.165	.589	2.306
Fall 2006	-.270	.311	.752	1	.386	.764	.415	1.405
Fall 2007	-.093	.328	.081	1	.777	.911	.479	1.732
Fall 2008	-.391	.300	1.695	1	.193	.677	.376	1.218
Constant	2.903	2.397	1.468	1	.226	18.237		

* The odds ratio is significant at the .05 level.

Table C3

Logistic Regression 5.1c: Analysis of Persistence of Test Score Higher Students

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.046	.055	.696	1	.404	1.047	.940	1.166
HS GPA	.537	.397	1.827	1	.176	1.710	.785	3.725
Gender: Male	.336	.199	2.859	1	.091	1.400	.948	2.067
Race								
White			5.111	4	.276			
Black	.299	.437	.467	1	.494	1.348	.572	3.175
Hispanic	.841	.919	.837	1	.360	2.318	.383	14.045
Asian	.565	.676	.697	1	.404	1.759	.467	6.623
Unknown	2.390	1.133	4.447	1	.035*	10.918	1.184	100.683
Application Date								
Early			9.751	2	.008*			
Regular	.525	.583	.809	1	.368	1.690	.539	5.298
Late	-.074	.582	.016	1	.898	.928	.297	2.903
Religion								
Christian			6.522	3	.089			
Baptist	.226	.203	1.235	1	.266	1.253	.842	1.865
Non-Christian	.601	.295	4.163	1	.041*	1.824	1.024	3.249
Unknown	.914	.512	3.182	1	.074	2.494	.914	6.807
Residency: In-state	.378	.224	2.849	1	.091	1.459	.941	2.263
Intended Major								
Undeclared			16.936	11	.110			
Art	-.453	.904	.251	1	.616	.636	.108	3.739
Business	.069	1.171	.003	1	.953	1.071	.108	10.642
Education	-.633	.905	.490	1	.484	.531	.090	3.126
Humanities	-1.527	1.142	1.786	1	.181	.217	.023	2.039
Music Business	-1.736	.984	3.114	1	.078	.176	.026	1.212
Music	-.455	.860	.279	1	.597	.635	.118	3.428
Nursing	.156	.891	.031	1	.861	1.169	.204	6.705
Religion	-.625	1.005	.386	1	.534	.535	.075	3.842
Science	-1.009	.986	1.048	1	.306	.365	.053	2.517
Social Science	-.004	.944	.000	1	.997	.996	.157	6.336
Theatre	-.726	.903	.646	1	.421	.484	.083	2.839

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Cohort Year								
Fall 2003			4.879	5	.431			
Fall 2004	.345	.328	1.106	1	.293	1.412	.742	2.685
Fall 2005	.262	.293	.795	1	.373	1.299	.731	2.308
Fall 2006	.145	.286	.257	1	.612	1.156	.661	2.023
Fall 2007	.463	.308	2.253	1	.133	1.588	.868	2.906
Fall 2008	.599	.309	3.760	1	.053	1.821	.994	3.337
Constant	-2.792	1.491	3.508	1	.061	.061		

* The odds ratio is significant at the .05 level.

Table C4

Logistic Regression 5.2a: Analysis of Persistence of Neither Low Students

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.057	.024	5.540	1	.019*	1.059	1.010	1.110
HS GPA	.522	.254	4.230	1	.040*	1.685	1.025	2.771
Gender: Male	.083	.121	.470	1	.493	1.086	.857	1.376
Race								
White			3.166	4	.530			
Black	.039	.332	.014	1	.907	1.040	.542	1.993
Hispanic	1.310	.803	2.661	1	.103	3.707	.768	17.892
Asian	-.006	.532	.000	1	.991	.994	.350	2.820
Unknown	-.084	.465	.033	1	.856	.919	.370	2.286
Application Date								
Early			7.349	2	.025*			
Regular	.932	.360	6.699	1	.010*	2.538	1.254	5.139
Late	.787	.369	4.545	1	.033*	2.198	1.066	4.532
Religion								
Christian			7.206	3	.066			
Baptist	.334	.132	6.423	1	.011*	1.396	1.079	1.808
Non-Christian	.255	.155	2.702	1	.100	1.290	.952	1.747
Unknown	.053	.227	.054	1	.816	1.054	.676	1.645

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Residency: In-state	.150	.130	1.345	1	.246	1.162	.901	1.499
Intended Major								
Undeclared			10.130	11	.519			
Art	-1.221	1.051	1.349	1	.245	.295	.038	2.314
Business	-1.224	1.099	1.240	1	.265	.294	.034	2.535
Education	-1.188	1.052	1.277	1	.258	.305	.039	2.394
Humanities	-.625	1.104	.321	1	.571	.535	.062	4.656
Music Business	-1.200	1.100	1.189	1	.275	.301	.035	2.602
Music	-1.143	1.035	1.220	1	.269	.319	.042	2.425
Nursing	-1.158	1.039	1.242	1	.265	.314	.041	2.406
Religion	-1.201	1.057	1.293	1	.256	.301	.038	2.386
Science	-1.340	1.098	1.491	1	.222	.262	.030	2.251
Social Science	-1.275	1.046	1.485	1	.223	.279	.036	2.172
Theatre	-1.703	1.049	2.638	1	.104	.182	.023	1.422
Cohort Year								
Fall 2003			5.250	5	.386			
Fall 2004	-.131	.207	.398	1	.528	.878	.585	1.317
Fall 2005	.064	.204	.100	1	.752	1.067	.715	1.591
Fall 2006	-.277	.186	2.211	1	.137	.758	.526	1.092
Fall 2007	-.250	.188	1.778	1	.182	.779	.539	1.125
Fall 2008	-.051	.191	.070	1	.791	.951	.654	1.382
Constant	-1.747	1.501	1.354	1	.245	.174		

* The odds ratio is significant at the .05 level.

Table C5

Logistic Regression 5.2b: Analysis of Persistence of High School Grades Low Students

							95% C.I. for Odds Ratio	
Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	Lower	Upper
Test Score	0.047	.052	.803	1	.370	1.048	.946	1.161
HS GPA	0.610	.531	1.319	1	.251	1.841	.650	5.215
Gender: Male	0.303	.221	1.888	1	.169	1.355	.879	2.088
Race								
White			2.672	4	.614			
Black	0.055	.500	.012	1	.912	1.057	.396	2.817
Hispanic	0.686	.951	.521	1	.470	1.987	.308	12.813
Asian	1.189	.912	1.700	1	.192	3.285	.550	19.637
Unknown	20.976	12055.334	.000	1	.999	1287011712.920	.000	.
Application Date								
Early			10.294	2	.006*			
Regular	0.447	.741	.363	1	.547	1.563	.366	6.682
Late	-0.241	.733	.108	1	.742	0.786	.187	3.308
Religion								
Christian			6.632	3	.085			
Baptist	0.400	.225	3.165	1	.075	1.492	.960	2.320
Non-Christian	0.792	.350	5.125	1	.024*	2.208	1.112	4.382
Unknown	0.584	.548	1.138	1	.286	1.794	.613	5.250
Residency: In-state	0.759	.259	8.561	1	.003*	2.137	1.285	3.553
Intended Major								
Undeclared			8.751	11	.645			
Art	-0.384	.959	.161	1	.689	0.681	.104	4.457
Business	0.543	1.493	.132	1	.716	1.721	.092	32.101
Education	-0.162	.994	.027	1	.870	0.850	.121	5.960
Humanities	-1.818	1.306	1.938	1	.164	0.162	.013	2.099
Music Business	-0.752	1.046	.516	1	.472	0.472	.061	3.664
Music	-0.135	.926	.021	1	.884	0.873	.142	5.367
Nursing	0.264	.960	.076	1	.783	1.302	.198	8.551
Religion	0.212	1.120	.036	1	.850	1.236	.137	11.111

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio Lower	Upper
Science	-0.960	1.175	.667	1	.414	0.383	.038	3.832
Social Science	-0.192	.997	.037	1	.848	0.826	.117	5.832
Theatre	-0.459	.972	.223	1	.637	0.632	.094	4.249
Cohort Year								
Fall 2003			3.503	5	.623			
Fall 2004	0.238	.382	.386	1	.534	1.268	.599	2.684
Fall 2005	0.144	.338	.182	1	.670	1.155	.595	2.243
Fall 2006	0.504	.338	2.222	1	.136	1.656	.853	3.212
Fall 2007	0.322	.333	.936	1	.333	1.381	.718	2.653
Fall 2008	0.485	.329	2.181	1	.140	1.624	.853	3.093
Constant	-3.183	2.345	1.843	1	.175	0.041		

* The odds ratio is significant at the .05 level.

Table C6

Logistic Regression 5.2c: Analysis of Persistence of Test Score Low Students

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio Lower	Upper
Test Score	.024	.072	.115	1	.734	1.025	.890	1.179
HS GPA	.164	.414	.157	1	.692	1.178	.523	2.654
Gender: Male	.199	.195	1.035	1	.309	1.220	.832	1.788
Race								
White			2.939	4	.568			
Black	-.808	.639	1.598	1	.206	.446	.127	1.560
Hispanic	-.350	.738	.225	1	.635	.705	.166	2.993
Asian	-.580	.851	.464	1	.496	.560	.106	2.970
Unknown	-.628	.909	.478	1	.489	.534	.090	3.168
Application Date								
Early			6.669	2	.036*			
Regular	.723	.447	2.609	1	.106	2.060	.857	4.950
Late	.305	.447	.464	1	.496	1.356	.564	3.260

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Religion								
Christian			2.916	3	.405			
Baptist	.105	.212	.244	1	.621	1.111	.733	1.684
Non-Christian	-.214	.229	.866	1	.352	.808	.515	1.266
Unknown	-.349	.367	.905	1	.341	.705	.344	1.448
Residency: In-state	-.074	.199	.140	1	.708	.928	.629	1.370
Intended Major								
Undeclared			16.579	11	.121			
Art	.640	.626	1.045	1	.307	1.896	.556	6.464
Business	.850	.798	1.132	1	.287	2.339	.489	11.184
Education	1.345	.692	3.780	1	.052	3.839	.989	14.902
Humanities	.396	.649	.373	1	.541	1.486	.417	5.297
Music Business	-.202	.873	.054	1	.817	.817	.148	4.524
Music	.088	.583	.023	1	.880	1.092	.348	3.428
Nursing	.720	.605	1.418	1	.234	2.055	.628	6.725
Religion	.901	.700	1.659	1	.198	2.463	.625	9.706
Science	-.048	.910	.003	1	.958	.953	.160	5.676
Social Science	.392	.638	.378	1	.539	1.480	.424	5.171
Theatre	.477	.644	.548	1	.459	1.611	.456	5.690
Cohort Year								
Fall 2003			7.776	5	.169			
Fall 2004	.256	.308	.695	1	.404	1.292	.707	2.362
Fall 2005	.119	.284	.177	1	.674	1.127	.646	1.966
Fall 2006	-.263	.277	.904	1	.342	.769	.447	1.322
Fall 2007	.232	.306	.578	1	.447	1.262	.693	2.297
Fall 2008	-.402	.271	2.209	1	.137	.669	.393	1.137
Constant	-.052	2.318	.000	1	.982	.950		

* The odds ratio is significant at the .05 level.

Table C7

Logistic Regression 5.2d: Analysis of Persistence of Both Low Students

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	-.068	.082	.691	1	.406	.934	.795	1.097
HS GPA	1.149	.528	4.733	1	.030*	3.155	1.121	8.884
Gender: Male	-.006	.230	.001	1	.978	.994	.633	1.559
Race								
White			5.616	4	.230			
Black	-.374	.552	.458	1	.499	.688	.233	2.031
Hispanic	1.082	.857	1.596	1	.206	2.951	.551	15.814
Asian	-.707	.821	.742	1	.389	.493	.099	2.466
Unknown	.024	.942	.001	1	.980	1.024	.162	6.486
Application Date								
Early			12.043	2	.002*			
Regular	1.244	.489	6.460	1	.011*	3.469	1.329	9.054
Late	.620	.485	1.634	1	.201	1.859	.719	4.809
Religion								
Christian			2.962	3	.397			
Baptist	.368	.241	2.331	1	.127	1.446	.901	2.320
Non-Christian	.357	.307	1.356	1	.244	1.429	.784	2.607
Unknown	-.050	.495	.010	1	.920	.952	.361	2.512
Residency: In-state	-.197	.228	.740	1	.390	.822	.525	1.286
Intended Major								
Undeclared			4.879	11	.937			
Art	.862	.746	1.337	1	.248	2.369	.549	10.215
Business	.167	.906	.034	1	.854	1.182	.200	6.985
Education	.553	.724	.583	1	.445	1.738	.421	7.182
Humanities	.215	.787	.075	1	.785	1.240	.265	5.805
Music Business	-.254	1.044	.059	1	.807	.775	.100	6.000
Music	.375	.688	.296	1	.586	1.455	.377	5.608
Nursing	.696	.724	.924	1	.336	2.006	.485	8.296
Religion	.476	.943	.255	1	.613	1.610	.254	10.222
Science	.717	1.070	.448	1	.503	2.048	.251	16.689
Social Science	.553	.797	.482	1	.488	1.738	.365	8.280
Theatre	.169	.737	.053	1	.818	1.184	.279	5.020

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Cohort Year								
Fall 2003			7.276	5	.201			
Fall 2004	-.550	.386	2.025	1	.155	.577	.271	1.231
Fall 2005	-.696	.367	3.608	1	.058	.498	.243	1.022
Fall 2006	-.202	.383	.278	1	.598	.817	.386	1.730
Fall 2007	-.805	.364	4.877	1	.027*	.447	.219	.913
Fall 2008	-.665	.365	3.306	1	.069	.514	.251	1.053
Constant	-1.582	2.684	.347	1	.556	.206		

* The odds ratio is significant at the .05 level.

Table C8

Logistic Regression 6.1a: Analysis of Graduation of Consistent Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.118	.031	14.228	1	.000*	1.125	1.058	1.196
HS GPA	.503	.271	3.453	1	.063	1.654	.973	2.812
Gender: Male	-.183	.127	2.060	1	.151	.833	.649	1.069
Race								
White			2.981	4	.561			
Black	-.435	.380	1.311	1	.252	.647	.308	1.363
Hispanic	-.006	.551	.000	1	.992	.994	.338	2.930
Asian	-.513	.601	.730	1	.393	.599	.184	1.943
Unknown	-.006	.642	.000	1	.993	.994	.282	3.500
Application Date								
Early			12.425	2	.002*			
Regular	.695	.352	3.901	1	.048*	2.004	1.005	3.993
Late	.268	.357	.565	1	.452	1.307	.650	2.631
Religion								
Christian			5.651	3	.130			
Baptist	.265	.140	3.608	1	.058	1.304	.992	1.715
Non-Christian	.248	.156	2.504	1	.114	1.281	.943	1.741
Unknown	-.100	.238	.177	1	.674	.905	.568	1.442

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Residency: In-state	.060	.131	.211	1	.646	1.062	.821	1.373
Intended Major								
Undeclared			7.897	11	.722			
Art	.777	.799	.945	1	.331	2.175	.454	10.421
Business	.428	.943	.206	1	.650	1.534	.242	9.745
Education	.510	.792	.414	1	.520	1.665	.353	7.860
Humanities	.753	.826	.831	1	.362	2.123	.421	10.710
Music Business	.535	.878	.371	1	.542	1.707	.305	9.538
Music	.440	.776	.321	1	.571	1.552	.339	7.103
Nursing	.223	.780	.082	1	.775	1.249	.271	5.766
Religion	.188	.811	.054	1	.817	1.207	.246	5.919
Science	.722	.893	.655	1	.418	2.059	.358	11.842
Social Science	.265	.795	.111	1	.739	1.303	.275	6.186
Theatre	.517	.798	.421	1	.517	1.678	.351	8.011
Cohort Year								
Fall 2003			.325	2	.850			
Fall 2004	.071	.145	.238	1	.626	1.073	.808	1.426
Fall 2005	-.006	.139	.002	1	.967	.994	.757	1.305
Constant	-5.269	1.044	25.460	1	.000	.005		

* The odds ratio is significant at the .05 level.

Table C9

Logistic Regression 6.1b: Analysis of Graduation of High School Grades Higher Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.077	.081	.897	1	.344	1.080	.921	1.265
HS GPA	.676	.971	.485	1	.486	1.967	.293	13.188
Gender: Male	.018	.278	.004	1	.948	1.018	.591	1.755
Race								
White			2.619	4	.624			
Black	-.800	1.198	.446	1	.504	.449	.043	4.703
Hispanic	-.656	1.318	.248	1	.619	.519	.039	6.869
Asian	.187	1.491	.016	1	.900	1.205	.065	22.412
Unknown	.176	1.537	.013	1	.909	1.193	.059	24.248
Application Date								
Early			4.001	2	.135			
Regular	.762	.623	1.498	1	.221	2.143	.632	7.267
Late	.301	.629	.230	1	.632	1.352	.394	4.636
Religion								
Christian			14.517	3	.002*			
Baptist	.519	.318	2.662	1	.103	1.680	.901	3.134
Non-Christian	-.192	.289	.444	1	.505	.825	.469	1.453
Unknown	-1.393	.481	8.371	1	.004*	.248	.097	.638
Residency: In-state	.314	.288	1.191	1	.275	1.369	.779	2.407
Intended Major								
Undeclared			11.465	11	.405			
Art	-1.713	1.245	1.895	1	.169	.180	.016	2.067
Business	-.689	1.364	.255	1	.613	.502	.035	7.268
Education	-1.371	1.259	1.186	1	.276	.254	.022	2.994
Humanities	-2.653	1.323	4.024	1	.045*	.070	.005	.941
Music Business	-1.130	1.724	.430	1	.512	.323	.011	9.474
Music	-.987	1.214	.661	1	.416	.373	.035	4.024
Nursing	-.977	1.226	.635	1	.425	.377	.034	4.160
Religion	-1.603	1.315	1.486	1	.223	.201	.015	2.649
Science	-1.456	1.737	.703	1	.402	.233	.008	7.019
Social Science	-1.548	1.238	1.563	1	.211	.213	.019	2.408

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Theatre	-1.127	1.267	.792	1	.374	.324	.027	3.879
Cohort Year								
Fall 2003			.309	2	.857			
Fall 2004	-.156	.296	.277	1	.599	.856	.479	1.530
Fall 2005	-.019	.280	.004	1	.947	.981	.567	1.698
Constant	-2.673	2.907	.845	1	.358	.069		

* The odds ratio is significant at the .05 level.

Table C10

Logistic Regression 6.1c: Analysis of Graduation of Test Score Higher Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	-.105	.075	1.987	1	.159	.900	.777	1.042
HS GPA	2.208	.545	16.428	1	.000*	9.095	3.127	26.451
Gender: Male	-.020	.264	.006	1	.940	.980	.585	1.644
Race								
White			3.191	4	.526			
Black	.183	.699	.068	1	.794	1.201	.305	4.727
Hispanic	1.951	1.247	2.447	1	.118	7.033	.611	81.027
Asian	-.043	1.063	.002	1	.968	.958	.119	7.698
Unknown	.094	1.267	.006	1	.941	1.099	.092	13.164
Application Date								
Early			9.017	2	.011*			
Regular	1.041	.773	1.814	1	.178	2.831	.623	12.874
Late	.268	.779	.118	1	.731	1.307	.284	6.013
Religion								
Christian			10.092	3	.018*			
Baptist	.747	.283	6.981	1	.008*	2.111	1.213	3.676
Non-Christian	.189	.331	.324	1	.569	1.208	.631	2.311
Unknown	1.078	.484	4.966	1	.026*	2.938	1.139	7.580

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Residency: In-state	-.470	.288	2.672	1	.102	.625	.356	1.098
Intended Major								
Undeclared			6.201	11	.860			
Art	-.430	1.572	.075	1	.784	.650	.030	14.175
Business	-.912	1.829	.249	1	.618	.402	.011	14.483
Education	.655	1.511	.188	1	.665	1.925	.100	37.166
Humanities	-.833	1.998	.174	1	.677	.435	.009	21.850
Music Business	.580	1.597	.132	1	.717	1.786	.078	40.872
Music	.230	1.463	.025	1	.875	1.259	.072	22.146
Nursing	.253	1.473	.029	1	.864	1.287	.072	23.080
Religion	-.052	1.608	.001	1	.974	.950	.041	22.192
Science	1.072	1.614	.441	1	.507	2.921	.123	69.129
Social Science	-.250	1.516	.027	1	.869	.779	.040	15.202
Theatre	.327	1.529	.046	1	.831	1.386	.069	27.735
Cohort Year								
Fall 2003			1.654	2	.437			
Fall 2004	.295	.308	.914	1	.339	1.343	.734	2.458
Fall 2005	-.096	.282	.116	1	.734	.909	.523	1.580
Constant	-5.681	2.060	7.605	1	.006	.003		

* The odds ratio is significant at the .05 level.

Table C11

Logistic Regression 6.2a: Analysis of Graduation of Neither Low Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.084	.028	9.400	1	.002*	1.088	1.031	1.148
HS GPA	.732	.290	6.367	1	.012*	2.079	1.178	3.671
Gender: Male	-.150	.140	1.150	1	.284	.861	.654	1.132
Race								
White			2.913	4	.573			
Black	-.122	.441	.077	1	.782	.885	.373	2.101
Hispanic	.329	.758	.189	1	.664	1.390	.314	6.144
Asian	-.847	.704	1.447	1	.229	.429	.108	1.704
Unknown	.252	.653	.148	1	.700	1.286	.358	4.625
Application Date								
Early			8.269	2	.016*			
Regular	.649	.464	1.956	1	.162	1.914	.771	4.751
Late	.250	.471	.282	1	.595	1.284	.510	3.234
Religion								
Christian			6.714	3	.082			
Baptist	.386	.157	6.033	1	.014*	1.472	1.081	2.003
Non-Christian	.154	.166	.868	1	.351	1.167	.843	1.614
Unknown	-.018	.243	.006	1	.941	.982	.610	1.580
Residency: In-state	.058	.148	.156	1	.693	1.060	.794	1.416
Intended Major								
Undeclared			4.286	11	.961			
Art	.374	1.077	.120	1	.729	1.453	.176	12.009
Business	.135	1.141	.014	1	.906	1.144	.122	10.707
Education	.518	1.072	.233	1	.629	1.678	.205	13.721
Humanities	.377	1.114	.115	1	.735	1.459	.164	12.959
Music Business	.626	1.138	.302	1	.582	1.869	.201	17.386
Music	.687	1.050	.428	1	.513	1.987	.254	15.553
Nursing	.466	1.053	.196	1	.658	1.594	.202	12.559
Religion	.728	1.086	.450	1	.502	2.071	.247	17.388
Science	.470	1.129	.173	1	.677	1.600	.175	14.635
Social Science	.639	1.068	.358	1	.550	1.894	.234	15.350

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Theatre	.464	1.078	.185	1	.667	1.590	.192	13.152
Cohort Year								
Fall 2003			.244	2	.885			
Fall 2004	-.035	.158	.048	1	.827	.966	.709	1.316
Fall 2005	-.074	.150	.244	1	.621	.929	.693	1.245
Constant	-5.609	1.619	12.002	1	.001	.004		

* The odds ratio is significant at the .05 level.

Table C12

Logistic Regression 6.2b: Analysis of Graduation of High School Grades Low Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	0.024	0.077	0.094	1	.759	1.024	.880	1.191
HS GPA	1.672	0.804	4.320	1	.038*	5.323	1.100	25.756
Gender: Male	-0.217	0.336	0.416	1	.519	0.805	.416	1.556
Race								
White			8.920	4	.063			
Black	-0.314	1.276	0.061	1	.805	0.730	.060	8.899
Hispanic	2.596	1.647	2.485	1	.115	13.411	.532	338.311
Asian	1.050	1.531	0.470	1	.493	2.857	.142	57.411
Unknown	-18.284	40192.970	0.000	1	1.000	0.000	.000	.
Application Date								
Early			10.654	2	.005*			
Regular	1.561	1.068	2.136	1	.144	4.762	.587	38.621
Late	0.430	1.044	0.170	1	.681	1.537	.199	11.899
Religion								
Christian			4.573	3	.206			
Baptist	0.730	0.355	4.226	1	.040*	2.075	1.035	4.162

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Non-Christian	0.361	0.454	0.633	1	.426	1.435	.590	3.493
Unknown	0.765	0.641	1.424	1	.233	2.148	.612	7.542
Residency: In-state	-0.261	0.367	0.504	1	.478	0.770	.375	1.583
Intended Major								
Undeclared			13.393	11	.268			
Art	19.894	26723.871	0.000	1	.999	436331517.425	.000	.
Business	-0.133	38636.099	0.000	1	1.000	0.875	.000	.
Education	20.558	26723.871	0.000	1	.999	847986104.880	.000	.
Humanities	1.238	48266.345	0.000	1	1.000	3.448	.000	.
Music	20.831	26723.871	0.000	1	.999	1113845872.658	.000	.
Business								
Music	19.775	26723.871	0.000	1	.999	387481629.244	.000	.
Nursing	19.927	26723.871	0.000	1	.999	450905277.401	.000	.
Religion	17.656	26723.871	0.000	1	.999	46542889.464	.000	.
Science	22.956	26723.871	0.000	1	.999	9325272199.747	.000	.
Social Science	18.584	26723.871	0.000	1	.999	117693775.366	.000	.
Theatre	20.120	26723.871	0.000	1	.999	547117653.340	.000	.
Cohort Year								
Fall 2003			0.483	2	.785			
Fall 2004	-0.180	0.386	0.217	1	.642	0.835	.392	1.781
Fall 2005	-0.229	0.349	0.431	1	.511	0.795	.401	1.577
Constant	-27.146	26723.871	0.000	1	.999	0.000		

* The odds ratio is significant at the .05 level.

Table C13

Logistic Regression 6.2c: Analysis of Graduation of Test Score Low Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Test Score	.056	0.087	.407	1	.523	1.057	.891	1.254
HS GPA	1.132	0.522	4.713	1	.030*	3.102	1.116	8.622
Gender: Male	-.034	0.239	.021	1	.886	.966	.604	1.545
Race								
White			1.567	4	.815			
Black	-.700	0.685	1.045	1	.307	.497	.130	1.900
Hispanic	-.411	0.843	.238	1	.626	.663	.127	3.459
Asian	-.320	0.975	.108	1	.743	.726	.107	4.909
Unknown	-.662	1.621	.167	1	.683	.516	.022	12.366
Application Date								
Early			6.631	2	.036			
Regular	1.229	0.572	4.608	1	.032*	3.416	1.113	10.489
Late	.824	0.578	2.032	1	.154	2.281	.734	7.086
Religion								
Christian			4.469	3	.215			
Baptist	-.031	0.262	.014	1	.904	.969	.580	1.619
Non-Christian	-.136	0.272	.249	1	.618	.873	.512	1.488
Unknown	-1.029	0.497	4.291	1	.038*	.357	.135	.946
Residency: In-state	.253	0.248	1.041	1	.308	1.288	.792	2.094
Intended Major								
Undeclared			8.411	11	.676			
Art	.216	0.920	.055	1	.814	1.241	.204	7.538
Business	.325	1.172	.077	1	.782	1.384	.139	13.759
Education	.167	0.939	.032	1	.859	1.182	.188	7.445
Humanities	-.180	0.951	.036	1	.850	.835	.130	5.387
Music Business	-20.811	22162.019	.000	1	.999	.000	.000	.
Music	-.128	0.884	.021	1	.885	.880	.156	4.982
Nursing	-.425	0.895	.226	1	.635	.654	.113	3.776
Religion	-.895	1.016	.776	1	.378	.409	.056	2.993
Science	-.678	1.525	.198	1	.657	.508	.026	10.083

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio Lower	Upper
Social Science	-.821	0.937	.769	1	.381	.440	.070	2.758
Theatre	.148	0.935	.025	1	.874	1.159	.186	7.243
Cohort Year								
Fall 2003			.518	2	.772			
Fall 2004	.067	0.268	.061	1	.804	1.069	.632	1.809
Fall 2005	.180	0.254	.504	1	.478	1.197	.728	1.969
Constant	-5.610	2.802	4.009	1	.045	.004		

* The odds ratio is significant at the .05 level.

Table C14

Logistic Regression 6.2d: Analysis of Graduation of Both Low Students in Cohorts 2003 to 2005

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio Lower	Upper
Test Score	0.042	0.110	0.145	1	.704	1.043	.841	1.293
HS GPA	1.376	0.724	3.609	1	.057	3.959	.957	16.371
Gender: Male	-0.249	0.302	0.680	1	.410	0.779	.431	1.410
Race								
White			1.933	4	.748			
Black	-0.401	0.750	0.286	1	.593	0.670	.154	2.909
Hispanic	0.174	1.070	0.026	1	.871	1.190	.146	9.701
Asian	-0.301	1.184	0.065	1	.799	0.740	.073	7.525
Unknown	0.756	1.249	0.366	1	.545	2.129	.184	24.642
Application Date								
Early			1.913	2	.384			
Regular	0.407	0.636	0.410	1	.522	1.503	.432	5.223
Late	0.004	0.634	0.000	1	.995	1.004	.290	3.478
Religion								
Christian			2.556	3	.465			
Baptist	0.402	0.337	1.422	1	.233	1.495	.772	2.895
Non-Christian	0.359	0.384	0.874	1	.350	1.432	.675	3.041
Unknown	-0.370	0.634	0.340	1	.560	0.691	.199	2.394

(*table continues*)

Variable	β	S.E.	Wald	*df*	*p*	Odds Ratio	95% C.I. for Odds Ratio	
							Lower	Upper
Residency: In-state	-0.426	0.312	1.873	1	.171	0.653	.354	1.202
Intended Major								
Undeclared			5.197	11	.921			
Art	-0.254	1.161	0.048	1	.827	0.775	.080	7.550
Business	21.363	22,239.068	0.000	1	.999	1895931601.720	.000	.
Education	-0.644	1.126	0.327	1	.567	0.525	.058	4.776
Humanities	-1.125	1.231	0.836	1	.360	0.325	.029	3.621
Music Business	-0.584	1.692	0.119	1	.730	0.557	.020	15.353
Music	-0.661	1.119	0.349	1	.555	0.517	.058	4.626
Nursing	-0.433	1.137	0.145	1	.703	0.649	.070	6.022
Religion	-1.758	1.367	1.654	1	.198	0.172	.012	2.511
Science	0.415	1.473	0.079	1	.778	1.515	.084	27.192
Social Science	-0.380	1.216	0.098	1	.755	0.684	.063	7.417
Theatre	-0.306	1.137	0.072	1	.788	0.737	.079	6.842
Cohort Year								
Fall 2003			2.864	2	.239			
Fall 2004	0.582	0.367	2.513	1	.113	1.789	.872	3.674
Fall 2005	0.080	0.340	0.055	1	.815	1.083	.556	2.109
Constant	-4.907	3.639	1.819	1	.177	0.007		