Factors that Predict Academic Achievement for Students Who are Undecided Majors

Kimberly S. Brown

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Joan B. Hirt, Chair

Penny L. Burge

Steven M. Culver

Steven M. Janosik

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By

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Abstract

Higher education administrators recognize the importance of examining persistence as a means of understanding why students and have significant variability in enrollment patterns and depart from college prematurely (Braxton, 2000). One of the most common methods of evaluating student persistence is through academic achievement, measured by grade point average (McGrath & Braunstein, 1997; Tross, Harper, Osher, & Kneidinger, 2000). Previous researchers indicate academic achievement of college students can be influenced by a number of factors including academic major (Turner & Bowen, 1999). One group that has not received significant attention by researchers is the undecided population, those students who matriculate to colleges and universities without declaring an academic major.

Undecided students warrant additional research as they make up one of the fastest growing populations in higher education. Anywhere from 20% to 50% of entering college students are undecided majors (Lewallen, 1995). These students are often described as a vulnerable group with a decreased probability of persisting.

The purpose of the current study was to explore differences between two sub-groups of undecided students. In addition, an investigation was conducted into which factors could predict the academic achievement of first year, undecided students. Undecided students were classified as either Non-Specific Majors (NSMs, students who indicated they were not able or did not want to make a commitment to one particular major at the time they applied for admission to the university) or Specific Majors (SMs, students who indicated a particular degree granting program as their first choice of major but were not accepted to that major). Background characteristics, self-perception of abilities, degree aspirations, and academic achievement were examined using secondary analysis of institutional Cooperative Institutional Research Program (CIRP) data.

Findings revealed significant differences between NSMs and SMs. In terms of their background characteristics, four significant differences were identified including sex, high

school grade point average, race, and parental education. Only one measure of self-perception of abilities revealed a significant difference between the two groups: artistic abilities. No significant differences were found in terms of degree aspirations. Regarding academic achievement, NSMs tended to experience higher levels of academic success than SMs. Finally, for both the NSM and SM group, background characteristics, self-perceptions of abilities, and degree aspirations were able to explain a significant amount in variance in academic achievement, though to a greater degree within the NSM group.

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Chapter One

Introduction

Higher education administrators have paid considerable attention to the retention and persistence of undergraduate students in hopes of reducing the percentage of students who leave college prematurely. Retention refers to an institution's ability to retain students from one year to another. Student persistence refers to students' conscious choice and ability to continue in their pursuit of their educational goals. Simply stated, persisters are students who enroll at an institution and continue their enrollment, though not necessarily in consecutive terms, until they have completed their degree requirements (Blecher, 2006). While the terms "retention" and "persistence" are often used interchangeably, it is important to note that retention is an institutional outcome and persistence is a student outcome (Hagedorn, 2003).

Retention and persistence are worthy of examination given that American colleges and universities consistently experience a first to second year persistence rate of only 75%. That is, one quarter of entering first year students do not persist to their second year of college (Braxton, 2000). It is important to understand why students are dropping out or have significant variability in enrollment patterns for institutions to respond to students' needs.

The increased focus on student retention and persistence is warranted due to two important policy issues within higher education. First, student retention is a means of evaluating institutional performance (Green, 2002; Metz, 2004). Stakeholders today frequently request indicators of performance as a means of establishing institutional accountability and accountability is receiving a great deal of attention within the American higher education system. Generally, accountability is the "obligation to report to others, to explain, to justify, to answer questions about how resources have been used, and to what effect" (Trow, 1996, p. 2). Specifically, accountability in higher education relates to the policy of holding colleges and universities responsible for student achievement and progress. Retention rates are commonly used as a measure of student achievement and progress.

Second, retention also has significant financial implications that must be considered. When institutions are able to retain students from one year to another, they better position themselves to positively influence their revenue stream. This is particularly crucial given the increasing financial pressures placed on colleges and universities. Jones (2007) noted that from 2005 through 2013 all states should expect possible budget deficits that will significantly limit

federal and state funding for higher education while concomitantly increasing the financial burden of students and parents. Given decreased state funding, institutions will have to continue to develop strategies to increase their revenue. An increased focus on improving retention rates, hence increasing revenues from tuition, is one such strategy.

A review of the literature reveals significant contributions from individuals who propose models, or lenses, through which to examine retention. Two theoretical frameworks dominate the work on student persistence and retention: the Student Integration Model (Tinto, 1975; 1987) and the Student Attrition Model (Bean, 1980). Both models provide the foundation for much of the subsequent research in the area of student persistence (Cabrera, Nora, & Castaneda, 1993).

Vincent Tino (1975) argues that students' successful integration into the institutional environment, both socially and academically, positively affects their retention in his Student Integration Model. Evidence of successful integration includes students' ability to become involved stakeholders in their institution. Retention and persistence are enhanced where an appropriate match between the environment and student commitment exists (Tinto, 1975; 1987; 1993). While fully agreeing with the importance of integration, Bean (1990) goes further by asserting that the best predictor of student persistence is the student's beliefs and attitudes, also known as the Student Attrition Model. Bean's model proposes that students' beliefs are influenced by the interaction between the students and institutional environment.

In addition to producing theoretical models, research has revealed three important factors affecting student retention and persistence. These factors include institutional commitment, financial support available to students, and college grades earned (Bean, 1990; Gloria, Kurpius, Hamilton, & Wilson, 1999; Tinto, 1993). Institutional commitment and support of students significantly improves retention. For example, in one study that examined the role of academic and non-academic factors affecting college retention, institutional commitment had a positive relationship with retention (ACT Policy Report, 2004). Evidence of institutional commitment can be found through programs and services such as the provision of quality academic advising (Frost, 1993; Thomas, 1990), implementation of early warning systems (Hyer & Joslin, 1998; Kuh, 2007), and connection of students in a meaningful way to some positive activity or role model (Kuh).

Research also has been conducted to examine the financial factors that affect retention

and persistence. St. John (1990) found that tuition increases have a negative impact on persistence during student transition from the second to the third year. However, he also noted a positive correlation between increases in retention and increases in grants, loans, and work-study awards. The impact of finances on retention may be more indirect than direct. Tinto (1993) notes that students frequently cite leaving college for financial reasons because this tends to be more socially acceptable than other reasons such as academic failure.

Since retention is an institutional issue while persistence is a student matter, it is important to examine the literature on persistence. One of the most common methods of evaluating student persistence is through academic achievement, often defined by grade point average (GPA) earned by students (McGrath & Braunstein, 1997; Tross, Harper, Osher, & Kneidinger, 2000). College grades tend to be "both a reflection of the person's ability and the institution's preferences for particular styles of academic behavior" (Tinto, 1975, p. 104). As such, performance measured at the end of the first term of enrollment in the form of a grade point average has proven to be an important factor in both college retention and student persistence (Johnson, 2006; McGrath & Braunstein). GPA is not only used as an indication of individual performance, but also as a means of drawing comparisons among groups of students (Lovegreen, 1993).

According to Pascarella and Terenzini (1991), students who earn higher GPAs typically have responded favorably to the environment established by a particular institution. However, when students perform below the required academic standard, they frequently leave the institution for one of two reasons. First, institutional policies and procedures often require students who fail to meet the minimum academic standards to suspend their enrollment for a specified time period. Secondly, students often opt to leave the institution to deal with their personal feelings of failure, possibly related to family pressures and the influence of a negative social stigma associated with failure (Tinto, 1993).

Although a GPA is calculated at the end of each term a student is enrolled, the GPA earned during the first semester tends to be a better indicator of academic achievement than other variables (Allen, 1999; McGrath & Braunstein, 1997). If students are able to earn higher grades early in their academic career, then the tendency is for students to continue performing at a similar level throughout their academic career. Better grades lead to higher grade point averages, which in turn leads to greater academic achievement (i.e., persistence) for students.

Academic achievement, or a student's ability to meet or exceed the academic standards of a given institution, is important because it reflects a measure of students' acquisition of important skills and attributes considered necessary to demonstrate that student learning has occurred. Some benefits of student academic achievement represent public interests, such as increasing the United States' global competitiveness and increased civic engagement (Lopez-Claros, Porter, Schwab, & Sala-i-Martin, 2006; Jones, 1996). Other benefits of student achievement reflect private interests, including greater earning potential for individuals (College Board, 2006; Institute for Higher Education Policy, 1998, 2005).

Global competitiveness is an international concept based on the belief that individual countries compete against one another in terms of their ability to raise productivity by making better use of resources (Lopez-Claros et al., 2006). Countries' relative competitiveness can be evaluated on nine pillars or categories. Of primary importance to this study is the fifth of these, higher education. This pillar is defined as not only access to higher education but also evidence of academic achievement, as in graduates' ability to effectively engage in critical thinking, problem solving, and communication. Carnevale, Gainer, and Meltzer (1990) note that many employees fail to meet the basic reading, writing, and mathematical standards required to make American businesses economically strong and competitive with their major rivals in foreign enterprises. Attainment of these skills prepares college graduates to compete in the global economy (Jones, 1996). Another public benefit of academic achievement in higher education is increased participation in civic matters. Researchers have shown that achievement in higher education creates societal benefits such as political interest and involvement (Milligan, Moretti, & Oreopoulos, 2004), increased voting and voter registration (Blais, 2000; College Board, 2006; Wattenberg, 2002), and differences in health-related patterns (College Board, 2006).

In addition to serving the public interest by increasing America's global competitiveness and level of civic involvement, academic achievement also serves private interests of students themselves by increasing their earning potential. Generally, annual earnings are positively correlated with completed levels of higher education. The College Board's Education Pay Update (2006) notes that 46% of bachelor's degree recipients between the ages of 35 and 44 working full-time in 2005 earned at least $60,000 while only 12% of high school graduates earned that amount. This correlation between increased income and increased educational level persists, regardless of the age of the graduate.

Given the significant individual and societal benefits of academic achievement, it is important to consider the factors that influence academic achievement in higher education. Four factors have been identified in the literature as having an impact on academic achievement: student background characteristics, self-perception of abilities, degree aspirations, and choice of academic major. The specific set of background characteristics that students bring with them to college affects their academic performance (Astin, 1993b; Naretto, 1995). Background characteristics include age, gender, race, parental educational background, high school GPA, college admission test scores, and family income level, (Kahn & Nauta, 2001; Leppel, 1984; 2002; McGrath & Braunstein, 1997; Pascarella & Terenzini, 1991; Tinto, 1993). However, these characteristics do not account for all of the variation in academic performance.

Another factor that contributes to student academic achievement is self-perception of abilities (Bryson, Smith, & Vineyard, 2002; Jackson, Smith, & Hill, 2003; Sedlacek, 2004). Specifically, students who report higher levels of self-confidence in their abilities tend to be academically successful. It is necessary for students to exhibit confidence in their abilities to achieve their academic goals (Sedlacek, 2004).

A third factor contributing to the academic achievement of students is their degree aspirations. Students reporting a desire to achieve educational goals beyond the bachelor's degree tend to achieve academically, persist, and graduate at greater rates than do students for whom a bachelor's degree is the ultimate educational goal (Walpole, 2007). While it may be beneficial for students to consider long-term goals such as the highest level of degree desired (e.g., earning a master's or doctorate. degree), they must first complete a four-year degree and that process begins by selecting a major.

Many factors have been identified as influencing students' choice of college major. Gender and socio-economic status are such influences; males tend to seek majors that are perceived as more financially lucrative regardless of their socio-economic background. However, in making their choice of major, women's socio-economic status plays a larger role. Specifically, women from lower socio-economic levels also choose majors in more lucrative fields while women from higher socio-economic levels are more willing to explore majors not directly linked to high-paying jobs as they are less concerned about money and job security (Green, 1992).

More recent literature has identified additional factors related to choice of college major

including peer group size (Griffith, 2008), self-efficacy (Lent, Sheu, Singley, Schmidt, Schmidt, and Gloster, (2008), labor market expectations (Turner & Bowen, 1999), college experiences (Turner & Bowen, 1999), and parental occupation (Leppel, Williams, & Waldauer, 2001). Regardless of the factors that influence choice of college major, the choice ultimately has implications for academic achievement.

Several studies have revealed differences in the influence of college major on academic achievement (Wood, 1990). For example, African American second year students who major in business, engineering, health, or computer science, all considered to be "high-demand" fields, are more likely to persist and succeed academically than African American students majoring in other fields (St. John, Hu, Simmons, Carter, & Weber, 2004). Also, Pascarella and Terenzini (1991) reported that students choosing majors in the social sciences or humanities experience greater academic achievement that they attributed to what they believed to be more frequent interactions with faculty.

One particular group of students has been highlighted in the literature on academic achievement and academic major. Undecided students are those who are "unwilling, unable, or unready to make educational or vocational decisions" (Gordon, 1995, p. x). This population of students tends to produce lower scores than decided students in terms of high school grade point average, college grade point average, and American College Testing (ACT) Program composite scores (Wood, 1990). Research also indicates that undecided students have lower academic performance and persistence rates (Leppel, 2001).

These facts take on added importance because the population of undecided students in higher education is rapidly increasing even as more options for academic programs become available to students. Specifically, undecided students account for 20%-50% of entering college students (Lewallen, 1995). In terms of the growing population of undecided students, it is also important to note that approximately 33% of students at the study institution were undecided in the last three years. Research regarding this population focuses primarily on the normalcy of being undecided (Gordon, 1995; Lewallen, 1993), differences between decided and undecided students (Osipow, 1983; Serling & Betz, 1980; Taylor & Betz, 1983), and defining subtypes of this population (Gordon, 1998; Lucas & Epperson, 1988; Newman, Fuqua, & Minger, 1990; Savickas & Jarjoura, 1991). As such, this population has received considerable attention from higher education leaders. A review of the current literature supports these previously made

conclusions.

Recent literature related to undecided students has focused on categorizing types of undecided students (Savickas & Jorgourna, 1991). In particular, after reviewing numerous studies that examined categories of decided and undecided students, Gordon (1998) proposed four sub-types of undecided students that include tentatively undecided, developmentally undecided, seriously undecided, and chronically indecisive. The advantage of making use of these subtypes includes a greater ability to provide unique interventions for students as well as develop customized evaluations of programs and services for different groups of undecided students. On the other hand, using these subtypes can pose challenges because few students easily fit exclusively into one category or the other.

Lewallen (1993) suggests that students' status as undecided regarding their major or career is not related to their academic progress and persistence. He does, however, argue that this population requires alternative methods of delivery of academic services. To assist them, various programs and services have been developed. For example, Pennsylvania State University recognizes the challenges undecided students face and has created an enrollment unit designed to meet their needs (White, 2000). Other institutions have followed suit in acknowledging that undecided students have special needs that may require a special approach to academic advising. Suggested services for undecided students include courses and workshops co-sponsored by both academic advising and career services members (Teitelbaum, 2000) to facilitate their decision-making processes.

<div align="center">Statement of the Problem</div>

Retention and persistence of students in higher education is a significant concern for administrators (Blecher, 2006) as they explore ways to decrease the number of students who depart from college prematurely. Improved retention rates are a means of assessing institutional accountability (Green, 2002; Metz, 2004; Trow, 1996) and increasing institutional revenues (Jones, 1996), two important policy issues within higher education. These policy issues have become a focus of the research on student retention and persistence.

One measure of student persistence is academic achievement and a number of factors have been identified that influence academic achievement including student background characteristics, self-perception of abilities, highest degree aspired, and choice of academic major (Astin, 1993b; Kahn & Nauta, 2001; Leppel, 1984; Leppel, 2002; McGrath & Braunstein, 1997;

Naretto, 1995; Pascarella & Terenzini, 1991; Tinto, 1993). A review of the literature regarding academic achievement reveals differences in academic performance depending on students' academic major (Wood, 1990). Several factors influence students' choice of academic major including peer group size (Griffith, 2008), self-efficacy (Lent, Sheu, Singley, Schmidt, Schmidt, and Gloster, (2008), labor market expectations (Turner & Bowen, 1999), college experiences (Turner & Bowen, 1999), and parental occupation (Leppel, Williams, & Waldauer, 2001).

Undecided students have been identified as a vulnerable population because research indicates that they tend to have lower academic performance and persistence rates compared to their counterparts who have declared majors (Leppel, 2001). This deficiency perspective, however, is highlighted particularly in research studies in which undecided students are compared to students who have declared an academic major. Other studies examining differences among students in various majors have excluded the undecided population from investigation entirely.

When considering the issues related to undecided students, it is imperative to consider the varying levels of undecidedness (Gordon, 1998). Undecided students at the institution where this study was conducted consist of two distinct sub-groups. The first includes students who indicated they were not able or did not want to make a commitment to one particular major at the time they applied for admission to the university. They are referred to as Non-Specific Majors (NSMs). The second group of students is referred to as the Specific Majors (SMs). During the admission process, these students indicated a particular degree granting program as their first choice of major but were not accepted to that major. Instead, they were offered admission as an undecided student and told they might transfer into their first choice at a later point in time.

Despite a wealth of research on predicting the academic achievement of students, and programs and services designed to promote academic achievement among undecided students, no studies have focused on predicting the academic achievement of undecided students by examining their background characteristics, self-perception of abilities, and highest degree aspired to from a lens other than the deficiency perspective. In addition, existing literature on undecided students and academic achievement examine this population as a homogeneous group. The current study was designed to address these gaps in the literature.

Purpose Statement

The purpose of this study was to determine the relationship between academic achievement and undecided student status. Specifically, this researcher determined how much of the variation in academic achievement could be explained by the pre-college characteristics for Specific Majors (SMs) and Non-Specific Majors (NSMs). These pre-college characteristics included background characteristics, self-perception of abilities, and degree aspirations. I also investigated which, if any, of the pre-college characteristics were the best predictor(s) of academic achievement. Academic achievement was defined as the cumulative GPA at the end of the second semester.

The factors used to predict academic achievement were variables measured by the 2005, 2006 and 2007 Cooperative Institutional Research Program's (CIRP) Annual Freshman Survey (AFS) (Higher Education Research Institute, 2007). The AFS variables used for this study were grouped into three categories: background characteristics, self-perception of abilities, and degree aspirations.

The sample was comprised of undecided, full-time students between the ages of 18 and 20 at a single institution. The participants were first enrolled as students in the Fall semesters of 2005, 2006, or 2007, and completed the AFS during the summer prior to their matriculation.

Research Questions

The present study examined six research questions:

1. Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of background characteristics?
2. Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of self-perception of abilities?
3. Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of degree aspirations?
4. Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of academic achievement (first year GPA)?
5. For NSMs, how much of the variance in GPA is explained by background characteristics, self-perception of abilities, and degree aspirations?
6. For SMs, how much of the variance in GPA is explained by background characteristics, self-perception of abilities, and degree aspirations?

Significance of the Study

The present study was significant for future practice, research, and policy within higher education. In regards to practice, this study provided results that may be of benefit to three constituencies. First, academic advisors were provided with information about the factors that predict academic achievement for undecided students. Advisors might use the findings to assess what services they deliver to undecided majors.

Second, the results of this study were significant for undecided students. This population of students might benefit from the results that highlight the background characteristics, self-perception of abilities, and degree aspirations that were most likely to predict academic achievement. Undecided students could use the findings to assess their own preparedness for academic achievement.

Third, admissions officers are charged with recruiting new classes of students to institutions each year with an expectation that the students will have the ability to succeed academically. This study provided admissions officers with information about the potential impact of background characteristics, self-perception of abilities, and degree aspirations on the academic achievement of undecided students. Admissions officers might use this information to refine their selection process or factors they consider in making their recommendation about which students should be offered admission, admitting students who better match the institution's strengths.

The study also served to promote future research. While I used end-of-year-one GPA as a measure of academic achievement, future investigations might examine academic achievement during the entire college career. Specifically, cumulative grade point average could be tracked at the end of each academic year for which undecided majors were enrolled. Such an approach would provide a broader time frame over which to measure academic achievement and might more accurately measure success for undecided students.

This study defined achievement in college exclusively in terms of academic performance. Future studies might seek to broaden the definition of achievement to include both academic and non-academic indicators of achievement. Expanding the operational definition of achievement might provide the opportunity to highlight collegiate achievement in students not always evidenced by their grade point average.

Finally, future research might include an examination of students from other majors.

While the current study focused on undecided students, this population constitutes only a fraction of the total enrollment of most higher education institutions. Such a future study might provide a greater awareness of the factors that predict academic achievement for students from various majors.

Policy implications were also evidenced in this study. Academic administrators charged with developing standards for internal transfer (i.e., changing majors within the same institution) could benefit from the results of the current study. The findings provided this group of policymakers with data regarding the factors that predict academic achievement among undecided students. They might use the results to evaluate the standards used to assess internal transfer applications.

Another way in which the results of the current study might influence policy is related to admission standards. Policymakers might use information about factors that predict achievement when determining admissions standards for undecided students.

Academic administrators concerned with retention of undecided majors might benefit from the results of this study as this population of students tends to have lower retention rates. The results provided insight into the effect of background characteristics, self-perception of abilities, and degree aspirations on the academic achievement of undecided students. The data might be used to develop policies geared towards the unique needs of this group of students.

<div align="center">Delimitations</div>

There were several delimitations in the current study. The first related to the sample. All participants were undecided majors at the same institution. The unique characters of students at this institution may have affected the results in some unforeseen manner.

 Second, the pre-existing data set presented a potential delimitation. The data provided from CIRP's Annual Freshman Survey contained only select variables that were used to measure the constructs of background characteristics, self-perception of abilities, and degree aspirations of undecided majors. It is possible that these variables did not fully measure the constructs, hence limiting the viability of the findings.

A third delimitation related to the collection of AFS data. Respondents provided self-reported data. It is possible that they were not candid in their responses. If the respondents were not candid, the results may have been skewed.

Despite these delimitations, this study was worthwhile to higher education administrators

as it filled a gap in the literature related to academic achievement and undecided students. Additional information about this group may provide a clearer picture of about achievement among undecided majors.

Organization of the Study

This study is organized around five chapters. The first chapter created an argument for the importance of the study by introducing the topic and presenting the purpose statement, research questions, and significance of the study. The second chapter provides a review of the literature related to academic achievement and undecided majors. Chapter Three presents the methodology of the study including how the sample was selected, data collection procedures, and the data analysis techniques employed. The results of the study are reported in Chapter Four while the final chapter discusses those results and their implications for future practice, research and policy.

Chapter Two

Literature Review

This study was designed to address a gap in the literature regarding the academic achievement among undecided students during their first year of enrollment at a four-year public research institution. Specifically, differences in academic achievement between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of pre-college characteristics were examined. In addition, the study examined whether the pre-college characteristics could be used to successfully predict the academic achievement of undecided students. The literature review is centered on these areas of study.

First, for purposes of this study, first-year college grade point average (GPA) was used as a measure of students' academic achievement. Therefore, GPA as a measure of academic achievement was reviewed. Next, it was necessary to examine the literature on pre-college characteristics that influence academic achievement. Three groups of studies were reviewed. These included background characteristics, self-perception of abilities, and degree aspirations. Finally, since the study examined achievement among undecided students, research on that population of college students was explored.

GPA and Academic Achievement

In terms of academic achievement in college, grade point average (GPA) is commonly used as an indicator of student achievement. Specifically, first-year college GPA is a measure of the consistent academic achievement of a student across terms (Brashears & Baker, 2003). In addition, the value of using GPA as a measure of academic achievement has been highlighted as GPA has been found to be a significant predictor of persistence (Allen, 1999; Mitchel, Goldman, & Smith, 1999; Murtaugh, Burns, & Schuster, 1999) and serves as one indication of the degree to which students have responded to the institutional environment (McGrath & Braunstein, 1997; Tinto, 1993; Tross, Harper, Osher, & Kneidinger, 2000).

Allen (1999) examined the existence of an empirical link between motivation and persistence. He concluded that regardless of students' racial/ethnic status (minority or nonminority), first-year college GPA exerts the largest influence on whether or not a student persists. In addition, the higher a student's GPA the greater the probability of retaining that student from the first to the second year of enrollment in college (Murtaugh, Burns, & Schuster, 1999).

First-year GPA also provides insight into whether students are responding positively to the institutional environment. Students who respond negatively to the institutional environment do not tend to experience high levels of academic achievement. Tinto (1993) noted that students with low GPAs tend to leave college for two reasons. First, most colleges and universities have established academic policies to determine an acceptable level of academic performance necessary to continued enrollment. When students fail to meet the standard, they are often dismissed from school. Second, many students will opt to leave college because of the negative stigma associated with academic failure. Regardless of the reason, low academic achievement often results in students leaving the college environment.

GPA is frequently cited as a major indicator of academic achievement (Pascarella & Terezeni, 1991). Unsuccessful students waste personal, societal and institutional resources (Yorke, 1998). Researchers often attempt to successfully predict factors that influence GPA in an effort to improve the academic achievement of students. Pre-college characteristics are one set of factors that must be considered in relation to the academic achievement of students.

Pre-College Characteristics Influencing Academic Achievement

Researchers have examined first year college students prior to matriculation in hopes of gaining further insight into the distinguishing attributes of entering cohorts. These attributes are referred to as pre-college characteristics. Three pre-college characteristics have been discussed in the literature: background characteristics, self perception of abilities, and highest degree aspired to (Bauer & Liang, 2003; Nelson, Scott, & Bryan, 1984; Rasmussen, 2002; Ting & Robinson, 1998). Results indicate that pre-college characteristics influence academic achievement (Bauer & Liang).

Background Characteristics

Most studies suggest that background characteristics influence academic achievement only during the first year of enrollment. Six specific background characteristics have been identified: (a) high school achievement, (b) gender, (c) SAT scores, (d) ethnicity, (e) parental education, and (f) parental income (Terenzini, Theophilides, & Lorang, 1984).

Previous studies indicate high school academic achievement, as measured by students' high school GPA successfully predicts academic achievement in college (Daugherty & Lane, 1999; DeBerard, Spielman, & Julka, 2004; Noble & Sawyer, 2002). In an effort to investigate the ability of overall high school GPA to predict first-year college GPA, Noble & Sawyer (2002)

demonstrated that high school GPA had even greater predictive ability than that of the ACT standardized achievement test. In addition, Daugherty & Lane (1999) found that lower levels of academic preparedness from high school, including high school GPA, was associated with less academic success in college and greater probabilities of attrition.

Gender is a second background characteristic that has been explored in relation to academic achievement and much of that literature is related to females (Betts & Morell, 1999; Pike, Schroeder, & Berry, 1997). However, conflicting findings have been found regarding females and academic achievement. For example, a consistent pattern emerged in the literature indicating that females perform to a lesser degree than males in terms of academic achievement in science (Campbell, Hambo, & Mazzeo, 2000; Hamilton, Nussbaum, Kupermintz, Kerkhoven, & Snow, 1995). The work of Campbell et al. (2000) is particularly important in that these researchers examined student achievement in the United States over time and concluded that males consistently score higher in science than females, regardless of age. Yet, other findings suggest that females exhibit more curiosity, which is associated with better achievement, than their male counterparts (Rouse & Austin, 2002) and that female students tend to have higher grade point averages (Zheng, Saunders, Shelley, & Whalen, 2002).

SAT scores have served as another background characteristic used to predict academic achievement (College Board, 2001). These scores account for 17% of the variance in college grade point average (Wolfe & Johnson, 1995). Several studies have investigated the relationship between SAT scores and subsequent academic achievement in college level mathematics courses (Bridgeman, 1982; Gussett, 1974; Troutman, 1978), though descriptions of the exact nature of the relationship varies. Most notably, Troutman examined the predictive validity of a number of variables and concluded the best single predictor of academic achievement in a finite math course is the SAT mathematics score. The relative strength of the SAT mathematics score was further validated by Gussett's (1974) research which revealed the SAT-M scores yielded significant correlations with earned grades in freshman mathematics. However, Bridgeman (1982) later noted that the SAT math score is a better predictor of academic achievement in more advanced math courses than lower level math courses. Despite the relative impact, it is clear that the SAT scores have a significant influence on subsequent academic achievement. In addition, college admission tests predict academic achievement as defined by grade point average at the end of the first year of enrollment in college (House, 1996).

Another background characteristic explored in the literature is ethnicity. Research indicates a relationship between ethnicity and academic achievement in college (Berger & Braxton, 1998; Murtaugh, Burns, & Schuster, 1999) though significant differences among ethnic groups exist with regard to which variables most accurately predict academic achievement (Bennett & Okinaka, 1990; Dorsey & Jackson, 1995; Fuertes, Sedlacek, & Liu, 1994; Nora, 1987; Rodriguez, 1996; Trippi & Stewart, 1989). For example, Fuertes et al. (1994) reported that empirical research has been able to explain very little about the academic achievement of Asian American students noting studies that employ traditional measures such as standardized test scores to predict achievement have produced low validity. For African American students, however, strong self-concepts are considered to be significant predictors of academic achievement and persistence (Dorsey & Jackson, 1995). Similarly, Rodriguez (1996) indicated first-year Mexican American students with stronger academic self-concepts also reported higher academic achievement as measured by GPA. Also, minority students are less likely to become engaged in the college experience than White students. According to Murtaugh, Burns, & Schuster (1999), this lack of engagement leads to overall dissatisfaction with college and negatively impacts their academic achievement.

In the literature, parental education is consistently noted as a student background characteristic that influences academic achievement (Elkins, 1998; House, 1996; Ting & Robinson, 1998; Zheng, et. al, 2002). In their study on the predictors of academic achievement for first year residence hall students using a three-step model, Zheng et al. noted that parental education is significant throughout all three steps of the model. More specifically, "students were more apt to do better if their parents had more education, with first-year college GPA increasing on average by 0.02 for each unit's increase in parental education level" (p. 278). One plausible explanation for this finding is that parents with higher educational levels have higher expectations and provide greater support to their students.

A final background characteristic related to academic achievement is parental income. King (2002) explains that a student's unmet need is determined by calculating the difference between the cost of attending college and parental income. Therefore, low-income students tend to have higher levels of unmet financial need and accumulated debt. Both financial need and accumulated debt negatively impact students' academic achievement (Somers, Woodhouse, &

Cofer, 2004; King 2002). Middle and upper-income students tend to have greater financial resources, reducing their obstacles to academic achievement (King, 2002).

Self-Perception of Abilities

Self-concept refers to an individual's image of him/herself. It is a multi-layered construct reflecting various dimensions of students' self-perceptions of their abilities and attitudes (Byrne, 1984; Hansford & Hattie, 1982). More specifically, Ethington (1990) has expanded the concept to include an academic component and has defined academic self-concept as a student's ability and intellectual self-confidence.

The vast majority of research in this area has focused on pre-school, elementary, and secondary school youth, with substantially less attention given to examining the self-perception of abilities of college students (Smart & Pascarella, 1986). A review of the current literature indicates the same trend to be true today. Minimal research exists regarding college students' self-perception of abilities compared to younger student populations. Despite the limited research on college students' self-perception of abilities, there is clear consensus among researchers on two related issues. First, academic achievement is positively influenced by self-perception of abilities (Bauer & Liang, 2003; Hamacheck, 1995; Hickman, Bartholomae, & McHenry, 2000; Pritchard & Wilson, 2003; Zheng, et. al, 2002). Evidence supporting this conclusion includes Bauer & Liang's (2003) findings that students' personality type (encompassing self-perception of abilities) influences first-year GPA. Additionally, self-perception of abilities serves as a good predictor of future academic achievement (Pritchard & Wilson, 2003; Tross, Harper, Osher, & Kneidinger, 2000). The current study seeks to explain the variance in academic achievement for undecided students and because of its clearly established relationship with academic achievement, students' self-perception of abilities is included in the analysis.

Degree Aspirations

It is important to examine educational aspirations as they are a "fundamental part of the attainment process and yet are among the least understood concepts in higher education" (Carter, 2001, p. 6). Anecdotally, without aspirations college students' educational plans are not likely to come to fruition. However, research also confirms the relative strength of educational aspirations as a predictor of academic achievement. Pascarella (1984) investigates the influences of the college environment on students' educational aspirations and concludes "by far, the best predictor of educational aspirations at the end of the second year of college was the level of

educational aspiration at entrance to college" (p. 767). In addition, others have reached similar conclusions noting that "the student's degree aspirations at the time of college entrance are the most potent predictors of enrollment in graduate and professional school" (Astin, 1977, p.112).

Defining aspiration can be difficult as it has been considered a concept that is synonymous with several other terms including expectation, educational plan, wish, dream, intention, and ambition (Carter, 2001). For the current study, aspirations are defined as the "goal that one intends or expects to attain" (Berman & Haug, 1975, p. 166). The goal under investigation in the current study includes the highest degree aspired to by first-year college students.

Aspirations have been studied since the late 1960s (Carter, 1999). However, when aspirations are investigated particular focus has been placed on research design and college students. Regarding design, researchers have studied aspirations as either an outcome or as a predictor of an outcome. For example, several scholars have concluded students' aspirations are directly affected by institutional characteristics and experiences (Carter, 2001; Hossler & Gallagher, 1987; Astin, 1993b; Smith, 1990). Fewer studies have used aspirations as a predictor of an outcome (Dey & Astin, 1993; Hull-Toye, 1995; Pascarella, Smart, & Stoecker, 1989).

The aspirations of college students are frequently examined in the literature. However, Carter (2001) notes more research related to aspirations for the high school-to-college population exists than research reporting on college students' plans to attend graduate school. The current study builds on this body of literature by examining the post-baccalaureate degree aspirations of college students as indicated prior to enrollment in their first term of college.

<div align="center">Undecided Students</div>

One body of literature on undecided students recognizes the diversity of needs among this group of students by creating sub-types, or categories of undecided students. In one model, four general categories of undecided students were identified: tentatively undecided, developmentally undecided, seriously undecided, and chronically indecisive. Tentatively undecided students are characterized as happy and playful (Lucas & Epperson, 1988), are comfortable with themselves and have a relatively high vocational identity level. These undecided students are closer to making a decision than are the developmentally undecided students (Gordon, 1998).

Developmentally undecided students tend to have several majors in mind. These students

may also be capable of succeeding in the majority of these fields. The undecidedness of this group can be attributed to the normal experience of transition in which they are developing the skills (e.g., decision-making) necessary to commit to one particular major (Gordon, 1998).

Seriously undecided students often feel pressure from society to make a decision about a major. This pressure creates anxiety that prompts seriously undecided students to turn to others (e.g., parents, academic advisors, and friends) to make the choice for them. Characterized by lower levels of vocational identity and self -esteem, seriously undecided students believe external obstacles prevent them from making a decision. The major difference between this group and the chronically indecisive group is the severity of the problem (Gordon, 1998). Chronically indecisive students exhibit excessive anxiety relative to their choice of major. Students in this category of undecidedness tend to display a more generalized uncertainty in other areas of their life (Gordon, 1998).

Another group of research on undecided students focuses on their ability to persist in the college environment. Close examination of the literature reveals a shift in researchers' perceptions across time. Specifically, earlier studies describe undecided students as a vulnerable population with a lower probability for being retained (Anderson, 1985; Beal & Noel, 1980; Noel, 1985; Sprandel, 1985). More recent literature, however, counters this argument (Cuseo, 2005; Granunke, Woosley, & Helms, 2006; Lewallen, 1992; 1993).

Evidence exists to support the general perception within higher education that students who are undecided or have not declared a major are less likely to persist. In his study examining student attrition, Noel (1985) described uncertainty of major as a form of attrition and concluded "uncertainty about what to study is the most frequent reason talented students give for dropping out of college" (p. 12). This conclusion is also supported by Sprandel (1985) who argued undecided students experience less academic achievement because they do not have a purpose for attending school. Anderson (1985) believed undecided students ultimately fail to persist because they do not have a clear focus and they lack direction in terms of their educational and career goals. The general belief that undecided students are more attrition prone simply because they have not declared a major represents a more negative view of this student population.

A major shift in assumptions regarding undecided students and persistence occurred in the mid-1980s due to conclusions drawn from studies being conducted at the time. Notably, Lewallen (1992) disputes that undecided students are less likely to persist because the

methodology of the majority of studies that draw such a conclusion is flawed. Although frequently cited on this topic, these findings "were not empirically derived from studying students, but were the result of respondent's opinions, perceptions, and judgments" (Lewallen, 1992, p. 29). Instead of drawing their conclusions from student data, the researchers surveyed administrators and staff.

Additional studies counter previous misconceptions that undecided students are more likely to drop out of college (Graunke et al., 2006; Lewallen, 1993). Graunke, et al. (2006) investigated the impact of institutional commitment, commitment to an educational goal, and commitment to an academic major on the probabilities of graduation for first-year students. Their results indicated commitment to an academic major, or decidedness, was negatively associated with probabilities of degree completion.

GPA is a commonly used measure of academic achievement and consistent predictor of academic achievement for students (Allen, 1999; Mitchel, Goldman, & Smith, 1999; Murtaugh, Burns, & Schuster, 1999). Brashears and Baker (2003) further explain how first-year college GPA is a measure of consistent academic achievement over multiple terms. This is reinforced by other studies that note that first-year GPA has the largest effect on student persistence (Allen, 1999) and that higher GPAs lead to greater chances of student retention from year one to year two of enrollment (Murtaugh et al., 1999).

To summarize, three pre-college characteristics of students have been explored in the literature in an effort to enhance the knowledge base relative to distinguishing attributes of first-year students. These include background characteristics, self-perception of abilities, and highest degree aspired to and each characteristic has an influence on academic achievement (Bauer & Liang, 2003; Nelson, Scott, & Bryan, 1984; Rasmussen, 2002; Ting & Robinson, 1998). Six specific background characteristics have been identified in the literature because of their ability to predict academic achievement: (a) high school achievement, (b) gender, (c) SAT scores, (d) ethnicity, (e) parental education, and (f) parental income (Terenzini, Theophildes, & Lorang, 1984).

Despite the limited amount of research regarding self-perception of abilities in college students, there is general agreement on two points: higher self-perceptions of abilities have a greater impact on academic achievement (Bauer & Liang, 2003; Hamacheck, 1995; Hickman, Bartholomae, & McHenry, 2000; Pritchard & Wilson, 2003; Zheng, et. al, 2002) and self-

perceptions of abilities serve as a valid predictor of future achievement for college academics (Pritchard & Wilson, 2003; Tross, Harper, Osher, & Kneidinger, 2000).

Degree aspirations are another pre-college characteristic that have an impact on academic achievement. For college students, these degree aspirations tend to be examined as an outcome (Carter, 1999). Fewer researchers have studied aspirations as a predictor of academic achievement (Dey & Astin, 1993, Hull-Toye, 1995; Pascarella, Smart, & Stoecker, 1998).

As for research on undecided students, there is little agreement about their persistence and academic achievement in comparison to other populations of students. One group of researchers describes undecided students as a vulnerable population with a lower probability for being retained (Anderson, 1985; Beal & Noel, 1980; Noel, 1985; Sprandel 1985). Others, however refute this argument (Cuseo, 2005; Granunke, Woosley, & Helms, 2006; Lewallen, 1992; 1993).

The current study seeks to expand existing literature on predicting academic achievement by investigating undecided students. Furthermore, it is important to note that not all undecided students have the same needs and concerns. Therefore, this study explores academic achievement by varying levels of undecidedness (Specific Majors and Non-Specific Majors). Using a multiple regression analysis, the background characteristics, self-perceptions of abilities, and degree aspirations of undecided students were examined in an effort to determine which factors best predict the academic achievement of this population.

Chapter Three

Method

The purpose of this study was to determine the relationship between academic achievement and undecided student status. Specifically, this study determined how much of the variation in academic achievement could be explained by the pre-college characteristics for Specific Majors (SMs) and Non-Specific Majors (NSMs). These pre-college characteristics included background characteristics, self-perception of abilities, and degree aspirations. I also investigated which, if any, of the pre-college characteristics were the best predictor(s) of academic achievement. Academic achievement was defined as the cumulative GPA at the end of the second semester.

The study was designed to explore the following research questions:

1.   Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of background characteristics?

2.   Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of self-perception of abilities?

3.   Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of degree aspirations?

4.   Are there statistically significant differences between Specific Majors (SMs) and Non-Specific Majors (NSMs) in terms of academic achievement (first year GPA)?

5.   For NSMs, how much of the variance in GPA is explained by background characteristics, self-perception of abilities, and degree aspirations?

6.   For SMs, how much of the variance in GPA is explained by background characteristics, self-perception of abilities, and degree aspirations?

This chapter describes the method employed in the study. This includes a description of the sample selection process, the data set, the validity and reliability of the data set, the data collection procedures, and the data analysis procedures.

Sample Selection

An overview of the institution at which the current study was conducted is helpful in understanding the sample selection. The study institution is a large, public, land grant university that enrolls approximately 30,000 students. When students apply for undergraduate admission to the institution they must indicate their choice of major by choosing from approximately 81

options offered by seven colleges. Admission counselors then evaluate each candidate's application in light of the institution's overall admission standards as well as the standards of the specific academic program the student is applying to, when appropriate. For example, those individuals who indicate Electrical Engineering as their choice of major must meet additional standards above and beyond those of the university's standards for admission to be admitted into that major.

One of the academic options available for undergraduate applicants to consider is the undecided option. While the undecided major option is available in three of the seven colleges at the institution, approximately one-third of each first year class enters the general undecided option, called the University Studies program, which is not affiliated with a specific college and is not a degree granting program. Rather, University Studies provides an academic home to students who do not have a declared major within a degree-granting program when admitted to the university.

Prior to matriculation, students enter the University Studies program by one of two methods. First, those who choose the general undecided option and meet the institutional admission standards are admitted to the University Studies program. Second, students who apply to another academic major (other than University Studies) and meet the institutional admission standards but do not meet the additional academic admission requirements of that particular major are admitted into University Studies. For purposes of this study, participants who enter University Studies through these two methods are call non-specific majors (NSMs) and specific majors (SMs), respectively.

The population for this study consisted of first-time, full-time first-year students entering in fall 2005, 2006, and 2007 who matriculated as University Studies students. There were 3,964 such students. The first-time freshmen enrollment numbers for University Studies during 2005, 2006, and 2007 were 1,438, 1,283, and 1,243 respectively (R. Giles, personal communication, September 2, 2008).

The sample consisted of participants who met certain criteria. All participants needed to be first-time students at the university, registered full-time, 18-19 years of age, and undecided students admitted into the University Studies program. They also had to have completed the Annual Freshman Survey (AFS) developed by the Cooperative Institutional Research Program (CIRP) (Higher Education Research Institute, 2007), and had to have continuously enrolled

during their first academic year at the university (i.e., fall and spring semesters). The AFS was administered to entering first-year participants during the summer orientation programs in 2005, 2006, and 2007. Each of these criteria had to be met for participants to be selected for the current study. Data covering a three-year time period were used to increase the sample size, recognizing that the sample must be large enough to ensure sufficient power in the statistical analysis. In addition, the larger sample size provided an opportunity to accommodate the mortality of cases that could not be included in the analysis because participants did not meet all of the selection criteria.

Only first-time enrolled participants were included in the current study. Transfer participants were not included because this population presents its own unique issues related to transitioning into a new collegiate setting. It is difficult to determine how academic achievement is influenced by transitional issues for transfer participants. Therefore, I included only first-time enrolled respondents to control for the influences that attending another university might have had on transfer students' transition to the study institution.

In order to ensure that all participants were enrolled on a full-time basis during their first year in college. Full-time was defined as enrolled in 12 or more units of coursework during the fall and spring semesters of the first year at the university. Since my study was designed to predict academic achievement as measured by the end of first year GPA, I needed to ensure that GPA was not unduly influenced by extreme performance (great success or failure) in a single class. Participants who enroll for 12 or more units offset extreme performance in a single class by their performance in other classes. Therefore, I included in the sample only those participants who enrolled for 12 or more units in each semester of their first year.

The intent of the current study was to examine differences in traditional-aged undecided college participants. Non-traditional aged participants might have reported different background characteristics, self-perceptions of abilities, and degree aspirations. In addition, those respondents who indicated they were between the ages of 18 and 19 at the time of completing the AFS were more likely to have graduated in the immediate past spring term, going directly from high school to college. Therefore, only those participants who reported they were 18 or 19 years of age when they completed the AFS were included in the study.

Only undecided participants from the University Studies program were included in the sample. Undecided participants are those participants who are exploring or have not declared an

academic major. The study institution has an organizational structure made up of seven undergraduate, academic colleges. Three colleges provide an option for participants to enroll as an undecided major. However, in these undecided programs participants are exploring majors within the specific college. On the other hand, participants enrolled in the University Studies program are not tied to any specific college and are encouraged to explore all academic options at the institution. Hence, only undecided participants admitted into the University Studies program were included in this population.

Finally, in the current study, academic achievement was measured by the cumulative grade point average (GPA) earned at the end of the first academic year. The use of the cumulative, year one GPA is directly related to the fact that academic achievement is generally defined as college grades earned. The cumulative GPA represents the average of these grades during a given period of time. It was necessary for participants to have an earned grade point average in both their first fall and spring semesters. Therefore, to be included in the current study, participants needed to be enrolled for both terms.

<div align="center">The Data Set</div>

The data set was created using data from three departmental offices. First, I requested that staff in the Undergraduate Admissions office provide a report in an Excel spreadsheet made up of five columns to provide the following information about all participants admitted into the University Studies program during the three selected academic years: identification number, last name, first name, first choice of major (University Studies or all others) and first term of enrollment (Fall 2005, 2006, or 2007). The data provided by Undergraduate Admissions were reviewed and included 3,989 students. Those students who indicated University Studies as their first choice (N=2664) were coded as 0 and became NSMs while those who indicated any other major were coded as 1 and were assigned to the SM group (N=1325).

Second, using the student identification numbers provided by the admissions staff, I accessed pre-existing departmental reports to collect information about the number of units each participant enrolled in during the fall and spring semesters of the first year and the cumulative GPA of each participant at the end of the first year of enrollment (fall and spring terms only). I had access to these reports as a matter of normal business operations. Three additional columns were added to the Excel spreadsheet: the total number of credits attempted for both their first fall and spring semesters enrolled and the first year cumulative GPA. Those cases in which the

student was not enrolled full-time for both semesters or did not earn a GPA for either or both semesters were eliminated from the sample as they no longer fit the selection criteria outlined in the study. This became my potential sample (*n=2695*). This file was forwarded to the Assessment Office.

Third, I requested that the Assessment Office staff provide the responses of the potential sample members to the AFS. The participant identification numbers provided in the Excel spreadsheet were used to match AFS responses to participants and staff in the Assessment Office transferred those responses into the dataset. There were 1835 cases where no AFS data existed for any of the items . These cases were deleted for a final sample size of 860. Per Assessment Office policy, staff then deleted all participant identification numbers and returned the dataset to me.

The AFS data included information about whether respondents had attended any other institution before enrolling at the study institution, as well as data about respondents' age. First-time enrolled status was determined by two items on the survey. The first item asked if the student had previously earned credit from the current institution. The second item asked students if they had taken courses at any other institution since leaving high school. Respondents who indicated "no" on both items were considered first-time enrolled. A separate item on the AFS provided students with the opportunity to indicate their age as of December 1 of the year in which they completed the survey. Again, those respondents indicating any age other than 18 or 19 were eliminated from further inclusion in the current study. Finally, potential sample members who did not complete the AFS were eliminated from the study. The final sample included participants who were first-time, full-time, 18-19 years of age, students admitted into the University Studies program and who completed the AFS and who had a GPA at the end of the first year in college.

<div align="center">The AFS Survey</div>

Administered since 1966, the AFS provides a detailed profile of each entering college class including demographic characteristics, secondary school experiences, and expectations of the college experience, degree goals and career plans, financial arrangements to pay for college, attitudes, values, life goals, and reasons for attending college. The AFS is a standardized survey instrument made up of two sections. The first section includes 40 standard items including a

host of sub-items. The second section includes a maximum of 21 optional questions that institutions can specify to meet their individual needs.

For purposes of this study, nine items and their respective sub-items from the first section of the AFS were examined. The nine items were assigned to one of three groups: background characteristics, self-perception of abilities, and degree aspirations. Table 1 provides details on all items included in the analysis. Six background characteristics and their corresponding items were selected for analysis in the study. These included: (a) sex, (b) a composite SAT score, (c) high school grades, (d) ethnicity, (e) a composite parental education score, and (f) parental income. The first question of the AFS asked participants to identify their sex. Participants had two options to select from; male or female. Participants were also asked to indicate their SAT I (verbal and math) and/or ACT scores. They were provided space on the survey to report their actual scores. For purposes of this study, ACT scores were converted to equivalent SAT scores as the latter are required for admission to the study institution. Next, participants reported their average grade in high school. Response options ranged from D (assigned a score of 1) to A or A+ (assigned a score of 8).

Participants were asked to provide their best estimate of their parents' total income in the previous year. They were to consider all sources before taxes. Fourteen options were provided for the participants. These options ranged from less than $10,000 to $250,000 or more. Table 1 details how these 14 options were collapsed into 3 categories: low income ($39,999 or less), middle income ($40,000-$74,999) and high income ($75,000 and above).

In terms of ethnicity, respondents reported the ethnic background of themselves, their father, and their mother. Only the response relative to themselves was considered for analysis. They were given the option to indicate if they were: (a) White/Caucasian, (b) African American/Black, (c) American Indian/Alaska Native, (d) Asian American/Asian, (e) Native Hawaiian/Pacific Islander, (f) Mexican American/Chicano, (g) Puerto Rican, (h) Other Latino, and (i) Other. They were also prompted to indicate all of the ethnicity options which were appropriate. However, the cell sizes for all groups other than Whites were too small to stand alone in the analysis. Therefore, it was necessary to create the majority and non-majority dichotomy for analysis purposes. The new categories are indicated in Table 1. It is important to note nine cases had missing information for this variable and thus were deleted from further analysis.

Table 1

Research Questions, Related AFS item, Response Options, Collapsed Categories, and Numeric Codes

Research Question Related AFS item	Response Options	Collapsed Category and Numeric Codes
Background Characteristics		
Sex	Male Female	0=female 1=male
SAT Composite Score Math and Verbal	0-999	0-999
High School Grades	A or A+ A- B+ B B- C+ C D	1=D 2=C 3=C+ 4=B- 5=B 6=B+ 7=A- 8=A or A+
Parental Income	Less than $10,000 $10,000-14,999 $15,000-19,999 $20,000-24,999 $25,000-29,999 $30,000-39,999 $40,000-49,999 $50,000-59,000 $60,000-74,999 $75,000-99,999 $100,000-149,999 $150,000-199,999 $200,000-$249,999 $250,000 or more	1=Low income ($39,999 or less) 2=Middle income ($40,000-$74,999) 3=High income ($75,000 and above)

Table 1 (continued)

Research Questions, Related AFS item, Response Options, Collapsed Categories, and Numeric

Codes

Research Question Related AFS item	Response Options	Collapsed Category and Numeric Codes
Ethnicity	White/Caucasian African American/Black American Indian/Alaska Native Asian American/Asian Native Hawaiian/Pacific Islander Mexican American/Chicano Puerto Rican Other Latino Other	0=Majority 1=Non-majority
Parental Education Composite (mother and father)	Grammar school or less Some high school High school graduate Postsecondary school other than college Some college College degree Some graduate school Graduate degree	1=High school degree or less 2=Some college experience and/or degree 3=Some graduate experience and/or degree
Highest degree aspired None Vocational certificate Associate Bachelor's degree Master's degree Ph.D. or Ed.D. Other	None Associate Bachelor's degree Master's degree Ph.D or Ed.D	1=Less than a Bachelor's degree 2=Bachelor's degree (including Associate and Bachelor's degree) 3=Post-Bachelor's degree (Master's degree, Ph.D. or Ed.D) 4=Other

Table 1 (continued)

Research Questions, Related AFS item, Response Options, Collapsed Categories, and Numeric

Codes

Research Question Related AFS item	Response Options	Collapsed Category and Numeric Codes
Self-perception of abilities Analytic ability (academic and mathematical ability)	Lowest 10% (1) Below average (2) Average (3) Above average (4) Highest 10% (5)	1=Below average (includes Below average and Lowest 10%) 2=Average 3=Above average (includes Highest 10% and Above average)
Self-perception of abilities Artistic Ability (artistic ability and creativity)	Lowest 10% (1) Below average (2) Average (3) Above average (4) Highest 10% (5)	1=Below average (includes Below average and Lowest 10%) 2=Average 3=Above average (includes Highest 10% and Above average)
Self-perception of abilities Leadership ability (leadership ability, public speaking ability, self-confidence (intellectual), and self-confidence (social))	Lowest 10% (1) Below average (2) Average (3) Above average (4) Highest 10% (5)	1=Below average (includes Below average and Lowest 10%) 2=Average 3=Above average (includes Highest 10% and Above average)
Self-perception of abilities Emotional health (drive to achieve, emotional health, and initiative)	Lowest 10% (1) Below average (2) Average (3) Above average (4) Highest 10% (5)	1=Below average (includes Below average and Lowest 10%) 2=Average 3=Above average (includes Highest 10% and Above average)

The parental education item asked participants to indicate the highest level of formal education obtained by their parents. Two responses were solicited for this item; one for the mother's highest level of formal education and another for the father's highest level. A composite variable for parental education was created by combining the highest level of education completed for both parents. Respondents selected from one of eight response options that ranged from grammar school or less to graduate degree. For purposes of this study, these eight options were collapsed into three categories including high school degree or less, college experience and/or degree, and graduate experience and/or degree (see Table 1). Therefore, the possible scores for parental education ranged from 2 (both parents having a high school degree or less) to 6 (both parents having some graduate experience and/or degree). Scores of 2 to 3.5 were assigned to group 1 (high school degree or less). Those with scores 3.6 to 4.5 were assigned to group 2 (some college experience and/or degree). Group 3 (some graduate experience and/or degree) was comprised of those scores ranging from 4.6 to 6. For this variable, 10 cases were identified as missing data. To maintain an appropriate sample size, missing data were replaced with the item mean score of 2.0.

Respondents' self-perceptions of their abilities were represented by one item on the AFS that included 21 sub-items. Participants rated themselves on each of the 21 sub-items by comparing themselves to the average person their age. Examples of these 21 traits included academic ability, public speaking ability, and writing ability. In previous research, factor analysis was conducted on the 21 sub-items related to self perception of abilities to cluster related items. The factor analysis yielded the following factors and their corresponding labels: (a) analytical ability (academic and mathematical ability), (b) artistic ability (artistic ability and creativity), (c) leadership ability (leadership and public speaking ability, and intellectual and social self-confidence), and (d) emotional health (drive to achieve, emotional health, and initiative) (Zheng, et. al, 2002). These four factors were included in the final analysis of the current study (see Table 1). Table 2 provides a detailed listing of the 21 self-perception of abilities, the four factors, and their sub-items. For each of the items participants were provided with 5 options to rate themselves. These options and the corresponding valued assigned to each included highest 10%=5, above average=4, average=3, below average=2, and lowest 10%=1. Table 3 indicates the number of cases that had missing data for this variable, the mean score for the specific item, and the value used to substitute for missing data. This replacement was

Table 2

AFS Self-perception of Abilities and Four Major Factors with Sub-items

AFS Self-perception of Abilities	Four Major Factors with Corresponding Sub-items
Academic ability	Analytical ability
Artistic ability	Academic ability
Computer skills	Mathematical ability
Cooperativeness	Artistic ability
Creativity	Artistic ability
Drive to achieve	Creativity
Emotional health	Leadership ability
Leadership ability	Leadership ability
Mathematical ability	Public speaking ability
Physical health	Self-confidence (intellectual)
Persistence	Self-confidence (social)
Popularity	Emotional health
Public speaking ability	Drive to achieve
Religiousness	Emotional health
Risk-taking	
Self-confidence (intellectual)	
Self-confidence (social)	
Self-understanding	
Spirituality	
Understanding of others	
Writing ability	

Table 3

Ability Items, Number of Missing Cases, Mean Scores, and Value Replaced (n=852)

Ability Item	Number of Missing Cases	Mean Score	Value Replaced
Academic ability	8	3.99	4
Artistic ability	9	2.89	3
Competitiveness	9	3.65	4
Computer Skills	9	3.84	4
Cooperativeness	8	3.82	4
Creativity	8	3.89	4
Drive to achieve	9	3.96	4
Emotional health	8	3.81	4
Leadership ability	8	3.68	4
Mathematical ability	10	3.78	4
Physical health	8	3.37	3
Public speaking ability	9	2.92	3
Self-confidence (intellectual)	9	3.76	4
Self-confidence (social)	8	3.61	4
Self-understanding	9	3.68	4
Spirituality	10	3.16	3
Understanding of others	8	3.85	4
Writing ability	8	3.41	3

necessary to maintain a sufficient sample size. To determine the composite score for each of the final four factors, the participants ratings were averaged (i.e., analytic ability score is the average of academic and mathematical ability ratings) based on the 5 option scale. Then, for purposes of this study, I created three categories: above average, average, and below average. To ensure equal sample size representation for each of the 3 categories, scores for each of the factors were ranked and one-third of the sample was assigned to each. For example, those whose average score for analytic ability was in the highest third of all scores were assigned to the above average group while those whose average score was in the lowest third of all scores were assigned to the below average group.

In terms of highest degree aspired to, one item on the AFS asked participants to indicate the highest academic degree they intended to obtain (see Table 1). The 10 response options to this item ranged from no degree to various types of terminal degrees. Considering the study institution does not offer all of the degrees included as response options (e.g., vocational certificate), the options were collapsed into 3 categories including less than a B.A., Bachelor's degree, and post-Bachelor's degree. The Bachelor's degree option included respondents who indicated the highest degree they aspired to was an Associate or Bachelor's degree. Those indicating Master's degree, Ph.D. or Ed.D were assigned to the Post-Bachelor's degree category. Those respondents who indicated "other" as the highest academic degree they intended to obtain were not able to provide more detailed information describing what the other degrees might include. Therefore, in cases where respondents indicated "other" a substitution was made. The average for the group was used to retain those cases for inclusion in the study.

The proposed coding for this item (1=less than a bachelor's degree, 2=bachelor's degree, 3=post-bachelor's degree, 4=other) presumes the data is ordinal in nature, where "those persons with the higher level properties in the natural variable are expected to get higher scores than those persons from lower properties" (Goldstein & Hersen, 1984, p. 52). Specifically, it is natural to conclude that those respondents who indicate a higher level of degree aspirations would receive a higher value for their response. Since this item is similar to a Likert scale, it is appropriate to address the issue of missing data by substituting the item mean for the cases where

responses were not provided. This was a necessary analytical strategy to minimize the effects of missing data.

<div align="center">Validity and Reliability</div>

It was necessary to determine the validity and reliability of the AFS before analysis could proceed. Validity is the extent to which the AFS measures what it intends to measure. Researchers often assess the validity of their instruments by conducting factor analyses on specific constructs of the instruments. Factor analysis is a statistical technique which clusters like items to determine if they all have a similar influence on an outcome. Several studies have conducted such an investigation with the AFS, concluding the AFS is a valid instrument (Astin, 1991; Astin, 1992; Luo & Jamieson-Drake, 2005).

The degree to which the content of an instrument reflects what the researcher wants to know is referred to as content validity (Suskie, 1996). The content validity of the AFS is assessed by the CIRP Advisory Board. This board is comprised of higher education experts from across the county and it meets annually with the CIRP staff to ensure that the AFS continues to meet its intended purpose. In addition, the CIRP program is the nation's largest and oldest study that examines the American higher education system over time. The AFS is administered at approximately 700 institutions to more than 400,000 students each year (HERI, 2009). For the current study, administrators for the CIRP Annual Freshman Survey were contacted and asked to provide any data supporting the validity of the instrument. They responded that the data was unavailable.

Reliability addresses the extent to which an instrument is internally consistent or is a stable measure over a given period of time (Corbetta, 2003). The consistency of answers for the majority of the AFS items has remained stable during the survey's nearly four decade existence, indicating its reliability. While changes in responses have been noted, these changes "can be linked to temporal trends or to real and meaningful exogenous shocks (the events of September 11th, for example)" (HERI, 2009, paragraph 3). Overall, the CIRP is a valid and reliable instrument. The CIRP is a copyrighted instrument so it is not appended to this study. Details about the CIRP can be obtained from http://www.gseis.ucla.edu/heri/cirpoverview.php. While items on the AFS can change annually, the items included for the current study did not change with one exception. The specific AFS item regarding self-perception of abilities consistently included 21 sub-items. However, the 2007 survey instrument deleted

"religiousness" and added "computer skills." Therefore, to ensure consistency among the 2005, 2006, and 2007 survey instruments these two sub-items were excluded from analysis in the current study.

<div align="center">Data Collection Procedures</div>

Data collection began after I received approval from the Institutional Review Board (IRB) of the institution at which the current study was undertaken. A request detailing the purpose statement, research questions, sample selection, and methodology was submitted and IRB approval was granted (see Appendix A). I then requested the data set from staff in the Admission office, and added data about enrollment status and GPA before requesting AFS data. The AFS data were added to the dataset by the Office of Academic Assessment.

Since 1971, AFS data have been collected by the study institution in an effort to better understand the characteristics of its entering student body. The AFS is administered as a matter of routine each year during the institution's summer orientation program. Institutional representatives proctor the AFS and establish the guidelines including date, time, and location for participants to complete the AFS. The completed surveys are collected by the proctors and forwarded to CIRP for processing and scoring. A complete report is returned to the institution each year, including the original data set. I submitted a list of student identification numbers of those students admitted to University Studies in 2005, 2006, and 2007 to the Assessment Office. Using this list of identification numbers, staff members in the Assessment Office were able to pull the AFS data for those students. They then eliminated identification numbers from the data set so I was not able to connect responses to any individual student. The final data set was sent to me as a single Excel file.

<div align="center">Data Analysis Procedures</div>

Secondary analysis was employed for this study. That is, analysis was conducted on previously collected survey data and I attempted to answer a new question with pre-existing data (Corbetta, 2003). Several advantages of using such an approach have been documented. They include minimizing the cost of obtaining the data and increasing the sample size by combining data (Singleton & Straits, 1999).

The data analysis for the current study entailed three steps. The first involved coding the data. For example, I needed to classify the participants into one of two types of undecidedness (SM or NSM) based on the data provided by Undergraduate Admissions. For this variable, it was

necessary to use dummy coding, which assigned values of 0 or 1 to reflect the absence or presence of an intended major. Undecided status was related to initial choice of academic major at the time the respondents completed their admission application. Major admission requirements typically go beyond the admission standards of the university. NSMs were those participants who did not apply to any particular major in their admission materials. They were coded as 0. SMs, coded as 1, were those participants who applied to a specific academic program but were denied admission because they failed to meet that particular major's admissions requirements.

Another variable that required coding included ethnicity. Each case required evaluation in terms of the two collapsed categories representing ethnicity: majority or non-majority. For example, an African American respondent would be coded as a 1 representing the non-majority group, whereas White or Caucasian students would be coded as a 0 for inclusion in the majority group.

Coding also occurred whenever the original data set was not coded in a manner conducive to the current study. For example, within the background characteristics, sex was coded into numerical data (0 = female, 1 = male). In addition, institutional data indicated the following average composite SAT scores for first-time freshmen in 2005, 2006, and 2007 respectively: 1203, 1201, and 1203. The three-year SAT average score was 1202. Those students who reported their SAT scores on the AFS as being at or above the three- year average were coded as 1. Those who reported SAT scores below the institutional average for that year were coded as 0. For verification purposes, the coding was reviewed by a second coder. This step was taken to ensure that each response was properly coded, diminishing the chance for error. Several other components of the data set also required coding.

Once coding was complete for all variables, I analyzed the data to address the research questions posed in the study. The first four research questions investigated the differences between SMs and NSMs in terms of their background characteristics (sex, SAT composite score, parental income, ethnicity, and composite parental education), self-perception of abilities, degree aspirations, and academic achievement. To address these questions, I conducted chi-squares and t-tests (as appropriate) to determine whether significant differences ($p < .05$) existed between groups for each of the variables identified in the study.

In addition, once significant variables were identified a multiple linear regression was employed based on the assumption that more than one independent variable has a significant

effect on academic achievement. This analysis was necessary to assess the relative importance of various combinations of independent variables, including all main effects and all interactions among the factors. This approach addressed the fifth and sixth research questions that attempted to determine how much variance in academic achievement was explained by background characteristics, self-perceptions of abilities, and highest degree aspired for each undecided status (SMs and NSMs).

In conclusion, the present study was designed to examine the relationship between academic achievement and undecided status. Specific pre-college characteristics related to background characteristics, self-perception of abilities, and highest degree aspired were examined to determine if how much variation in academic achievement between SMs and NSMs could be explained. In addition, I examined whether demographic characteristics, self-perception of abilities, degree aspirations, and undecided status predicted academic achievement for each of the two groups (SMs and NSMs). The methodology described in the current chapter was sufficient to respond to the research questions outlined in this study.

Chapter Four

Results of Study

The purpose of this chapter is to report the findings of the current study. First, the sample of undecided students is described by examining the differences between the NSMs and SMs in terms of their background characteristics, self-perception of abilities, degree aspirations, and academic achievement. These findings relate to the first four research questions.

To address the final two research questions, the nature of the relationship within each of the two sub-groups of undecided students and their respective background characteristics, self-perception of abilities, and degree aspirations were examined to determine how much variance in academic achievement can be explained by these factors.

Comparing NSMs and SMs

The data set for this study provided the opportunity to investigate the similarities and differences between 852 undeclared students who were classified as either NSMs ($N = 538$) or SMs (n=314). The literature describes academic achievement as an important measure of student persistence. In addition, a review of the literature notes a number of pre-college characteristics that influence academic achievement including background characteristics, self-perception of abilities, and degree aspirations.

Background Characteristics

The first research question posed in the study focused on differences between SMs and NSMs by background characteristics. The background characteristics included sex, high school grade point average, parental income, race, parental education, and SAT score. Crosstab analysis was conducted on all background characteristics except SAT scores. Crosstabs are designed for discrete variables, usually those measured on nominal or ordinal scales. Because SAT scores are continuous variables that can assume many different values, crosstab analysis was not an appropriate form of analysis. Therefore, a t-test was used to examine differences in the two groups by SAT score.

The crosstabs analysis, as shown by the resulting chi squares, led to four significant differences between groups. First, a significant difference in terms of sex was revealed. Specifically, more NSMs were female ($N = 283$) than male ($N = 255$), while significantly more males ($N = 240$) than females ($N = 74$) were SMs. The differences by sex were significant at the level of $p = .000$ (see Table 4).

Table 4

Results of Chi-Squares Comparing NSMs (n=538) and SMs (n=314) on Background Characteristics

Variables		NSM		SM		Total		P-value
		N	%	N	%	N	%	
Sex	Male	255	47.40	240	76.43	495	58.10	
	Female	283	52.60	74	23.57	357	41.90	
	Total	538	100.00	314	100.00	852	100.00	.000*
High School GPA	C+	1	0.19	0	0.00	1	0.12	
	B-	11	2.04	10	3.18	21	2.46	
	B	60	11.15	51	16.24	111	13.03	
	B+	174	32.34	120	38.22	294	34.51	
	A-	178	33.09	81	25.80	259	30.40	
	A or A+	114	21.19	52	16.56	166	19.48	
	Total	538	100.00	314	100.00	852	100.00	.022*
Parental Income	Low income	44	8.18	32	10.19	76	8.92	
	Middle income	110	20.45	74	23.57	184	21.60	
	High income	384	71.38	208	66.24	592	69.48	
	Total	538	100.00	314	100.00	852	100.00	.280
Race	Majority	448	83.27	237	75.48	685	80.40	
	Non-majority	90	16.73	77	24.52	167	19.60	
	Total	538	100.00	314	100.00	852	100.00	.007*
Parental Education	Low	101	18.77	84	26.75	185	21.71	
	Medium	226	42.00	123	39.17	349	40.96	
	High	211	39.22	107	34.08	318	37.32	
	Total	538	100.00	314	100.00	852	100.00	.022*

The findings also revealed significant differences between NSMs and SMs related to their high school grade point average.   Table 4 revealed that NSMs tended to report higher grades earned during high school than SMs (p=.022). The three highest grade options students could report included: (a) A or A+, (b) A-, and (c) B+. The percentages of NSMs indicating these grade options were 21.19%, 33.09%, and 32.34% respectively for a total of more than 86%. For the SM group the respective percentages were 16.56%, 25.80%, and 38.22%, or a total of only 80%.

The analysis also revealed that significantly more of the sample were students from the majority race category (White) in comparison to the non-majority race category (all other race categories) regardless of their major classification (NSM versus SM) ($p = .007$). Of the total sample, 685 students were of the majority and 167 were from the non-majority group.

As indicated in Chapter Three, parental education was grouped into 3 options: low, medium, and high. In two of these three groups, NSMs represented a larger percentage of the sample than SMs. The exception was at the low level, where there were more SMs than NSMs. The difference between NSMs and SMs in respect to parental income was significant at the level of $p = .022$ (see Table 4).

There were no significant differences between the NSMs and SMs on the remaining two demographic characteristics. Specifically, Table 4 highlights the fact that regardless of whether students indicated their parents' income level as low, middle, or high no significant differences emerged between NSMs and SMs. In an effort to examine differences between the two groups in relation to their SAT scores, a t-test was conducted (see Table 5). Although the mean SAT score for the two groups varied (NSM mean = 1194.89, sd = 104.86; SM mean = 1184.75, sd = 102.35) the difference was not significant ($p = .170$).

Self-perception of Abilities

The second research question in the study examined differences between NSMs and SMs on self-perceptions of ability. Current literature indicates students' self-perception of abilities serves as a predictor of projected academic achievement in college. This study examined self-perceptions of four abilities including analytic ability, artistic ability, leadership ability, and emotional health. Using chi-square analysis, findings suggested no significant differences between NSMs and SMs in terms of their analytic ability, leadership ability, and emotional

Table 5

Results of T-test Comparing SAT Scores between NSMs (n=538) and SMs (n=314)

		N	Mean	SD	P-value
SAT score	NSM	538	1194.89	104.86	.170
	SM	314	1184.75	102.35	
	Total	852			

health (see Table 6). However, significantly more NSMs indicated higher self-ratings of their artistic ability ($p = .019$) than their SM counterparts.

Degree Aspirations

A final pre-college characteristic which has been found to have an impact on academic achievement is degree aspirations, the subject of the third research question posed in the study. While the literature on college students tends to examine degree aspirations as an outcome, the current study used it as a means to examine differences between NSMs and SMs and later as a predictor of academic achievement. For the current sample of 852 students, a p-value of .471 indicated no significant differences existed between the NSMs and SMs (see Table 7).

 Academic Achievement

As noted in Chapter Two, first-year grade point average is frequently used as a measure of student achievement and has been found to be a significant predictor of persistence in the literature. Therefore, in the current study, the first-year GPAs of 852 undecided students were analyzed using an independent sample t-test to determine if a significant difference in first-year GPA existed for NSMs and SMs. The findings revealed there is a statistically significant difference between the two groups in terms of their academic achievement as measured by their cumulative, first-year GPA ($t = 6.431$, $p = .000$). The mean first-year GPA for NSMs (3.02) was significantly higher than that for SMs (2.73) (see Table 8).

Predicting Academic Achievement

Prior to analysis, it was important to scan the data for general trends. Table 9 provides general descriptive statistics for each of the variables included in the analysis for this study. This includes the mean score and standard deviation for each variable.

Also, the correlations among all variables and background characteristics, self-perception of abilities, and degree aspirations were examined. First, for degree aspirations, the correlations varied in degree and direction, ranging between -.15 (Race and Income) and .24 (Parental Education and SAT). Despite the variation in value and direction of these correlations, Table 10 indicates the majority of the correlations were small to moderate in terms of size. Because the correlations were not high, there was less concern about issues of multicollinearity and all background characteristics were retained for inclusion in the regression analysis.

Table 6

Results of Chi-Squares Comparing NSMs (n = 538) and SMs (n = 314) on Self-perception of

Abilities

Variables		NSM		SM		Total		
		N	%	N	%	N	%	P-value
Analytic Ability	Below average	222	41.26	117	37.26	339	39.79	
	Average	190	35.32	115	36.62	305	35.80	
	Above Average	126	23.42	82	26.11	208	24.41	
	Total	538	100.00	314	100.00	852	100.00	.476
Artistic Ability	Below average	248	46.10	126	40.13	374	43.90	
	Average	141	26.21	72	22.93	213	25.00	
	Above Average	149	27.70	116	36.94	265	31.10	
	Total	538	100.00	314	100.00	852	100.00	.019*
Leadership Ability	Below average	7	1.30	3	0.96	10	1.17	
	Average	390	72.50	242	77.07	632	74.18	
	Above Average	141	26.21	69	21.97	210	24.65	
	Total	538	100.00	314	100.00	852	100.00	.332
Emotional Health	Below average	217	40.33	126	40.13	343	40.26	
	Average	164	30.48	98	31.21	262	30.75	
	Above Average	157	29.18	90	28.66	247	28.99	
	Total	538	100.00	314	100.00	852	100.00	.973

Table 7

Results of Chi-Squares Comparing NSMs (n=538) and SMs (n=314) on Degree Aspirations

Variables		NSM		SM		Total		P-value
		N	%	N	%	N	%	
Degree Aspirations	Less than a Bachelor's degree	3	0.56	0	0	3	0.35	
	Bachelor's degree	120	22.30	66	21.02	186	21.83	
	Post-Bachelor's degree	409	76.02	246	78.34	655	76.88	
	Other	6	1.12	2	.64	8	0.94	
	Total	538	100.00	314	100.00	852	100.00	.471

Table 8

Results of T-test Comparing First Year GPA between NSMs (n = 538) and SMs (n = 314)

		N	Mean	SD	P-value
Academic Achievement	NSM	538	3.02	.60	.000*
	SM	314	2.73	.68	
	Total	852			

*p<.05

Table 9

Descriptive Statistics for Background Characteristics, Self-perception of Abilities, Degree Aspirations, and Academic Achievement for Undecided Students (n = 852)

Variable	Mean	SD
Academic ability	1.85	0.79
Artistic ability	1.87	0.86
Degree aspiration	2.78	0.44
High school grade point average	1.89	0.82
Income	6.51	1.03
Leadership ability	2.61	0.65
Parental Education	2.16	0.75
Race	0.20	0.40
SAT score	1191.15	104.00
Sex	1.42	0.49
1st Year grade point average	2.91	0.64

Table 10

Correlations Among All Variables and Undecided Students' (n = 852) Background

Characteristics

	Background Characteristics					
	High School GPA	Income	Parental Education	Race	SAT	Sex
Academic ability	.13**	.03	-.01	.01	.13**	-.12**
Artistic ability	.10**	-.00	.02	.06	-.09**	.13**
Degree aspiration	.08*	-.02	.12**	.03	.03	.05
Emotional Health	.06	.08*	.05	-.02	-.01	-.05
High school grade point average		-.08*	-.08*	-.12**	-.03	.18**
Income	-.08		.30**	-.15**	.11**	.00
Leadership ability	.05	.08*	.10**	-.05	.14**	-.08
Parental Education	-.08*	.30**		-.13**	.24**	.03
Race	-.12**	-.15**	-.13**		-.01	-.05
SAT score	-.03	.11**	.24**	-.01		-.11**
Sex	.18	.00	.03	-.05	-.11**	
1st Year GPA	.26**	.05	.13**	-.04	.08*	.234**

**Correlation is significant at the .01 level (2-tailed)

*Correlation is significant at the .05 level (2-tailed)

The next set of correlations were used to examine the relationship between the predictor variables and self-perception of abilities (see Table 11). The findings indicate these correlations varied in degree, direction and significance. Similar to the correlations with background characteristics, the correlations with self-perception of abilities were primarily small to moderate in regard to degree, with one exception. This exception included the correlation between Leadership Ability and Emotional Health that had a value of .40 (see Table 11). All self-perception of abilities were retained for inclusion in the regression model.

Table 11 also reveals the findings of the correlation between the predictor variables and degree aspiration. All of the correlations were positive and small in terms of size. Based on the findings, degree aspiration was retained for inclusion in the regression model.

The correlations between background characteristics, self-perception of abilities, and degree aspirations and the dependent variable (Academic Achievement) were positive with one exception. The correlation of race and academic achievement was -.04, reflecting a weak and negative correlation. As noted in Tables 10 and 11, correlations for academic achievement and the remainder of the variables were all positive and small to moderate with values ranging from .000 (Artistic Ability) to .264 (High School GPA). This indicated the data were suitable for correlation with the dependent variable for further investigation through multiple linear regression. Since no assumptions were made beforehand regarding a specified order of entry for the predictor variables, a direct method was used in the regression analyses.

Multiple Linear Regression-NSM

Multiple linear regression was employed to help determine whether background characteristics, self-perception of abilities, and degree aspirations could be used to predict the academic achievement of NSM students ($n = 538$), the fifth research question posed in the study. This model, Model 1, was significant ($F (11, 526) = 9.582, p = .000$) and resulted in four significant predictors of academic achievement for NSMS: high school GPA, parental education, SAT score, and sex. Model 1 explained 16.7% of the variance in academic achievement for NSMs (see Table 12).

To determine if the interactions among the significant factors in the first model help explain more of the variance a second model was executed for NSMs in which the interactions of each of the significant predictors previously identified were entered into the regression analysis.

Table 11

Correlations Between All Variables and Undecided Students' (n=852) Self-perception of Abilities and Degree Aspirations

	Self-perception of Abilities and Degree Aspirations				
	Academic Ability	Artistic Ability	Leadership Ability	Emotional Health	Degree Aspirations
Academic ability		.16**	.234**	.25**	.09**
Artistic ability	.16**		.12**	.14**	.09**
Degree aspiration	.09**	.09**	.10**	.04	
Emotional Health	.25**	.14**	.40**		.04
High school GPA	.13**	.10**	.05	.06	.08*
Income	.03	-.00	.08*	.08*	-.02
Leadership ability	.23**	.12**		.40**	.10**
Parental Education	-.01	.02	.10**	.05	.12**
Race	.01	.06	-.05	-.02	.03
SAT score	.13**	-.09**	.14**	-.01	.03
Sex	-.128*	.13**	-.09*	-.05	.05
1st Year GPA	.028	.00	.01	.01	.08*

**Correlation is significant at the .01 level (2-tailed)

*Correlation is significant at the .05 level (2-tailed)

Table 12

Results of Regression of Background Characteristics, Self-perception of Abilities, and Degree

Aspirations on Academic Achievement for NSMs (n = 538)

Model	B	Std. Error	Beta	t	p-value	R²
1 (Constant)	.34	.38		.92	.36	.167*
Academic ability	-.01	.03	-.01	-.26	.80	
Artistic ability	-.03	.03	-.04	-1.00	.32	
Degree aspiration	.10	.05	.08	1.91	.06	
Emotional health ability	-.001	.03	-.01	-.19	.85	
High school GPA	.17	.03	.29	6.88	.00	
Income	.05	.04	.05	1.20	.23	
Leadership ability	.00	.06	.00	.07	.94	
Parental education	.09	.04	.11	2.40	.02	
Race	-.03	.07	-.02	-.46	.64	
SAT	.00	.00	.10	2.43	.02	
Sex	.21	.05	.18	4.22	.00	
2 (Constant)	1.68	2.80		.60	.55	.184
Academic ability	-.02	.03	-.02	-.46	.65	
Artistic ability	-.03	.03	-.04	-.84	.40	
Degree aspiration	-.12	.72	-.09	-.16	.87	
Emotional health ability	-.01	.03	-.02	-.42	.67	
High school GPA	.31	.32	.52	.95	.34	
Income	.05	.04	.05	1.27	.21	
Leadership ability	.01	.06	.01	.19	.85	
Parental Education	.15	.29	.19	.52	.61	
Race	-.021	.07	-.01	-.31	.76	
SAT	-.00	.00	-.49	-1.25	.21	
Sex	.82	.69	.69	1.20	.23	
Degree x High school GPA	-.05	.05	-.38	-1.01	.31	
Degree x Parental education	-.02	.08	-.06	-.21	.84	
Degree x SAT	.00	.00	.81	1.44	.15	
Degree x Sex	-.20	.11	-.54	-1.87	.06	
High school GPA x Parental	-.00	.03	-.04	-.12	.90	
education	.00	.00	.25	.44	.66	
High school GPA x SAT	-.07	.05	-.42	-1.34	.18	
High school GPA x Sex	.00	.00	.32	.68	.50	
Sex x SAT						

*p<.05

The interactions included: (a) degree and high school GPA, (b) degree and parental education, (c) degree and SAT score, (d) degree and sex, (e) high school GPA and parental education, (f) high school GPA and SAT score, (g) high school GPA and sex, and (h) sex and SAT score. Model 2 resulted in no significant predictors of academic achievement for NSMS. In addition, Model 2 explained 18.4% of the variance in academic achievement for NSMs. Despite this increase in R^2 from model 1 to model 2, the increase was not significant (F (11, 518) = 1.322, p = .230).

Multiple Linear Regression-SM

For the population of students identified as SMs, another multiple linear regression was used to investigate the final research question in the study: can background characteristics, self-perception of abilities, and degree aspirations be used to predict the academic achievement of SMs (n = 314). The first model, Model 1, was significant (F (11, 302) = 9.726, p = .029) and resulted in three significant predictors of academic achievement for SMs: high school GPA, parental education, and sex. Model 1 explained 6.6% of the variance in academic achievement for SMs (see Table 13).

A second model was executed for SMs in which the interactions of each of the significant predictors above were entered into the regression analysis. The interactions included (a) high school GPA and parental education, (b) high school GPA and sex, and (c) parental education and sex. This second regression model for SMs resulted in only one significant predictor which was the interaction of high school GPA and parental education. Although the ability to explain the variance in academic achievement for SMs increased to 7.9% in model 2, this change was not significant (F (3, 299) = 1.474, p = .222).

In summary, the results of the data analysis revealed differences between NSMs and SMs as well as several factors that play a role in predicting first year GPA for undecided students. These findings, and their implications for future practice, research, and policy, are discussed in the next chapter.

Table 13

Results of Regression of Background Characteristics, Self-perception of Abilities, and Degree Aspirations on Academic Achievement for SMs (n = 314)

Model	B	Std. Error	Beta	t	p-value	R^2
1 (Constant)	1.67	.59		2.80	.01	.066*
Academic ability	.06	.05	.067	1.11	.27	
Artistic ability	-.02	.05	-.02	-.37	.72	
Degree aspiration	-.01	.10	-.00	-.05	.96	
Emotional health ability	.03	.05	.04	.61	.54	
High school GPA	.10	.04	.15	2.49	.01	
Income	-.02	.06	-.02	-.28	.78	
Leadership ability	-.07	.10	-.05	-.75	.46	
Parental education	.11	.05	.13	2.12	.04	
Race	.14	.09	.09	1.57	.12	
SAT	1.34	.00	.00	.03	.97	
Sex	.21	.10	.13	2.20	.03	
2 (Constant)	2.80	1.17		2.38	.02	.079
Academic ability	.06	.05	.07	1.19	.24	
Artistic ability	-.03	.05	-.04	-.62	.54	
Degree aspiration	-.01	.10	-.00	-.05	.96	
Emotional health ability	.03	.05	.04	.63	.53	
High school GPA	-.08	.16	-.12	-.48	.63	
Income	-.01	.06	-.01	-.12	.91	
Leadership ability	-.07	.10	-.04	-.69	.49	
Parental Education	-.50	.31	-.58	-1.62	.11	
Race	.14	.09	.09	1.59	.11	
SAT	1.71	.00	.00	.04	.97	
Sex	.26	.66	.16	.40	.69	
High school GPA x Parental education	.10	.05	.72	1.98	.05	
High school GPA x Sex	-.02	.10	-.07	-.16	.87	
Parental Education x Sex	.02	.12	.03	.13	90	

Chapter Five

Discussion

This study was designed to address the gap in the literature regarding background characteristics, self-perceptions of abilities, and degree aspirations that predict the academic achievement of first-year, undecided students. An institutional data set comprised of first-year students served as the foundation for this study. Other data were added that included students' cumulative first-year GPA and their undecided status (NSM or SM). Chi-squares were used to determine whether there were differences between NSMs and SMS in terms of their background characteristics (sex, high school GPA, parental income, race, parental education, and SAT score), self-perceptions of abilities (analytic ability, artistic ability, leadership ability, and emotional health), and degree aspirations.

One of the background characteristics, SAT score, was a continuous variable which could assume a wide range of different values. Therefore, a t-test was used to examine the differences between NSMs and SMs related to their self-reported SAT scores. This same rationale provided justification for the use of a t-test to investigate whether differences existed between NSMs and SMs in terms of their academic achievement. Academic achievement was defined as students' cumulative GPA at the end of their first year of enrollment. To determine how much variance in academic achievement for NSMs and SMs could be explained, multiple regression models were used. In order to assess the impact of possible interactions of the predictor variables, the interactions of significant variables were added to the models.

The purpose of this chapter is to discuss the findings within the framework provided by current literature. Implications for future practice, research and policy are also recommended.

Discussion

Results of this study are discussed in relation to the six research questions posed in the study. The first four research questions examined whether differences existed between NSMs and SMs in terms of their background characteristics, self-perceptions of abilities, degree aspirations, and academic achievement. The final two research questions investigated the degree to which these factors predicted the academic achievement (GPA) of the two groups of undecided students (NSMs and SMs).

Background Characteristics

The first research question presented in this study examined whether significant differences in background characteristics existed for NSMs and SMs. To explore this question a crosstab was used and chi-square analyses were conducted based on the belief that background characteristics might be causally influencing students' undecided status. Findings revealed significant differences with respect to four background characteristics: (a) sex, (b) high school GPA, (c) race, and (d) parental education.

Sex. First, in terms of sex, the SM group included more men (76.43%) than women (23.57%). This finding was not completely surprising as the gender distribution of the study's total sample was comprised of 58.10% men and 41.90% women and institutional data indicate the gender distribution of first-year undecided students for 2005-2007 consisted of 59.57% men and 40.43% women. Nevertheless, males represented a significantly larger portion of the SM group. One plausible explanation for this difference relates to the nature of the SM population. At the institution at which this study was conducted, the majority of students in the SM group were denied admission into a single degree option, general engineering, which tends to have a first-year student gender distribution includes more men than women. Specifically, the gender distribution for the first-year students in engineering during 2005-2007 for men and women was 84.25% and 15.75%, respectively. Therefore, the gender demographics of the SM group more closely matched those of their most frequently cited choice of major.

A noteworthy finding, however, is revealed regarding sex and the NSM group which was composed of significantly more women (52.60%) than men (47.40%). This finding deviates from both the sample population as well as the first-year, undecided student population during 2005-2007, so the reasons that women make up a greater portion of the NSM group cannot be easily explained. It is possible students' reasons for choosing a major can provide some context to interpreting this finding. Malgwi, Howe, and Burnaby (2005) found that women's aptitude in a particular subject was a significant influence on their choice of major. In light of their finding, women at the university from which the current sample was derived may not initially have had confidence in their aptitude in the majors for which the institution has its greatest reputation: Engineering and Architecture. If their confidence was lower in these areas, perhaps they felt the need to explore more options before committing to a major. On the other hand, men choose their major based on perceived potential for career advancement and higher salary expectations

(Malgwi, Howe, & Burnaby, 2005). Therefore, they might have selected a major during the admission process regardless of their aptitude and preparedness to begin the major. These influences on students' choice of major may explain why the NSM group has significantly more women than men.

High School GPA. The institution at which this study was conducted is considered selective in terms of its admission standards. Specific evidence of this includes the fact that in 2007 the average high school GPA of students who were offered admission to the institution was 3.85. In light of these high academic credentials of potential first-year students, it is startling to note the significant difference in high school grades between the NSM and SM groups. Specifically, a greater percentage NSMs (54.28%) indicated an average high school grade of an A than SMs (42.36%). In addition, a smaller percentage of NSMs (45.72%) reported their average high school grade as a B or less than the SM group (57.64%). Both findings support the idea that NSMs had higher levels of academic performance in high school than the SMs.

This finding is counterintuitive given the assumption that students who are committed to a particular major or degree program experience greater levels of academic achievement as a result of their goal commitment and focus. That is, the SMs were undecided only because they were not accepted into their first choice major, hence could be considered committed to an academic program. However, the lower levels of average high school grades for the SM group might explain the fact that many of these students were denied entry into their first choice of major because their high school credentials, including grades, were not as competitive as those who were offered admission. If the SM group had average high school grades which mirrored the overall average GPA for students admitted to the university, more SMs would have been directly admitted into their first choice of major instead of enrolling in the undecided option.

Race. A third significant difference in background characteristics between NSMs and SMs was found in relation to race. Due to the small number of students representing racial backgrounds other than Caucasian, the analysis of differences by race were based on a comparison of majority and non-majority students. Findings revealed the overall sample's racial distribution of majority and non-majority students to be 80.40% and 19.60%, respectively. However, closer examination reveals differences between the undecided student statuses. The racial distribution among the NSM group was very similar to the sample distribution: majority (83.27%) and non-majority (16.73%) students. For the SM group, though, there is a greater

deviation from the sample population with 75.48% majority and 24.52% non-majority students. Clearly, the SMs have a greater representation of non-majority students than the NSM group. Societal forces again may partially explain the impact of race on undecided major status. The non-majority SM group members may have experienced more pressure from parents and their communities to begin their college enrollment focused on a particular major. This would decrease or better manage the time required to complete their degree. While the intent of these expectations may have been to encourage and provide focus for non-majority students, these students may have ultimately chosen to apply for admission to a major for which they were not prepared to succeed.

Parental Education. The final background characteristic for which significant differences between NSMs and SMs were revealed is parental education, with significantly more SMs (26.75%) having parents with lower levels of education than NSMs (18.77%). This finding is interesting in light of the fact that only 21.71% of the sample population indicated low parental educational levels. One possible explanation could be related to the difference found in race. Since a significant portion of the SM group was comprised of non-majority students, it would follow that their parents were also considered non-majority. As non-majority parents they may have less education than the majority parents. Other feasible explanations for this finding are not available but the current finding warrants future investigation.

Self-perception of Abilities

The second research question posed in this study examined whether significant differences in self-perceptions of abilities could be identified for NSMs and SMs. Respondents' self-perceptions of abilities were represented by one item on the AFS that included 21 sub-items. These 21 sub items were collapsed into four groups based on previous research in which factor analysis was conducted on the 21 sub-items in order to cluster related items. The factor analysis yielded the following clusters and their corresponding labels: (a) analytical ability (academic and mathematical ability), (b) artistic ability (artistic ability and creativity), (c) leadership ability (leadership and public speaking ability, and intellectual and social self-confidence), and (d) emotional health (drive to achieve, emotional health, and initiative) (Zheng, et. al, 2002). These four factors were included in a chi-square analysis to explore potential differences between the two groups.

Of the four self-perceptions of abilities examined, the only significant difference between NSMs and SMs was in the ratings of their artistic abilities. Specifically, a greater percentage of SMs (36.94%) rated their artistic ability as above average than NSMs (27.70%). Given that artistic ability is a measure students' artistic and creativity, this finding does not come as a surprise because of the nature of the institution at which the study was conducted. This university has top-ranked engineering and architecture programs. Recall that the SM group included students who were denied admission to their first choice major. The overwhelming majority of students in the SM group were denied admission into Engineering or Architecture. Specifically, 478 first-year students were denied admission to majors within the architecture college and 833 within general engineering from 2005 to 2007 out of a total undecided population of 3990 students. Both of these academic majors place a major emphasis on creativity and design which might explain the higher self-ratings of self-perception of artistic abilities by SMs. Both engineering and architecture and design students have to demonstrate a skill set based on artistry and creativity.

Degree Aspirations

Examining whether significant differences in degree aspirations could be identified for NSMs and SMs was the purpose of the third research question. The analysis employed to address this question was a chi-square. The 10 response options related degree aspirations from the Annual Freshman Survey were collapsed into four groups: (a) less than a Bachelor's degree, Bachelor's degree, post-Bachelor's degree, and other. The greatest percentage of responses indicated students aspired to a Bachelor's degree (21.83%) or post-Bachelor's degree (76.88%) regardless of students' affiliation with either the NSM or SM group. No significant difference was found between NSMs and SMs in terms of their degree aspirations ($p = .471$).

There are a couple potential explanations for this finding. First, the institution from which the sample was drawn is a major research university with highly competitive admission standards. The average SAT score for entering classes in the three years in which the sample matriculated was 1203. Also, faculty members were awarded hundreds of millions of dollars in research grants during those years and there is a growing emphasis on engaging undergraduates in research activities. Finally, the students in the sample completed the AFS prior to enrolling at the institution. It is possible that they had high aspirations prior to selecting a university to attend and that their selection of this particular university was, in part, due to their assumption that a

degree from the school would facilitate their post-baccalaureate degree plans, regardless of their undecided status (NSM or SM).

Alternatively, the finding might be explained by the types of academic programs offered at the institution where the study took place. As noted previously, the university is host to top-rated programs in architecture and engineering. There are also major programs in sciences, business, natural resources, and agriculture. Many of these are fields in which advanced degrees are the norm for career success. This might explain why both groups in the study (NSMs and SMs) reported high degree aspirations.

Academic Achievement

Perhaps the most interesting finding of this study related to the fourth research question: Are there significant differences between NMSs and SMs in terms of their academic achievement, as measured by their first-year cumulative college GPA? The mean first-year GPAs for NSMs and SMs were 3.02 and 2.73, respectively. Though both mean GPAs are commendable and would indicate academic success at most institutions of higher learning, the results reveal the difference is highly significant at the level of $p=.000$. Most surprising is the fact that NSMs earned significantly higher GPAs than SMs. This finding is counterintuitive in that there is a generally held belief that the more certain a student is about his/her major choice the more likely that student is to be academically successful (Anderson, 1985; Leppel, 2001, Sprandel, 1985). In the case of the current study, SMs are students who originally applied for admission into a specific major but were not accepted because of additional entrance requirements beyond those of the institution. SM status would indicate students have a more focused and deliberate plan to declare their intended major as quickly as possible in comparison to NSMs. They have usually researched what it will take to transfer to their first choice major and are able to clearly articulate the requirements and procedures that must be completed prior to initiating the transfer process. On the other hand, NSMs are characterized as truly undecided students who want to spend some time exploring all of the various degree programs and options available at the institution.

Interpreting this finding is challenging. Perhaps the flexibility of course scheduling for NSMs facilitates greater levels of academic achievement. In particular, as truly undecided students, NSMs have more opportunities during their first year of enrollment to select a variety of courses that satisfy both degree requirements and personal interests, while also providing

students the chance to explore various academic fields and disciplines. Students who are more interested in their coursework may experience higher levels of academic achievement. The same options are not available to SMs. Because these students have a specified academic plan in place and often have to complete prerequisite courses before they can even be considered for admission into their intended major, their course scheduling options are more rigid. SMs are often also under time constraints and need to complete these required courses within a predetermined time frame in order to be considered competitive applicants for internal transfer. This situation can jeopardize the success of SMs who may not have selected the most appropriate major and are attempting to complete course work for which they are not well prepared.

However, it is important to note that this finding should have been predictable to some degree because of the finding related to high school grades. Recall that there was a significant difference between NSMs and SMs in terms of high school grades. Prior research has shown that a consistent predictor of first year college GPA is high school GPA (Daugherty & Lane, 1999; DeBerard, Spielmans, & Julka, 2004; Noble & Sawyer, 2002). The results of the current study indicate high school grades differed significantly between NSMs and SMs. Logic would suggest that higher academic achievement in high school would produce high academic achievement in college.

Predicting Academic Achievement in NSMs

The next research question investigated the extent to which students' background characteristics, self-perception of abilities, and degree aspirations explain the variation in academic achievement for the NSM group. A multiple linear regression was the appropriate test to answer this research question in order to learn more about the relationship between these predictor variables and the dependent variable, academic achievement. Overall, the combination of these factors explained almost 17% of the variance in first-year GPA and this model was statistically significant (p<.05). Of the 11 predictor variables entered into the regression equation, three explained a significant portion of the variance: (a) high school GPA, (b) sex, and (c) SAT score.

The two best predictors of academic achievement in NSM students were the high school GPA (p=.00) and sex (p=.00). The findings reaffirm the positive correlation between high school GPA and first-year GPA that other researchers have found (Daugherty & Lane, 1999; DeBerard, Spielmans, & Julka, 2004; Noble & Sawyer, 2002). NSM students who have higher

academic performance in high school tend to continue their academic success in college, perhaps because of the positive behaviors and skills they have learned in high school that they are able to transfer to the college level.

The results also indicate that female NSM students had significantly higher academic achievement compared with that of their male peers. This finding is particularly interesting given prior research supporting the notion that during college, female students' academic performance tends to be lower than male students (Campbell, Hambo, & Mazzeo, 2000; Hamilton, Nussbaum, Kupermintz, Kerkhoven, & Snow, 1995). Yet in the current study it is the exploratory, female student who generally performs better academically. Perhaps the ability to be open and receptive to investigating all of their degree options is of great benefit to female students as noted by Rouse and Austin (2002). In addition, Green and Foster (1986) found that female students were more intrinsically motivated in terms of curiosity, which can be linked to better academic achievement. On the other hand, male students from the NSM group may experience more self-induced pressure to quickly decide on one of the technical majors without benefit of researching their options in order to determine whether they are truly pursuing a major that is congruent with their personal skills, interests, and abilities. Clearly, students tend to be less academically successful when they have selected an inappropriate major.

Another significant predictor in this model was SAT score. The general purpose of the SAT is to determine whether students are ready for college-level academic work. Results of this study indicate NSM students are significantly better prepared to handle college-level academic work than are students from the SM group. The mean SAT scores for the NSM and SM groups are 1195 and 1189 respectively. This finding is of interest because again, it would be intuitive to accept the idea that NSM students, who do not express a clear indication of their choice of major immediately upon acceptance, would be less focused and thus less prepared for college, which would translate to lower SAT scores.

A second regression model was run for the NSM group that included background characteristics, self-perception of abilities, and degree aspirations and also introduced interactive effects. None of the interactions were found to have a significant influence on academic achievement. However, the introduction of the interactions increased the amount of variance in academic achievement that was explained to 18.4% which is an increase of 1.7% over the first

model.   Despite this increase presented, the first model remained the most significant model for predicting the academic achievement of the NSM group.

Despite the statistical significance of the multiple regression model for the NSM group, only about 17% of the variance in academic achievement can be explained. Therefore, the model may not include the most powerful predictors of academic achievement. With only 17% of the variance accounted for, it is clear that factors beyond background characteristics, self-perception of abilities, and degree aspirations are having an impact on the academic achievement of NSM students. More research is needed to reveal what those additional factors might be.

Predicting Academic Achievement in SMs

The final research question presented in this study specifically examined the SM group in an attempt to explore to what degree background characteristics, self-perception of abilities, and degree aspirations explain the variance in academic achievement. Again, the analysis used to examine the relationship between the predictor variables and academic achievement was multiple linear regression. The result reveals that background characteristics, self-perception of abilities, and degree aspirations explained 6.6% of the variance in first-year GPA and this model was statistically significant ($p<.05$). After analyzing all of the predictor variables entered into the regression equation, the findings indicate that three predictor variables explained a significant portion of the variance for SMs: (a) high school GPA, (b) parental education, and (c) sex.

The single best predictor of academic achievement for SMs was high school GPA ($p=.01$). Similar to the findings for the NSMs, the students from the SM group earned high grades in high school. There is a positive correlation between high school GPA and first-year GPA (Daugherty & Lane, 1999; DeBerard, Spielmans, & Julka, 2004; Noble & Sawyer, 2002) and that might explain this finding.

The second most useful predictor of academic achievement was sex ($p=03$). Female students, who are members of the SM group, tend to earn higher first-year GPAs than their male counterparts. This finding is similar to that of the NSM group. Therefore, females, regardless of their level of undecidedness (NSM versus SM) tend to earn higher first-year GPAs. Speculation leads to the conclusion that sex serves as a predictor of academic achievement for SMs in much the same fashion as it does for NSMs. Again, female students regardless of undecided status are more willing to explore their options even if they enroll in college with a particular intended major in mind. A combination of this openness to new opportunities and developmental

advising which challenges students to continually research and re-affirm their choice of major, positions female SM students to achieve higher levels of academic success.

The third significant predictor of academic achievement for SMs was parental education (p=.04). Among SMs, students whose parents had higher levels of educational attainment tend to earn higher GPAs. Perhaps parents with higher educational levels tend to recognize the benefits of attaining higher levels of education including higher earnings, increased civic engagement, and a general improvement in quality of life. Given some of these benefits, parents may encourage their offspring to earn good grades, which contributes to the academic achievement of students. Parents with higher levels of educational attainment have generally benefitted themselves and do not want their children to miss the opportunity to benefit as much, if not more, than they experienced.

Another regression model was run for the SMs that introduced interactive effects in addition to the main predictor variables. The only significant interaction which was found to have a significant influence on academic achievement was high school GPA by parental education. The introduction of the interactions increased the amount of variance in academic achievement that was explained by 1.3% beyond that explained by the first model. The first model remained the most significant model for predicting the academic achievement of the SM group despite the marginal increase. At face value this finding makes practical sense. Those students whose parents have achieved higher levels of education are more likely to have home lives that include enrichment from books and magazines, higher levels of conversation around the family dinner table, and rich and meaningful interactions with different social circles and friends who have also had a variety of opportunities to be exposed to new and different ways of thinking. Therefore, it seems more likely that students with higher GPAs in high school and with more educated parents will do better academically in college. What is puzzling regarding this finding is why it is unique to the SM population. Future research is warranted in this area.

Overall, less variance in academic achievement is explained by background characteristics, self-perception of abilities, and degree aspirations for SMs than NSMs. It is important to note the amount of variance explained for both groups is relatively low. Therefore more research is warranted to identify what additional factors contribute to the ability to predict GPA for all undecided students, with particular attention to identifying the factors for the SM

population as the findings this study indicate SMs may be facing more obstacles hindering their potential for higher levels of academic achievement.

<div align="center">Relationship of the Findings to Prior Research</div>

The results of this study are significant when considered in the context of prior research. Overall, prior research supports and contradicts the findings of the current study in terms of differences in background characteristics, self-perceptions of abilities, degree aspirations, college academic achievement, and the ability to explain the amount of variance in first-year GPA for students within the NSM and SM groups

Regarding the first research question that investigated differences between NSMs and SMs in terms of the background characteristics, the relationship of the findings of the current study to prior research is important to note. Despite a persistent theme in the literature regarding females having lower academic achievement levels in comparison to their male counterparts (Campbell, Hambo, & Mazzeo, 2000; Hamilton, Nussbaum, Kupermintz, Kerkhoven, & Snow, 1995) the current study found that female undecided students tended to experience higher levels of academic success, as measured by their cumulative GPA, in their first year of college.

The findings regarding sex and GPA in this study contradict some prior studies but support others. My results reveal that being female, regardless undecidedness status (NSM or SM) was significantly associated with academic achievement. This is consistent with studies like those of Zheng, Saunders, Shelly, & Whalen (2002) who found that females tend to have higher grade point averages. Rouse & Austin (2002) account for this greater success by noting that females tend to demonstrate more curiosity which has been linked to better achievement. However, other scholars (Campbell, Hambo, & Mazzeo, 2000; Hamilton, Nussbaum, Kupermintz, Kerkhoven, & Snow, 1995) have reported that women are less successful in terms of academic achievement than their male counterparts. It would seem that no firm conclusions can be drawn about sex and GPA among undecided students in the absence of additional research.

In the current study, high school GPA continued to serve as a consistent predictor of academic achievement in college. The findings support research from prior studies which also found that high school GPA has a significant influence on academic success in college (Allen, 1999; Daugherty & Lane, 1999; DeBerard, Noble, & Sawyer, 2002; Pascarella & Terezeni, 1991; Spielmans, & Julka, 2004; Yorke, 1998). Unlike findings about sex and first-year college

GPA, the evidence that high school GPA is a sound predictor of first-year college GPA seems incontrovertible.

Prior research also supports the notion that parental education has a positive influence on student academic achievement (Elkins, 1998; House, 1996; Ting & Robinson, 1998; Zheng, et. al, 2002). The findings from the current study further advance this argument, at least among SMs. In the case of SMs, higher levels of parental education were linked with higher levels of academic achievement.

Results from the current study related to the second research question that investigated differences between NSMs and SMs in terms of the self-perceptions of abilities contradicted findings from prior research. In the current study self-perception of abilities did not vary significantly between sub-groups of undecided students. The only significant difference was in the area of artistic and creative abilities. As noted this might be attributable to the propensity for SMs to have been denied direct admission into Engineering or Architecture. No prior research has been done on differences between these two groups so more data are needed before any conclusions about this finding can be drawn.

Prior research was also contradicted by the findings of the current study in terms of the third research question that assessed differences in degree aspirations between NSMs and SMs. Degree aspirations, as reported prior to college enrollment, did not differ significantly between the two groups. Astin (1977) previously noted that degree aspirations were the most robust and authoritative predictor of post-graduate enrollment yet this factor does not differ based on undecided status. This may be explained simply by the idea that if first-year students are undecided about their undergraduate degree program then they probably have given even less consideration to their academic plans after college. This result might also be explained by the fact that the Astin study was conducted over three decades ago and the number of undecided students has grown enormously during that time. These conditions render it difficult to make any conclusive statement about degree aspirations among NSMs and SMs.

The fourth research question examined differences in academic achievement between sub-goups of undecided students. Prior research regarding the achievement of undecided students has dispelled beliefs that these students are more prone to lower levels of academic success (Cuseo, 2005; Granunke, Woosley, & Helms, 2006; Lewallen, 1992; 1993). Reinforcement of this position is provided by the current study that found undecided students who are truly

exploratory in terms of their academic major (i.e., NSMs) can and do attain higher levels of academic achievement. In fact, my study expands upon the prior findings by revealing that those students who are truly undecided (NSMs) earn significantly higher GPAs their first year in college than students who are undecided by default when they fail to gain admission to their first choice major (SMs).

Results from the fifth research question that investigated how much variance in GPA for NSMs could be explained by background characteristics, self-perception of abilities, and degree aspirations were also supported by prior research. Gordon (1998) argued that undecided students can be characterized as developmentally undecided. That is, not having an intended major is seen as less of a deficiency and more of a normal developmental process. My findings suggest that a portrait of undecided students cannot be painted with a broad brush and, in fact, there are differences among undecided students that need to be addressed.

Finally, there is prior research that supports the results about the factors that predict GPA, among the SMs that served as the final research question for the current study. My findings suggest definite differences between the NSM and SM groups in terms of how much variance in GPA can be explained, with more variance explained among NSMs. The difference between the two sub-groups of undecided students reaffirms the idea the undecided population is very diverse and does not benefit from being lumped into one homogenous group.   This conclusion affirms that noted by Lewallen (1995) who argued that research on this population has been burdened by treating all students without an academic major the same.

Still other researchers have presented evidence that cannot be supported by the results of the current study. According to findings by Lucas & Epperson (1988), undecided students can be classified into several categories. Based on the findings in their research, SMs would be classified as tentatively undecided students and tentatively undecided students exhibit higher levels of vocational identity and are much more comfortable with themselves, all leading to more confidence and greater levels of academic achievement. On the contrary, the findings of the current study indicate SMs do not differ in their self-perception of abilities from NSMs except in the area of artistic ability. The fluctuations between support and contradiction of prior research by the findings of the current study hinder the ability to make sound inferences regarding which factors impact the academic achievement of SM students.

The current research study was designed to expand the discussions of previous research on predicting academic achievement by investigating the undecided population, while recognizing that not all students without a major face the same challenges or have the same needs. In expanding this discussion, implications for future practice, research, and policy are notable.

<center>Implications for Future Practice, Research and Policy</center>

Findings from the current study have several implications for the academic achievement of undecided students during their first-year of enrollment. The results suggest that specific steps can be taken by high school guidance counselors, college admission counselors, academic support providers, and academic advisors in order to facilitate the academic achievement of undecided students.

First, high school guidance counselors play an important role in assisting college-bound students with choices they must make. These choices include the decision of what college students plan to attend and what major they will pursue. Though distinct, these two choices should not be considered in isolation of one another. High school guidance counselors should educate students regarding all of the major choices offered at a particular institution as well as the academic standards required for entry into these majors. Armed with this information, students should be able to make more informed decisions. Therefore, if students are not offered admission into their first of choice major at a particular college, they would be better prepared with information regarding an alternative institution that offers their intended major and for which their academic credentials would make them a viable candidate.

High school guidance counselors could also enhance their programs and services related to major and career exploration. This increased effort might lead students to making more informed choices regarding their major and career choices. In addition, for those students who are unable to make a choice of a major before applying to college, guidance counselors could alter their focus to be more affirming of the major and career exploration process. Nearly all colleges and universities offer services for undeclared majors and guidance counselors could assist students struggling with their choice of major to help normalize the notion of undecidedness. This increased attention may enable undecided students to embrace major exploration as a positive experience with many long term benefits.

Second, college admission counselors can take specific action related to facilitating the academic achievement of undecided students. Making decisions during the admission process is often complicated for counselors as they attempt to extend admission offers to the most qualified candidates who have the greatest probability of fitting into the institutional culture. Frequently, they are charged with bringing a pre-determined number of students into the entering class. In order to meet that target, admissions counselors extend admission offers to more students than they know they will be able to realistically accommodate in their entering first-year class. They do this for various reasons including competition with other institutions that seek to enroll the same students.

In making these admission decisions, choice of major will play a role. Admission counselors could educate prospective and admitted undecided students about the benefits and challenges to admission into the undeclared program. This education must go beyond simple notification of requirements necessary to transfer into their intended major. It must also include a realistic assessment of the chances students have to successfully transfer into these majors. For example, at the institution at which the study was conducted the requirements to transfer to one highly touted program are clearly articulated but what is not as clear is the fact that out of roughly 90 applicants per year, only seven are accepted as internal transfers. These kinds of data would help incoming students assess whether the institution is a good choice for them.

Third, those individuals working within the realm of academic support could implement specific programming efforts to facilitate the academic achievement of undecided students. The programming efforts could include development of pre-college initiatives, a first year experience program, and intrusive academic advising services.

Pre-college initiatives are generally designed to facilitate students' transition from high school to college and to stimulate their interest around a given theme or topical area. One example of a pre-college initiative might include a summer bridge program for undecided students where they begin their enrollment earlier than the traditional student (i.e., summer school) and are provided with structured opportunities to engage in major and career exploration. While this summer bridge program would be beneficial for all undecided students, it would be of particular benefit to SMs who would have the opportunity to reaffirm the appropriateness of their choice of intended major and also be exposed to the rigor of college level course work. This would all take place in an environment that provides extra support from faculty, academic

administrators and peer educators who have successfully navigated the process of changing into a major that is academically and personally satisfying.

Once undecided students are admitted and enrolled, academic support providers should consider developing a comprehensive, first-year experience program (including a learning community) that would specifically address the needs of undecided students. In addition to including course content focusing on the career development process, other important topics for the first-year experience program might include decision-making skills, learning about the academic programs available at the institution, and engaging in the campus community. This would allow students to learn more about themselves in relation to their community and learn from their peers who are attempting to chart their own paths.

Academic advisors for undecided students, as support providers, must also take the necessary steps to ensure that they are receiving appropriate training in order to stay abreast of the research and identified needs of this population of students. Many of these training and development opportunities are provided through national organizations such as the National Academic Advising Association (NACADA) which has commissions and interest groups for members with special advising areas of interest and intentionally brings together other members who share that interest. NACADA has a commission for those who work with undecided and exploratory students. It would seem prudent that those who work with undecided students take advantage of the opportunities offered by NACADA or related associations.

In addition to the implications for practice, findings from this study have implications for future research in the area of academic achievement and undecided students. These implications include the integration of qualitative data, use of data that are not self-reported, employing a longitudinal lens in the analysis, and examining forms of achievement other than GPA.

In an effort to explain differences between the NSMs and SMs in terms of their background characteristics, self-perceptions of abilities, degree aspirations, and academic achievement the current study analyzed data that were exclusively quantitative in nature. Future research should integrate a qualitative approach as well. A mixed approach would yield interesting results as there is no simple distinction between quantitative and qualitative techniques. In addition, both approaches have strengths and limitations. A mixed method approach would allow for the inclusion of the most effective strategies of both. Specific examples of qualitative techniques might include interviews or focus groups with undecided

students that might allow for a broader and deeper understanding of the factors that predict the academic achievement of such students. In particular, Krueger and Casey (2008) advocate that focus groups provide some degree of immersion into the lives of the research participants in which the interpersonal dynamics of a group can be observed. Finally, the cohesiveness developed in the group setting is typically viewed as less threatening to students and promotes identification with others who share similar experiences and concerns. The ultimate goal in this case would be for students to disclose as much information as possible about what has helped or hindered their academic achievement.

The data used in the current study were taken from the Cooperative Institutional Research Program (CIRP) Freshman Survey that is administered by the Higher Education Research Institute (HERI) at UCLA. It is self-reported data collected from respondents regarding first-year students' readiness for college, college selection process, values and beliefs about diversity and civic engagement, and expectations. While these self-reported data do provide valuable information regarding students, there is some concern about the validity of the data. Students' ability to recall information or their decision to provide what they believe to be socially desirable responses may not result in accurate reflections of their experiences. For example, the institution at which the current data were collected proudly disseminates the profile of its entering first-year students indicating high SAT scores, high school GPAs, and class ranks. Incoming students may feel the need to reaffirm their worthiness for admission by indicating they performed better in high school that they actually did in order to match the profile marketed to prospective students. Use of data from an alternative source might yield different results. For all of the background characteristics (gender, race, high school GPA, parental income, parental education, and SAT score) an alternative source of information is typically available through the undergraduate admissions office and data are usually submitted by more credible sources, such as high school guidance counselors. Integrating more reliable data into the mix might yield more compelling results.

This study examined the first-year GPAs of undecided students in order to predict the factors that affect their academic achievement. Further studies should be longitudinal in nature, tracking the academic achievement of undecided students over time. This approach would allow for a more comprehensive picture of what leads to higher levels of academic achievement for

this group. In addition, data would be available regarding which major(s) the students actually transfer into and how successful they are within those majors.

Academic achievement in the current study was defined as cumulative GPA at the end of the students' first year of enrollment. Future studies should seek to examine academic achievement from a different perspective such as persistence rates or time to degree. This would be a particularly useful strategy for undecided students in order to determine if they are persisting at the same rate and requiring the same amount of time to complete a degree as the general population or to determine if there are significant differences between NSMs and SMs in terms of either of these other measures.

Finally, the findings have implications for future policy at the institutional level. Policymakers who are accountable for recruitment and admissions, academic support services, and internal transfer guidelines may benefit from the results.

Policymakers responsible for recruitment and admission of students should review policies related to undecided students. While NSMs appear to have higher levels of academic achievement in their first year of enrollment, SMs are struggling to perform at the same level as their counterparts. Three possible policies could be introduced to the university in an effort facilitate the academic achievement of undecided students. First, future policies centered on educating prospective students during the recruitment process regarding the undecided option need further examination, particularly as they relate to SM students. SM students have applied for admission to a specific degree granting program and been denied admission. At that point, students may experience confusion regarding their options. Do they select another degree granting major or do they accept the offer of admission to the undecided option? Should they investigate options at another institution altogether? Policies that guide the recruitment process of SMs might prove useful to students, parents, and administrators, alike.

Next, policy review might lead to a change in admission and enrollment processes. For example, at the study institution, all undecided students are admitted into one undecided major. Future policy might recommend that students be admitted into an undecided option within each of the colleges or schools at an institution, depending on the organizational structure of the institution. This would relieve some of the stress students may experience centered on the decision-making process. If they are admitted directly into a college and provided quality academic and career advising, they will have successfully navigated one hurdle (entry into a

college) and simply have to focus on the specific degree granting program within that college they wish to pursue. This would also provide students with greater access to necessary courses as many colleges and departments restrict courses to students outside of their college and department.

Finally, another policy that could be introduced involving recruitment and admission of students would be the development of a total intake model. A total intake model would mandate that all first-year students enter the institution in a central unit, such as a University College or First-year Student Center. In addition, students would not be able to declare a major in a degree-granting program until they have completed their first year. This approach would level the playing field and allow students to compete for entry into their choice of major based on academic achievement at the college level instead of their high school performance, since high schools can vary dramatically in terms of quality.

Policymakers who are responsible for the development and implementation of academic support services should focus their programming efforts towards the needs of undecided students, with a particular emphasis on SM students. These students tend to be white males and have lower academic performance levels in high school and college. Policies might dictate programs and services for this population of students that could include tutoring, academic and career advising, and study skill seminars.

The final implication for future policy development involves administrators who are responsible for internal transfer (the change of major process). While students from all majors at an institution can be impacted by future policy in this area, undecided students are disproportionately affected in that they will automatically face this process as soon as they decide upon on a major. Internal transfer policy should be informed by the unique needs of undecided students and the significant differences that exist between NSMs and SMs. Intuitively, policymakers may believe that SMs are more focused and better prepared to begin coursework in their specific disciplines. However, the findings of the current study say just the opposite; it is the NSMs who achieve higher levels of academic success. Policymakers might consider these differences when promulgating procedures for internal transfer.

Policymakers responsible for internal transfer policy guidelines should also consider increasing the resources necessary to ensure undecided students have access to courses required for internal transfer. Many colleges and departments restrict access to courses for undecided

students when these are the very students who need to complete the courses in order to demonstrate their abilities in specific disciplines. It is imperative undecided students gain access to these keys courses as early in their academic careers as possible because the exposure they receive in these courses will help them in their decision-making process.

The results of the current study highlight implications for future practice, research, and policy. However, it is equally important to consider the limitations.

<center>Limitations of the Study</center>

Limitations have been revealed throughout the course of conducting and analyzing the data set. Specifically, three limitations emerged involving the generalizability of the results, the narrow definition of achievement, and the classification of undecided students.

One limitation of the current study centers on its generalizability, or the ability to use the findings to draw general conclusions about other groups of undecided students. The sample included students from only one institution and it is not clear whether their academic success (GPA) is related to the selectivity of the institution.   The results should be generalized with caution to undecided students at institutions other than selective research universities.

A second limitation involves the definition of achievement. For purposes of this study, achievement was measured as a function of academic success; first-year GPA. Although previous literature affirms that GPA is a consistent measure of academic achievement, there are alternative measures of achievement. For example, for undecided students, achievement could be measured by students' ability to make a decision about and transition into a major that is congruent with their skills, interests, and abilities. In addition, achievement could be measured by assessing the number of times students change their major after exiting an undecided program. More major changes would be a good indication that a student continues to face difficulty in deciding on an appropriate field of study. Other measures of academic achievement might have led to different results.

A final limitation relates to the classification of undecided students into two sub-categories: NSM and SM. While background characteristics, self-perceptions of abilities, and degree aspirations explained a larger amount of variance for students in the NSM group than the SM group, it is clear that much is still unknown about the factors that predict the academic achievement for both groups. More variation may exist within the population of undecided students than can be adequately assessed using simply two groups to differentiate its members.

Despite these limitations, significant information has been provided by the results of the current study in terms of the differences between NSMs and SMs. In addition, the amount of variance in academic achievement explained by these variables for both groups was highlighted. Previous literature has investigated the factors that predict academic achievement in many student populations but those studies have excluded undecided students. Moreover, when research was conducted on undecided students in prior studies it frequently involved a comparison between undecided students and students from degree-granting majors. My results provide a unique perspective by which to evaluate undecided students.

In conclusion, the significant findings in the current study were not surprising, as each of the factors revealed in my study had been previously reported in the literature as having an impact on academic achievement for other populations of students. For both groups, the models presented explained a statistically significant portion or variance. However, for practical purposes the percentage of variance explained was relatively low (NSM=16.7% and SM= 6.6%). More research regarding the factors that influence the academic success of this population is warranted. With increased academic achievement, it is expected that this population will also increase in retention rates.   Improved retention rates are a means of assessing institutional accountability (Green, 2002; Metz, 2004; Trow, 1996) and increasing institutional revenues (Jones, 1996). Since undecided students comprise a growing percentage of matriculating college students, improving their academic achievement, hence their retention rates, has important implications for colleges and universities.

References

ACT Policy Report. (2004). *The role of academic and non-academic factor in improving college retention*. Iowa City, IA: ACT.

Allen, D. (1999). Desire to finish college: An empirical link between motivation and persistence. *Research in Higher Education, 40*(4), 461-485.

Anderson, E. (1985). Forces influencing student persistence and achievement. In L. Noel, R. Levitz, D. Saluri, & Associates. *Increasing student retention: Effective programs and practices for reducing the dropout rate*. San Francisco, Jossey-Bass.

Astin, A. W. (1977). *Four critical years: Effects of college on beliefs, attitudes, and knowledge*. San Francisco, Jossey-Bass.

Astin, A. W. (1991). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. New York: Macmillan.

Astin, A. W. (1992). *Minorities in American higher education: Recent trends, current prospects, and recommendations*. San Francisco: Jossey-Bass.

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

Bauer, K. W., & Liang, Q. (2003). The effect of personality and precollege characteristics on first-year activities and academic performance. *Journal of College Student Development, 44*(3), 277-290.

Beal, P. E., & Noel, L. (1980). *What works in student retention*? Iowa City, IA: The American College Testing Program.

Bean, J. P. (1980). Dropouts and turnover: The synthesis and test of a causal model of student attrition. *Research in Higher Education, 12*, 155-187.

Bean, J. P. (1990). Why students leave: Insights from research. In D. Hossler & Associates (Eds.), *The Strategic Management of College Enrollments*, (pp. 147-169). San Francisco: Jossey-Bass.

Bennett, C., & Okinaka, A. M. (1990). Factors related to persistence among Asian, Black, Hispanic, and White undergraduates at a predominantly white university: Comparison between first and fourth year cohorts. *The Urban Review, 22*(1), 33-60.

Berger, J. B., & Braxton, J. M. (1998). Revising Tinto's interactionalist theory of student departure through theory elaboration: Examining the role of organizational attributes in the persistence process. *Research in Higher Education, 39*(2), 103-120.

Berman, G. S., & Haug, M. R. (1975). Occupational and educational goals and expectations: The effects of race and sex. *Social Problems, 23*, 166-181.

Betts, J. R., & Morell, D. (1999). The determinants of undergraduate grade point average. *The Journal of Human Resources, 34,* 268-293.

Betz, N., & Fitzgerald, L. F. (1987). The career psychology of women. Orlando: Academic Press.

Blais, A. (2000). *To vote or not to vote: The merits and limits of rational choice theory*. Pittsburg: University of Pittsburg Press.

Blecher, L. (2006). Persistence toward bachelor degree completion of students in family and consumer sciences. *College Student Journal*, *40*(3), 469-484.

Brashears, M. T., & Baker, M. (February 2003). *A comparison of the influence of traditional predictors and individual student talents upon collegiate success: A longitudinal study.* Paper presented at the Southern Agricultural Education Research Conference, Mobile, AL.

Braxton, J. M. (2000). *Reworking the departure puzzle*. Nashville, TN: Vanderbilt University Press.

Bridgeman, B. (1982). Comparative validity of the College Board Scholastic Aptitude Test: Mathematics and the descriptive tests of mathematics skills for predicting performance in college mathematics courses. *Educational and Psychological Measurement, 42*, 361-366.

Bryson, S., Smith, R., & Vineyard, G. (2002). Relationship of race, academic and nonacademic information in predicting first-year success of selected admissions first-year students. *Journal of the First Year Experience and Students in Transition, 14*(1), 65-80.

Byrne, B. M. (1984). The general/academic self-concept nomological network: A review of construct validation research. *Review of Educational Research, 54*, 427-456.

Cabrera, A. F., Nora, A., & Castaneda, M. B. (1993). College persistence: Structural equations modeling test of an integrated model of student retention. *Journal of Higher Education*, *64*(2), 123-140.

Campbell, J. R., Hombo, C. M., & Mazzeo, J. (2000). *NAEP 1999 trends in academic progress:*

Three decades of student performance. National Center for Education Statistics, Washington, DC.

Carnevale, A. P., Gainer, L. J., & Meltzer, A. S. (1990). *Workplace basics: The essential skills employers want.* San Francisco: Jossey Bass.

Carter, D. F. (1999). The impact of institutional choice and environments on African-american and white students' degree expectations. *Research in Higher Education, 40*(1), 17-41.

Carter, D. F. (2001). A *dream deferred? Examining the degree aspirations of African American and White college students*. New York: Routlegdge Falmer.

College Board. (2006). *Education pays: Second update*. Retrieved October 10, 2007, from http://www.collegeboard.com/prod_downloads/press/cost06/education_pays_06.pdf

College Board. (2001*). Predicting success in college: SAT studies of classes graduating since 1980*. Retrieved March 31, 2009, from http://professionals.collegeboard.com/profdownload/pdf/rdreport200_3919.pdf.

Corbetta, P. (2003). *Social research, theory, methods and techniques.* London: Sage.

Cuseo, J. (2005). Decided, undecided, and in transition: Implications for academic advisement, career counseling and student retention. In R. S. Feldman (Ed.). *Improving the first year of college: Research and practice*. (pp. 27-48). Mahwah, NJ: Lawrence Erlbaum Associates.

Daugherty, T. K., & Lane, E. J. (1999). A longitudinal study of academic and social predictors of college attrition. *Social Behavior and Personality, 27*(4), 355-362.

DeBerard, M. S., Speilman, G. I., & Julka, D. L. (2004). Predictors of academic achievement and retention among college freshmen: A longitudinal study. *College Student Journal*, *38*(1), 66-80.

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*(4), 569-581.

Dorsey, M., & Jackson, A. (1995). Afro-American students' perceptions of factors affecting academic performance at a predominantly white school. *Journal of Black Studies, 19*, 189-195.

Elkins, S. A., Braxton, J. M., & James, G. W. (May 1998). *Tinto's separation stage and its influence on first-semester college student persistence*. Paper presented at the Annual

Forum of the Association for Institutional Research, Minneapolis, MN. (ERIC Document Reproduction Service No. ED 424 799).

Ethington, C. A. (1990). A psychological model of student persistence. *Research in Higher Education, 31*(3), 279-293.

Frost, S. H. (1993). Developmental advising: Practices and attitudes of faculty advisors. *NACADA Journal, 13*(2), 15-20.

Fuertes, J. N., Sedlacek, W. E., & Liu, W. (1994). Using the SAT and noncognitive variables to predict the grades and retention of Asian American university studies. *Measurement and Evaluation in Counseling and Development, 27*, 74-84.

Frost, S. (1993). Strategies to help freshmen succeed. *Planning for Higher Education*, 21, 21-26.

Gloria, A. M., Kurpius, S. E. R., Hamilton, K. D., & Wilson, M. S. (1999). African American students' persistence at a predominantly White university: Influences of social support, university comfort, and self-beliefs. *Journal of College Student Development*, 40, 93-105.

Goldstein, G., & Hersen, M. (Eds.). (1984). *Handbook of Psychological Assessment.* New York: Pergamon.

Gordon, V. N. (1995). *The undecided college student: an academic and career advising challenge*. Springfield, Ill.: Thomas Publishing.

Gordon, V. N. (1998). Career decidedness types: A literature review. *Career Development Quarterly, 46*, 386-403.

Graunke, S. S., Woosley, S. A., & Helms, L. L. (2006). How do their initial goals impact students' chances to graduate? An exploration of three types of commitment. *NACADA Journal, 26*(1), 13-18.

Green, K. C. (1992). *After the boom: Management majors in the 1990*. New York: McGraw Hill.

Green, K. C. (2002). In search of academic accountability. *Converge*, *5*(1), 44-46.

Green, L., & Foster, D. (1986). Classroom intrinsic motivation: Effects of scholastic level, teacher orientation, and gender. *Journal of Educational Research, 80*(1), 34–39.

Griffith, A. L. (2008). *Determinants of grades, persistence and major choice for low-income and minority students*. Unpublished manuscript, Ithaca: Cornell University.

Gusset, J. (1974). College entrance examination board scholastic aptitude test scores as a

predictor for college freshmen mathematics grades. *Educational and Psychological Measurement, 34*, 953-955.

Hagedorn, L. S. (2003). *How to define retention: A new look at an old problem*. Unpublished reports from TRUCCS to the Los Angeles Community College District. Los Angeles: University of Southern California.

Hamacheck, D. (1995). Self-concept and school achievement: Interaction dynamics and a tool for assessing the self-concept component. *Journal of Counseling and Development, 73*, 419-425.

Hamilton, L. S., Nussbaum, E. M., Kupermintz, H., Kerkhoven, J. I. M., & Snow, R. E. (1995). Enhancing the validity and usefulness of large-scale educational assessments. *American Educational Research Journal*, *32*(3), 555-581.

Hansford, B. C., & Hattie, J. A. (1982). The relationship between self and achieve-ment/performance measures. *Review of Educational Research, 52*, 123-142.

Hickman, G. P., Bartholomae, S., & McHenry, P. C. (2000). Influence of parenting styles on the adjustment and academic achievement of traditional college freshmen. *Journal of College Student Development, 41*(1)*,* 41-54.

Higher Education Research Institute. (2007). CIRP freshman survey. Available from the Higher Education Research Institute web site, http://www.gseis.ucla.edu/heri/researchers/instruments/CIRP/2007SIF.PDF.

Higher Education Research Institute. (2009). CIRP freshman survey: Reliability and validity. Available from the Higher Education Research Institute web site, http://www.gseis.ucla.edu/heri/PDFs/CIRP_Reliability_Validity.PDF.

Hossler, D., & Gallagher, K. S. (1987). Studying student college choice: A three-phase model and the implications for policymakers. *College and University, 62*(3), 207-221.

House, J. D. (1996). *College persistence and grade outcomes: noncognitive variables as predictors for African-American, Asian-American, Hispanic, Native American, and White students*. Paper presented at the Annual Forum of the Association for Institutional Research, Albuquerque, NM. (ERIC Document Reproduction Service No. ED 397 710).

Hull-Toye, C. S. (1995). *Persistence based upon degree aspiration*. Paper presented at the Annual Meeting of the Association for the Study of Higher Education, Orlando, FL. (ERIC Document Reproduction Service No. ED 391-414).

Hyer, A. D., & Joslin. M. N. (1998). The first year seminar as a predictor of academic achievement and persistence. *Journal of the Freshmen Year Experience and Students in Transition*, 10, 7-30.

Institute for Higher Education Policy. (1998). *Reaping the benefits: Defining the public and private value of going to college.* Washington: Institute for Higher Education Policy.

Institute for Higher Education Policy. (2005). *The investment payoff: A 50-state analysis of the public and private benefits of higher education.* Washington: Institute for Higher Education Policy.

Jackson, A. P., Smith, S. A., & Hill, C. L. (2003). Academic persistence among Native American college students. *Journal of College Student Development, 44*(4), 548-565.

Johnson, I. Y. (2006). Analysis of stopout behavior at a public research university: The multi-spell discrete-time approach. *Research in Higher Education, 47*(8), 905-934.

Jones, D. (2007). State shortfalls projected to continue despite economic gains. *The National Center for Public Policy and Higher Education Policy Alert*. Retrieved at http://www.highereducation.org/reports/pa_shortfalls/index.shtml.

Jones, E. A. (1996). National and state policies affecting learning expectations. *New Directions for Higher Education*, 96, 7-18.

Kahn, J. H., & Nauta, M. M. (2001). Social-cognitive predictors of first-year college persistence: The importance of proximal assessment. *Research in Higher Education, 42*(6), 633-652.

King, J. E. (2002). *Crucial choices: How students' financial decisions affect their academic success.* Washington, DC: American Council on Education. Retrieved online March 31, 2009" http://www.acenet.edu/bookstore/pdf/2002_crucial_choices.pdf

Kuh, G. D. (2007). How to help students achieve. *The Chronicle of Higher Education*, B12.

Krueger, R. A., & Casey, M. A. (2009). *Focus groups: A practical guide for applied research.* Thousand Oaks, CA: Sage.

Lent, R. W., Sheu, H., Singley, D., Schmidt, J. A., Schmidt, L. C., & Gloster, C. S. (2008). Longitudinal relations of self-efficacy to outcome expectations, interests, and major choice goals in engineering students. *Journal of Vocational Behavior, 73*(2), 328-335.

Leppel, K. (1984). The academic performance of returning and continuing college students: An economic analysis. *Journal of Economic Education, 15*(1), 46–54.

Leppel, K. (2001). The impact of major on college persistence among freshmen. *Higher*

Education, 41(3), 327-342.

Leppel, K. (2002). Similarities and differences in the college persistence of men and women. *The Review of Higher Education*, *25*(4), 433-450.

Leppel, K., Williams, M. L., & Waldauer, C. (2001). The impact of parental occupation and socioeconomic status on choice of college major. *Journal of Family and Economic Issues, 22*(4), 373-394.

Lewallen, W. C. (1992). Persistence of the undecided: The characteristics and college persistence of student's undecided about academic major or career choice. *Dissertation Abstracts International, 53*, 12A, 4226.

Lewallen, W. C. (1993). The impact of being "undecided" on college student persistence. *Journal of College Student Development, 34*, 103-112.

Lewallen, W. C. (1995). Students decided and undecided about career choice: A comparison of college achievement and student involvement. *NACADA Journal, 15*(1), 22–29.

Lopez-Claros, A., Porter, M. E., Schwab, K., & Sala-i-Martin, X. (2006). *The Global Competitiveness Report 2006-2007*. New York: Macmillan.

Lovegreen, T. A. (1993). *Predicting the academic achievement of female engineering students during the first year of college using the SAT and non-cognitive variables*. Unpublished master's thesis, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Lucas, M. S., & Epperson, D. L. (1988). Personality types in vocationally undecided students. *Journal of College Student Development*, *29*(5), 460-466.

Luo, J., & Jamieson-Drake, D. (2005). Linking student precollege characteristics to college development outcomes: The search for a meaningful way to inform institutional practice and policy. *IR Applications, 7*(3), 1-18.

Malgwi, C. A., Howe, M.A., & Burnaby, P.A. (2005). Influences on students' choice of college major. *Journal of Education for Business, 80*(5). 275-282.

McGrath, M., & Braunstein, A. (1997). The prediction of freshmen attrition: An examination of the importance of certain demographic, academic, financial, and social factors. *College Student Journal, 31*(3), 396-408.

Metz, G. W. (2004). Challenge and changes to Tinto's persistence theory: A historical review. *Journal of College Student Retention*, *6*(2), 191-207.

Milligan, K, Moretti, E., & Oreopoulos, P. (2004). Does education improve citizenship?

Evidence from the United States and United Kingdom. *Journal of Public Economics, 88*, 1667-1795.

Mitchel, D. F., Goldman, B. A., & Smith, M. (1999). Change factors affecting college matriculation: A re-analysis. *Journal of the First-Year Experience and Students in Transition, 11,* 75–92.

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

Naretto, J. A. (1995). Adult student retention: The influence of internal and external communities. *NASPA Journal, 32*, 90-97.

Nelson, R. B., Scott, T. B., & Bryan, W. A. (1984). Precollege characteristics and early college experiences as predictors of freshman year persistence. *The Journal of College Student Personnel, 25*, 50-54.

Newman, J. L., Fuqua, D. R., & Minger, C. (1990). Further evidence of the use of career subtypes in defining career status. *Career Development Quarterly, 39*, 178-188.

Noble, J. P., & Sawyer, R. L. (2002). Predicting different levels of academic success in college using high school GPA and ACT composite score. *ACT Research Report Series*, 1-22.

Noel, L. (1985). Increasing student retention: New challenges and potential. In L. Noel, R. Levitz, & D. Saluri (Eds.), *Increasing student retention* (pp. 1-27). San Francisco: Jossey-Bass.

Nora, A. (1987). Determinants of retention among Chicano college students: A structural model. *Research in Higher Education* 26, 31-59.

Osipow, S. H. (1983). *Theories of Career Development (3rd ed.)*. Englewood Cliffs: Prentice-Hall.

Pascarella, E. T. (1984). College environmental influences on students' educational aspirations. *Journal of Higher Education, 55*, 751-771.

Pascarella, E. T., Smart, J. C., & Stoecker, J. (1989). College race and the early status attainment of black students. *Journal of Higher Education, 60(1)*, 82-107.

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

Pike, G. R., Schroeder, C. C., & Berry, T. R. (1997). Enhancing the education impact of residence halls: The relationship between residential learning communities and first-year

college experiences and persistence. *The Journal of College Student Development, 38*, 609-621.

Pritchard, M. E., & Wilson, G. S. (2003). Using emotional and social factors to predict student success. *Journal of College Student Development, 44*(1), 18-28.

Rasmussen, C. J. (2002). *An assessment of the relative influence of environmental, behavioral, and attitudinal aspects of the pre-college experience in determining students' long-term goals and aspirations*. AIR 2002 Forum Paper. (ERIC Document Reproduction Service No. ED 474 033).

Rodriguez, N. (1996). Predicting the academic success of Mexican-American and white college students. *Hispanic Journal of Behavioral Sciences, 18*, 329-342.

Rouse, K. A. G., & Austin, J. T. (2002). The relationship of gender and academic performance to motivation: Within-ethnic-group variations. *The Urban Review, 34*(4), 293-316.

Savickas, M. L., & Jarjoura, D. (1991). The decision scale as a type indicator. *Journal of Counseling Psychology*, 38, 85-90.

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

Serling, D., & Betz, N. (1980). *Development and evaluation of a measure of fear commitment. Journal of Counseling Psychology, 37*, 91-97.

Singleton, R. A., & Straits, B. C. (2001). Survey interviewing. In J.F. Gubrium & J.A. Holstein (Eds.), *Handbook of Interview Research: Context and Method* (pp. 59-82). Thousand Oaks, CA: Sage.

Smart, J. C., & Pascarella, E. T. (1986). Socioeconomic achievements of former college students. *Journal of Higher Education, 57*(5), 529-549.

Smith, D. G. (1990). Women's colleges and coed colleges: Is there a difference for women? *Journal of Higher Education, 61*(2), 181-195.

Somers, P., Woodhouse, S., & Cofer, J. (2004). Pushing the boulder uphill: The persistence of first-generation college students. *NASPA Journal, 41*(3), 418-435.

Sprandel, H. Z. (1985). Career planning and counseling. In L. Noel, R. Levitz, D. Saluri, & Associates. *Increasing student retention: Effective programs and practices for reducing the dropout rate*. San Francisco: Jossey-Bass.

St. John, E. P. (1990). Price response in persistence decisions: Analysis of the high school and
beyond senior cohort. *Proceedings for the Seventh Annual Conference of the
NASSGP/NCHELP Research Network*, 29-56. Trenton: New Jersey Higher Education
Assistance Authority.

St. John, E. P., Hu, S., Simmons, A., Carter, D. F., & Weber, J. (2004). What difference does a
major make? The influence of college major field on persistence by African American
and White students. *Research in Higher Education*, 45, 209-232.

Suskie, L. A. (1996). *Questionnaire survey research: What works*. Tallahassee, FL:
Association for Institutional Research.

Taylor, K., & Betz, N. (1983). Application of self-efficacy theory to the understanding and
treatment of career indecision. *Journal of Vocational Behavior, 22*, 63-81.

Teitelbaum, H. (2000). Anticipating, implementing, and adapting to changes in academic
advising. In V.N. Gordon, W. R. Habley, & Associates (Eds.), *Academic advising: A
comprehensive handbook* (pp. 180-191). San Francisco: Jossey-Bass.

Thomas, R. O. (1990). Programs and activities for improved retention. In Hoissler, D., Bean,
J.P., & Associates, *The strategic management of college enrollments*, (pp.186-201). San
Francisco: Jossey-Bass.

Terenzini, P. T., Theophilides, C., & Lorang, W. (1984). Influences on students' perception of
their personal development during the first three years of college. *Researching Higher
Education 21,* 178–194.

Ting, S. R., & Robinson, T. L. (1998). First-year academic success: A prediction model
combining cognitive and psychosocial variables for European and African Americans.
Journal of College Student Development, 39, 599-610.

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

Tinto, V. (1987). Leaving college: *Rethinking the causes and cures of student attrition*. Chicago,
IL: University of Chicago Press.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2[nod]
edition). Chicago, IL: University of Chicago Press.

Trippi, J., & Stewart, J. B. (1989). The relationship between self-appraisal variables and the
college grade performance and persistence of black freshmen. *Journal of College*

Student Development, *30*(6), 484-491.

Tross, S. A., Harper, J. P., Osher, L. W., & Kneidinger, L. M. (2000). Not just the usual cast of characteristics: Using personality to predict college performance and retention. *Journal of College Student Development, 41*, 323-334.

Troutman, J. (1978). Cognitive predictors of final grades in finite mathematics. *Educational and Psychological Measurement, 38*, 401-404.

Trow, M. (1996). Trust, markets and accountability in higher education: A comparative perspective. Center for Studies in Higher Education Research and Occasional Paper Series CSHE.1.96. Retrieved at http://cshe.berkeley.edu/publications/docs/ROP.Trow.Trust.1.96.pdf.

Turner, S. E., & Bowen, W. G. (1999). Choice of major: The changing (unchanging) gender gap. *Industrial and Labor Relations Review, 52*(2), 289-313.

Walpole, M. (2007). *Economically and educationally challenged students in higher education: Access to outcomes.* Series: ASHE Higher Education Report, v. 33, no. 3.

Wattenburg, W. P. (2002). *Where Have All the Voters Gone?*. Cambridge, MA/London: Harvard University Press.

White, E. R. (2000). Developing mission, goals, and objectives for the advising program. In V.N. Gordon, W. R. Habley, & Associates, *Academic advising: A comprehensive handbook* (pp. 180-191). San Francisco: Jossey-Bass.

Wolfe, R. N., & Johnson, S. D. (1995). Personality as a predictor of college performance. *Educational and Psychological Measurement, 55,* 177-185.

Wood, P. H. (1990). *The comparative academic abilities of students in education and other areas of a multi-focus university* (Report No. SP032663). Bowling Green State University. (ERIC Document Reproduction Service No. ED327480).

Yorke, M. (1998). Non-completion of undergraduates: Some implications for policy in higher education. *Journal of Higher Education Policy and Management, 20*(2), 189-201.

Zheng, J. L., Saunders, K. P., Shelley, M. C., & Whalen, D. F. (2002). Predictors of academic success for freshmen residence hall students. *Journal of College Student Development, 43*(2), 267-283.

Appendix A:

IRB Approval Letter
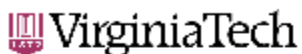
VirginiaTech

DATE: April 29, 2009

MEMORANDUM

TO: Joan B. Hirt
              Kimberly Brown

FROM: David M. Moore

SUBJECT: **IRB Exempt Approval:** "Factors that Predict Academic Achievement for Students Who are Undecided Majors" , IRB # 09-463

I have reviewed your request to the IRB for exemption for the above referenced project. The research falls within the exempt status. Approval is granted effective as of April 29, 2009.

As an investigator of human subjects, your responsibilities include the following:

1.   Report promptly proposed changes in the research protocol. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.

2.   Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

Invent the Future