

AN ANALYSIS OF THE FACTORS THAT CONTRIBUTE TO  
THE PERSISTENCE OF COLLEGE STUDENTS FROM  
THEIR FRESHMAN TO SOPHOMORE YEAR

DISSERTATION

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by

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2005

## **DEDICATION**

This dissertation is dedicated to my loving husband Peter L. Kiser for his unfaltering love and support, to my sons Zach and Anthony who are always a source of great fun, motivation, and inspiration, and to my grandmother Idela Galvez whose love, faith, and wisdom are forever with me.

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## ABSTRACT

# AN ANALYSIS OF THE FACTORS THAT CONTRIBUTE TO THE PERSISTENCE OF COLLEGE STUDENTS FROM THEIR FRESHMAN TO SOPHOMORE YEAR

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### SUPERVISING PROFESSOR: LARRY PRICE

The purpose of this study was twofold. The exploratory portion of this research was conducted to determine the practical and statistical contribution certain variables (high school grade point average (GPA), first-year college GPA, residence location, cumulative hours taken, mother's education level, father's education level, and gender) made to the prediction and explanation of the persistence of college freshmen. Secondly, a logistic regression model was developed that could be used by officials at colleges and universities to help them more fully predict and understand the factors associated with freshman retention and attrition.



A model consisting of 1,014 students was first developed and then the sample was divided into three other models, White students, Hispanic students, and African American students. The findings indicated that the most consistent factor that was statistically significant to the persistence of college freshmen was cumulative hours earned during the first year of college. This cumulative hours variable was statistically significant in the overall model, White students model, and Hispanic students model. No variables were statistically significant in the African American students model. However, no variables were found to be practically significant in any of the four models.

## CHAPTER I

### INTRODUCTION TO THE STUDY

#### Introduction

Each year millions of people walk onto college campuses and enroll as students. According to the projections of the National Center for Education Statistics (2004b), enrollment at institutions of higher learning is expected to increase from approximately 15 million students in 2001-2002 to approximately 18 million students by 2012-2013, representing an overall increase of 16%. The college students will be much more diverse than those who have preceded them. For much of the last half of the 20<sup>th</sup> century, federal and state policies have been put in place to make higher education more accessible to underserved populations in the United States, and the result has been more students than ever before attending college. However, there are wide gaps in how many students initially enroll in college and how many of those students persist to graduation (Swail, 2002).

When people enter college, they are faced with challenges for which they may or may not be prepared. The freshman year in particular represents a stressful transition for college students (Lu, 1994). Their integration into the social, academic, and cultural milieu of the university will certainly affect their persistence to the second year of college. Therefore, institutions are researching ways to help students transition into the college arena. Understanding factors that lead to student persistence benefits the university, its students, the community, and ultimately society.

Given the significant relationship between college academic policy and student retention, it is prudent and efficient to identify factors that lead to student success in order to best develop effective intervention programs (DeBernard, Spielmans, & Julka, 2004). Colleges and universities must be aware of the characteristics and needs of their students and be willing to make major institutional changes as necessary. Upcraft and Gardner (1989) contend that institutions of higher learning are obliged to develop policies, make decisions, and initiate programs and services that enhance freshman success. First-year incoming students, in particular, warrant systematic attention since evidence supports the fact that student success is principally determined by experiences during the freshman year (Noel, Levitz, & Sahuri, 1985).

#### Implications of High College Attrition Rates

Undergraduate students enrolled in colleges and universities throughout the United States are not a homogeneous group. As a result, postsecondary institutions must understand the variation in the undergraduate population in order to meet students' needs and assist them in persisting (NCES, 2003). Students who do not persist to their second year of college may be left with a sense of failure. Since the first year of college is the most critical to persistence, educational institutions that are able to increase their retention rates could significantly decrease the number of college students who leave higher education without earning a degree (Porter, 1990).

In order to maintain enrollment in a competitive environment, colleges and universities are vigorously attempting to retain students rather than replenish those lost to attrition (Kriner & Shriberg, 1992). The loss of students failing to return for another year of college often results in greater financial burdens, a lower graduation rate for the

institution, and may also influence how stakeholders, legislators, parents, and students view the higher education process (Lau, 2003). Tinto (1987) states that approximately 75% of the students who leave college do so during their first two years. He also contends that 85% of those students leave for reasons other than lack of acceptable academic performance. Again, universities and colleges must be responsive to the needs of their students and address those issues that are affecting student persistence.

When institutions of higher education have a high attrition rate, it costs thousands of dollars in unrealized tuition, fees, and alumni contributions. Leaving college without a degree may also be economically detrimental to the student (DeBernard, Spielmans, & Julka, 2004). Other losses to students who do not persist include a sense of failure and missed opportunities for intellectual growth and development. Colleges are committing a disservice to their newly diverse populations if they do not explore and act on the factors that lead students to academic persistence. If these factors are identified, institutions of higher education may be able to help lower their attrition rates. Retaining freshman students leads to a greater chance that those same students will go on to earn degrees and become productive members of society.

#### Persistence Factors

Numerous factors coincide with student persistence during the first year of college. These factors are both academic and non-academic in nature. The Scholastic Aptitude Test (SAT), American College Test (ACT), high school grade point average (GPA), first-year college GPA, and academic courses successfully completed during high school are all examples of academic factors that may correlate with persistence of college students. Demographic factors that play a role include ethnicity, gender, age, educational

level of parents, and socioeconomic status. Personal factors such as attitudes, social behaviors, and self-perceptions are also important to consider when studying persistence. All of the aforementioned factors, both academic and non-academic, may serve as predictors for first-year college student persistence to the sophomore year.

Some of the same factors that are used for prediction of college persistence are also used in the evaluation of admissions decisions at colleges and universities. In order for these educational institutions to make the most informed decisions, the admissions personnel consider these factors and then decide which variables or combination of variables will most likely lead to student success. These decisions are becoming even more vital as funding sources are increasing pressure on the educational institutions to assess the preparedness of the high school students they admit (Stern & Briggs, 2001).

Upcraft and Gardner (1989) believe that to enhance freshman success, an institution of higher education must 1) develop a clear and broader definition of success, 2) commit to a set of beliefs that create maximum opportunities for students, and 3) know and understand the variables that affect student success. Only then can the college or university determine policies, make decisions, and develop useful programs and services that provide freshmen with the greatest opportunity to succeed (Upcraft & Gardner, 1989). Swail (2002) states that without current and useful information, it is not likely that educational institutions will be successful at maintaining a high level of student retention. It is only when the personnel at an institution of higher education clearly understand the complexities of higher education with respect to coming generations and also understands emerging technologies, new strategies in teaching and learning, and the

forces that will impact higher education, that a college or university can prepare for the future (Swail, 2002).

### Intervention

Students derive numerous benefits from attending a college or university that may not be otherwise received elsewhere. Astin (1985) identifies three major types of benefits: educational, fringe, and existential benefits. Direct educational benefits include personal development aspects such as students' intellectual capacities and skills, values, attitudes, interests, and mental health. Indirect benefits typically refer to the credentials received from the institution along with the occupational outcomes. Lastly, existential benefits refer to the quality of the undergraduate experience in relation to satisfaction gained from interactions with peers and faculty, extracurricular and academic experiences, and recreational experiences (Astin, 1985).

Understanding the factors that lead to student persistence could provide a multitude of insights that could assist with student retention and ultimately lead to the attainment of the benefits described. College students who leave during or at the conclusion of their freshman year are the focus of the proposed study since this appears to be the point in time when the greatest numbers of students withdraw from college (Levitz, Noel, & Richter, 1999). Tinto (1996), for example, reported that approximately 57% of college departures occur before the start of the second year. Attrition rates reduce by one-half each year after the first year that an institution can retain a student. Therefore, reducing the first-year attrition rate may significantly reduce subsequent rates and greatly impact the average retention rate over a four-year period (Levitz et al., 1999).

## Demographics of Today's College Students

While diverse populations bring unique ideas and experiences to college campuses, they also bring personal and academic challenges that institutions of higher education may not have previously encountered to the current extent. Colleges and universities need to explore the complexities of these students in order to help them be successful and retain them through to graduation (Kuo, Hagie, & Miller, 2004). Keller (2001) noted that the traditional view of an undergraduate college student such as an 18 to 22 year old White, full-time student attending residential college is now only a small part of the current college population. According to Pascarella and Terenzini (1998), much of the research into college retention was conducted under this misconception of the traditional undergraduate student as opposed to the reality of the diverse populations on college campuses today. Additionally, as the demographics of undergraduate students continue to change it is likely that samples used in previous studies will no longer represent the current postsecondary landscape.

The racial and ethnic composition of undergraduate college students has changed dramatically over the last quarter of a century. In the last 20 years, minority enrollment in United States colleges and universities has increased by 115%, up from nearly 2 million in 1980-1981 to 4.3 million in 2000-2001 (ACE News, 2003). In 1994, approximately one-fourth of college undergraduates were students of color (Reason, 2003). The trend of an increasingly diverse college student population is expected to continue through the first decade of the 21<sup>st</sup> century (Keller, 2001). Students from racial and ethnic minority groups bring new challenges and opportunities to colleges and

universities, which must consider the varying cultures, values, and customs of these highly diverse students.

Although changes in the racial and ethnic makeup of undergraduate students may account for the greatest changes in the diversity of college and university populations, the percentage of women attending higher education also continues to increase. Women accounted for 56% of undergraduate students in 2001-2002 (NCES, 2004a), up from 50% in 1980 (Woodard, Love, & Komives, 2000). Institutions must meet the challenges of fully educating women students, provide for their unique needs, and empower them to succeed. Ignoring issues of first-year women college students is costly to the individuals, institutions, and to society itself (Dwyer, 1989).

Another consideration of the demographics of today's college freshmen is the number of "first-generation" college students from families where neither parent attained more than a high school education (Pascarella, Pierson, Wolniak, & Terenzini, 2004). In 1995-96, 34% of students entering America's four-year institutions were first-generation students (Choy, 2001). Little was known about their college experiences or their cognitive and psychosocial development during college. However, the evidence that had been collected indicated that first-generation college students were at a major disadvantage with respect to their knowledge about post-secondary education (Pascarella et al., 2004).

### Problem Statement

Every organization at some point assesses its policies and procedures and then determines future plans of action. Institutions of higher learning also need to examine their current situation and plan accordingly in order to fulfill their responsibilities and



accountability according to their stated purpose. The analysis of student retention is a necessary segment of this planning. Like business managers, educational administrators monitor their organization so that it does not reach a point at which it no longer meets the needs of those who use it. It is during the freshman year that students are called upon to make the greatest adjustments. While nearly all entering freshmen have been academically successful in high school, college is a major transition and may result in those same students not persisting to their second college year.

Higher education retention research can be traced back over 70 years, with much of the research being conducted prior to 1970. Inquiry into the reasons why some students do not complete their degree program stalled in the mid-1990's because of the widespread acceptance of Tinto's work (Braxton, 2000) which centered solely on traditional students' acclimation to the college environment. Keller (2001) suggests that with the rapidly changing demographics of college students there is a need to reconsider the variables that affect student retention.

This study focuses on examining the factors or combinations of factors that are valid predictors of college freshman persistence. The resulting model will then be statistically evaluated for use for White, African American and Hispanic groups. It seeks to answer the following questions posed by school administrators, faculty and staff, parents, and the community: 1) What factors affect college freshmen retention? 2) What variables or combination of variables can be used to predict the likelihood of a college freshman persisting to the sophomore year? and, 3) What information may be used to develop strategies that will ultimately assist colleges and universities in maintaining an acceptable retention rate?

## Terms and Definitions

1) For the purpose of this study, persistence and retention refer to those students continuing from their fall semester of their freshman year to the fall semester of their sophomore year. In this case, the fall semester for the incoming freshmen is August 2003 with the fall semester of the sophomore year being August 2004.

2) Attrition refers to the reduction in the number of students who return at the end of their freshman year (DeBernard et al., 2004).

3) For the purposes of this study, first-generation college students are those students whose parents do not have any education beyond the high school level (Pascarella et al., 2004).

4) Continuing-generation students in this study refer to those students who have at least one parent who attended college and may or may not have actually earned a college degree (Terenzini, et al., 1994).

5) Coping can be viewed in this study as the behavioral means by which the student adapts to the social and academic environment of the college or university (Eaton & Bean, 1993).

## Summary

As more students enroll in higher education, campuses are becoming more diverse, and college personnel must be concerned with the level of student persistence. Since the freshman year is a pivotal time for college students, it is essential to discover the factors that have the most influence on the persistence of these students. The increase in student diversity will invariably impact higher education research into retention studies. Pascarella and Terenzini (1998) concluded that research into retention studies

should change in the following ways. First, researchers have to study the interaction of different variables, such as race and gender. Second, college outcomes must be redefined when it comes to measuring success. Institutions should consider that every student may not be attending college with the intent to earn a degree. Finally, studies should include as many relevant variables and interactions as possible so as to understand as many facets of the diverse student population as possible (Pascarella & Terenzini, 1998).

## CHAPTER II

### REVIEW OF THE LITERATURE

#### Introduction

The amount of literature relating to college attrition, persistence, and retention is vast. In 2002, Smith reported that less than 70% of freshmen return for their sophomore year. For decades, colleges and universities have had to deal with the fact that some students do not persist at their institutions. Colleges and universities are responding to the student attrition issue by discovering what factors and combination of factors lead to student matriculation and retention. This review of the literature focuses on providing information regarding the reasons for studying freshmen specifically, early freshmen in American colleges, retention theories, general retention studies, and minority retention studies.

This study includes factors that are both cognitive and non-cognitive in nature. The variables chosen build on the work of Tinto (1975), Bean (1982), Astin (1984), and Bean and Metzner (1985) whose research is discussed in this literature review. The investigations of these four researchers encompass academic achievement, demographic, personality, and college interaction factors.

This research is exploratory in nature, and concentrates on the persistence of college freshmen only. The predictor variables used in this study encompass factors present prior to the students' first year of college (high school average, education level of

parents, and gender) along with three factors that occur over the course of the students' first year of college (residence location, cumulative hours, and first-year college grade point average (GPA)).

The residence of the freshman students is included as a variable because it relates to all incoming freshman students, and Texas State University–San Marcos, with some exceptions, requires all freshman students to live on campus (Texas State University, 2004c). Including the effects of living on a college campus further incorporates Tinto's (1975) interactionist model and Astin's (1984) involvement theory that link students' characteristics with their involvement in a college or university setting.

Cumulative hours taken by the student and first-year college GPA focus on the student's academic integration into the college or university environment. These two variables fit with Tinto's (1987) *Model of Institutional Departure*, which states that student retention is dependent on institutional experiences. Negative experiences, such as poor academic performance and an overwhelming course load, increase the likelihood that a college student will not persist.

The researcher sought to find the most important predictors of college freshman persistence and the statistical procedures that will explain the relative importance of each factor and combination of factors. While there is no required order for entering the variables into an exploratory regression model, factors that affect all groups in the study, academic achievement, college living arrangements, cumulative hours earned by the student, parents' level of education, and gender are discussed first. Next, persistence studies relating specifically to African Americans and Hispanics are presented.

### Importance of Studying College Freshman Retention

College students who leave during or at the conclusion of their freshman year were the focus of the proposed study since this appears to be the time when the greatest number of students withdraw from college (Levitz, Noel, & Richter, 1999). Statistics for college freshman attrition vary. Smith (2002) contended that 30% of first-year students do not return for their second year of college while Tinto (1996) reported that approximately 57% of college departures occur before the start of the second year. Attrition rates reduce by half each year after the first year that an institution can retain a student. Therefore, reducing the first-year attrition rate may significantly reduce subsequent rates and greatly impact the average retention rate over a four-year period (Levitz et al., 1999).

For example, a study conducted by Glynn, Sauer, and Miller (2003) at a private urban university led to the development of a logistic regression model of persistence with the potential of predicting attrition of incoming freshmen. The results of the application of the model revealed significant improvements in retention and graduation rates. In the ten years (1984-1993) prior to development of the model, the average rate of persistence from the freshman to sophomore year ranged between 74% and 76%. While this is a high retention rate in comparison to that of many other colleges and universities, the implementation of the model increased the freshman retention rate to an impressive 80.9% in 1994 and 84.6% in 1999 before falling to 81.2% in 2000 (Glynn et al., 2003). The results provide evidence that continued research into college freshman retention is necessary.

## A History of College Freshmen in America

Dwyer (1989) provided an overview of the evolution of college freshmen. Prior to the American Revolution, there were nine colleges that are now known today as the Ivy League (Harvard, Yale, Princeton, Pennsylvania, Columbia, Brown, and Dartmouth) in addition to William and Mary, and Rutgers. These colonial colleges were founded to train men to become church, political, and government leaders. At Harvard, each group of young men had a master who taught them every subject as a class for four years. The group spent four years learning the same subjects from the same tutor, eating together in the same hall, living together, and playing together. The bond formed from these experiences connected the classmates for a lifetime, and the same concept became a characteristic of American colleges and universities (Dwyer, 1989).

Along with learning and bonding, early college freshmen were the subjects of what is today known as hazing. For example, at Brown University in 1782, freshmen were required to build the fires, run errands for seniors, and clean the rooms. In addition, a statute for the university read, “all the students except the members of the Freshman Class shall be permitted the use of the Library.” The hazing of the freshman class was not as severe as it had been in the past, but the freshmen were still there to be exploited (Guild, 1980).

In the nineteenth century, secondary education began to improve as previously authorized activities such as hazing and freshman exploitation began to diminish, and more Americans wanted to enter the nation’s colleges and universities. This increased demand allowed for a more selective admissions process into higher education. As academic standards were raised, life for college freshmen also improved. Much of the

hazing that had previously been sanctioned by colleges and universities began to subside and was eventually repealed (Dwyer, 1989).

Although more students were now entering colleges and universities, by the mid 19<sup>th</sup> century, American postsecondary institutions began to recognize the need for help for those students who were coming to college academically under-prepared (Ryan & Glenn, 2004). Vassar established a preparatory program and Cornell referred students elsewhere in an attempt to better prepare freshmen for their entry into the college environment (Stahl & King, 2000). Other colleges continued the trend, and by 1928, there were over 100 such college freshman orientation courses (Schnell & Doetkott, 2003). Barefoot and Fidler (1996) state that the freshman seminar is by far the most commonly implemented tool for improving college students' freshman year and that one of the major reasons for its emergence has been the alarming rate of freshman-to-sophomore attrition.

#### Texas State University–San Marcos

The samples for this research study were drawn from students who attend Texas State University–San Marcos in Texas. The university offers degrees at the baccalaureate, masters, and doctoral levels. Total enrollment during the 2003-2004 academic year was 26,365, with 22,040 of those students at the undergraduate level. In addition, of those 22,040 undergraduate students, 57% were women, and 43% were men (Texas State University–San Marcos, 2004c).

The university has 21 residence halls and requires unmarried students who are under the age of 21, have fewer than 56 credits, and those not living in San Marcos or in the area with a parent to reside in one of the on-campus dormitories. Each residence hall



includes Freshman Interest Groups (FIGS) and Residential College. The FIGS provide opportunities for student academic activities through course work, hall programming, study groups, and mentorship from peers and faculty (Texas State University–San Marcos, 2004c).

The Texas State athletic programs are part of the National Collegiate Athletic Association (NCAA) Division I. Varsity sports for men include baseball, basketball, cross country, football, golf, and track and field. Women compete in basketball, cross country, golf, soccer, softball, tennis, track and field, and volleyball. In addition to varsity sports, club sports are available to the remainder of the study body (Texas State University–San Marcos, 2004c).

The ethnic composition of the freshman class of 2003 from which the samples in this study were drawn included Whites, 76%, Hispanics, 19% and African Americans, 5%. For freshmen students who began at Texas State University–San Marcos in fall 2003, the retention rate for the combined student group was 76% (Texas State University–San Marcos, 2004a). This retention rate reflects a five year increase of 7% from the 69% one-year retention rate for freshmen who entered the university in the fall of 1998 (Texas State University–San Marcos, 2004b).

However, the new freshmen retention rate declined by 1% from the fall 2002 student class. For the students who began as freshmen in fall 2003, the White student population had a 76% retention rate, the Hispanic student population had a 73% retention rate, and the African American population had a retention rate of 80% (Texas State University–San Marcos, 2004a).

## Survey Data

The data gathered for the proposed study were collected through the *Cooperative Institutional Research Program (CIRP) Freshman Survey* (CIRP, 2004). Established in 1966, it is a national longitudinal study of the American higher education system and is administered by the Higher Education Research Institute. The CIRP is considered the most comprehensive source of information on college students and is used by approximately 1800 institutions involving over 11 million students. The four-page survey instrument covers the following issues: 1) demographic characteristics, 2) expectations of the college experience, 3) secondary school experiences, 4) degree goals and career plans, 5) college finances, 6) attitudes, values, and life goals, and 7) reasons for attending college. In addition, each campus that elects to administer the survey to its incoming freshman students may add 21 of its own local questions. Items from previous years are repeated so that institutions are able to assess trends among their entering freshmen. However, the survey is revised annually to ensure that it meets the needs of the colleges and universities where it is used (CIRP, 2004.).

### Results from the 2003 Freshman Survey

The data for this research study came from students at Texas State University–San Marcos who completed the 2003 *CIRP Freshman Survey* and then agreed to allow their information to be used for research purposes. The university has participated in this survey for four years, beginning in 2000. Incoming freshmen complete the survey during their first discussion group meetings at freshman orientation, which is held in the summer prior to the beginning of the fall semester. Valid surveys were completed by 2,439 students (81%) of the 3,139 new freshmen in 2003. The following table summarizes

some of the results of the 2003 survey. Results are provided for the university in this research study in relation to other public universities with the same selectivity value. The selectivity value is the mean score estimate of the composite SAT score, in this case between 1085 and 1139 (Texas State University–San Marcos, 2003).

Table 1

Demographic Information from the *Cooperative Institutional Research Program (CIRP) Freshman Survey* in 2003

---

Variable	University in Current Study	Other Public Universities
No. of students	2439	13843
Male (%)	39	48
Female (%)	61	52
Ethnicity (%)		
White/Caucasian	79	90
African American/Black	4	4
Mexican American/ Puerto Rican/Other Latino	16	2
Average grade in high school		
A- to A +	56	51
B- to B+	43	46

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C to C+	1	3
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Mother's education level (%)

Did not graduate

high school	5	3
-------------	---	---

High school graduate	21	19
----------------------	----	----

Postsecondary education

(not college)	3	5
---------------	---	---

Some college	25	17
--------------	----	----

Undergraduate degree	31	39
----------------------	----	----

Graduate degree	14	17
-----------------	----	----

Father's education level (%)

Did not graduate

high school	6	3
-------------	---	---

High school graduate	19	19
----------------------	----	----

Postsecondary education

(not college)	3	5
---------------	---	---

Some college	22	15
--------------	----	----

Undergraduate degree	32	35
----------------------	----	----

Graduate degree	18	23
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In addition to the comparative data from the *CIRP Freshman Survey*, the following data for the university in this research study are provided:

## Enrollment (2003-2004)

Total enrollment:	26,365
Undergraduates:	22,040
Women	57%
Men	43%
White/Caucasian	75%
Hispanic	19%
African American	5%
Student to faculty ratio:	21:1
Average class size:	37
Returned for sophomore year:	76%
Hispanic	73%
African American	83%

## Estimated Direct Costs Based on 14 Hours (2004-2005)

Undergraduate	TX resident	Non-resident
Tuition and fees	\$2,275	\$6,500
Books and supplies	475	475
Campus room and board	3,400	3,400
Total	\$6,150	\$10,375

The freshman to sophomore retention rate at this university warrants further investigation into the factors that are contributing to the persistence of the freshmen. Of special interest is the high retention rate for minorities, specifically African American students. While the percentage (73%) of Hispanics who persist to their sophomore year

is just slightly below the overall average for the college (76%), the rate of persistence from the freshman to sophomore year for African Americans (83%) is 7 percentage points above the school's average (Texas State University–San Marcos, 2004a).

### Retention Theories

Over the last 50 years, an abundant amount of literature has been generated concerning college student persistence and retention. Several models exist to explain the attrition, persistence, and retention of college students. Each model concerns itself with students' college experiences and the campus environment in order to ascertain reasons for specific retention outcomes. Consequently, these theories take into consideration such factors as the institutions' policies, student commitment, campus climate, student involvement with peers and faculty, and student attitudes (Elmers, 2001).

An early persistence and attrition study conducted by Pantages and Creedon (1978) addressed methodological problems, national rates of student departure, theoretical models, and key variables that may be associated with attrition. Their study indicated that while research into attrition factors is widespread, the results are ambiguous. They contended that the stated degree of influence of motivational and personality factors is inaccurate because of poor measurement instruments. Pantages and Creedon (1978) found that academic factors such as high school GPA, class rank, and scholastic aptitude test scores were the most predictive variables of student attrition. However, the researchers also suggested that attrition was affected by an interaction of a number of variables and to attempt to isolate one as the single causal factor is misleading.

Tinto's (1975) interactionist model assumes that incoming students possess a set of individual traits that determine their commitment to the institution and their

commitment to earning a degree. These traits, along with their level of commitment, establish their level of academic and social integration into a specific college or university. Consequently, the student's choice to graduate, or to drop out, is greatly influenced by his or her level of persistence. Tinto (1997) also found that academic involvement leads to greater social integration. However, the connection between academic involvement and social integration is inversely related. As social integration increases, the positive influence of academic integration somewhat diminishes. Overall, as academic and social integration increase, so does persistence (Tinto, 1997).

A positive connection between the student and the institution leads to compatibility between a student's motivation, drive, and academic ability, and the academic and social characteristics of the college or university (Glynn et al., 2003). It follows, therefore, that higher education institutions should facilitate academic and social interaction, form a shared consensus regarding institutional goals, and promote persistence (Mangold, Bean, Adams, Schwab, & Lunch, 2003).

Bean (1985) worked from a theoretical base different from Tinto's (1975). He claimed that Tinto's model failed to include a series of external factors. Bean proposed a comprehensive model that included attitude constructs that both directly and indirectly affect student intent. The model included equally the process model of organizational turnover, which creates an analogy between student attrition in institutions of higher education and turnover in work organizations and Fishbein's and Ajzen's (1975) model of attitude and behavior relationships, which contended that attitudes are precursors of intentions, and intentions then control actions. Attitudes resulting from beliefs affect the behavioral act of persisting in college or dropping out (Bean, 1982).

Bean's (1982) model included student background as well as the environment inside the institution and outside of the institution. He specifically identified five classes of variables: 1) background, 2) organizational, 3) environmental, 4) intention to leave, and 5) attitudinal and outcome variables that affect a student's decision to leave or persist. Each of these five types of variables was said to have a unique effect on the students' college experience as well as an interaction between them that can impact student retention.

Astin's (1984) involvement theory stressed the role of student involvement as a means to persistence. He defined involvement as "the amount of physical and psychological energy that the student devotes to the academic experience." Astin's theory has five postulates: 1) involvement can be an experience or a specific activity, 2) some students exert more energy than others, 3) involvement has both quantitative and qualitative features, 4) the more students put into an activity, the more they get out of it, and 5) educational policy has a direct effect on student involvement.

In order for students to learn and grow, they must be actively involved in their environment (Astin, 1984). Astin (1984) also contended that it is the opportunities students have to get involved that determines undergraduate student development, not necessarily the type of institution. Students should also have an ample number of chances to interact with others and a strong commitment to the institution. Therefore, colleges and universities must implement policies that increase student involvement in order for those policies to be effective (Astin, 1984).

More recently, Kalsner (1991) concluded that the belief that college students drop out because of academic failure is a misconception. They more often withdraw due to



their personal lives, uncertainty about college goals, finances, and their level of integration into the college environment. His theory revolved around four themes of persistence. Kalsner suggested that high career and educational objectives and parental attitudes toward higher education increase the likelihood that the student will graduate. Second, the level of the student's integration into the university setting affects attrition. Third, financial difficulty in paying for college plays a role in attrition. Lastly, academic deficiency has a negative effect on retention, with a greater impact on women than men.

In Baker's and Velez's (1996) review of the college persistence literature, they highlighted five variables: 1) background factors such as socioeconomic status, ethnicity, and gender, 2) academic and social integration, 3) external factors, which are those aspects in a student's life that occur outside the college or university 4) institutional factors that include issues relating to type of institution (community college, 4-year institution, etc.), and 5) the impact of financial aid on persistence. They concluded that when combined with other variables, socioeconomic status is only moderately predictive of persistence. The authors also contended that external factors such as marital and other family responsibilities, part-time or full-time work responsibility, and encouragement from others to succeed in college played a major role in student persistence or attrition, which supported the theoretical premise of Bean and Metzner (1985) that focused on the factors that take place in student lives outside of the college environment.

A review of research on persistence conducted by Kennedy and Sheckley (1999) assessed more than 125 studies. The authors found that the body of literature revolved around three main categories, demographic variables, academic achievement and personality factors, and interactions between the college and the student. The authors

contended that demographic variables did not have a major impact on persistence. Of the 66 studies reviewed that examined the relationship of demographic variables, 36 reported no significant relationship between persistence and demographic variables and 30 reported a minor relationship with only 5% of the variance attributable to student persistence.

In contrast, factors concerned with academic achievement and personality factors indicated a significant relationship with persistence and attrition. Ninety-seven of the 116 studies reviewed accounted for an average of 12% of the variance, and 12 studies accounted for a 20% or more variance. Age and gender were considered in the academic achievement and personality factors category, and the review showed that age was not powerfully related to persistence while gender was moderately related. High school grades consistently explained about 20% of the variance in persistence, but standardized test scores were not a strong indicator of persistence, especially after the first year (Kennedy & Sheckley, 1999).

Lastly, of the 60 studies that researched student interactions on college campuses, all reported that interaction was a significant predictor of college persistence. These findings indicated that integrating into the college environment had a major effect on whether or not a student persisted. Therefore, the researchers concluded that Tinto's (1975) model and Bean's (1983) model actually explain almost 50% of the variance in student persistence (Kennedy & Sheckley, 1999).

The literature discussed by Kennedy and Schekley (1999) suggested that using the available models, persistence can be explained by both cognitive variables such as scholastic aptitude and academic achievement and non-cognitive variables such as

student intent to persist and personality factors. Academic achievement, academic and social integration into the college environment, and commitment are all important factors when studying persistence. Therefore, as the culture of the college campus becomes more diverse, further research is indicated.

### Prediction Studies

Studies conducted to predict student retention have centered on variables that include gender, race and ethnicity, socioeconomic status, high school grade point average, college grade point average, college entrance test scores, and the interaction between these variables (Peltier, Laden, & Maranga, 1999). Next is a discussion of the variables included in this study that are considered to have an effect on persistence and retention of college freshmen.

While each factor is discussed separately, it does not imply that they are independent of each other. In many cases, they are interrelated. The order for presentation of the variables is based on significant findings revealed in the reviews of retention research. In Reason's (2003) review of retention research, he found that high school grade point average and college admissions tests scores (academic variables) appear to be the most significant predictors of retention. Coinciding with these findings, Kennedy and Sheckley (1999) claimed that retention studies showed a major relationship between academic achievement and persistence. Therefore, academic variables are discussed first in this study.

The next factor that emerged as having a statistically significant impact on college persistence was the social and academic integration of the student to the college or university environment. Students who lived on campus tended to be more involved in

school activities and programs (Blimbling, 1993; Pascarella, 1985). According to Kennedy's and Schekley's (1999) review of retention research, social interaction was a major predictor of college persistence. For these reasons, the effects of living on a college campus are discussed next in the research.

Cumulative hours taken by the student are discussed next in the literature because of their inclusion in the research centering on academic integration. While there is not an abundance of research revolving around cumulative hours specifically, academic integration is heavily discussed by Astin (1993) whose theory of student involvement contended that the students' level of institutional involvement and engagement were highly significant in determining their level of effort and commitment to persistence. Furthermore, Tinto (1975, 1987) stressed the importance of academic and social integration into the college or university and its relationship to persistence and attrition.

The third variable presented in the literature review is whether or not the freshman student is a first-generation college student. The research centering on the persistence of first-generation college students is not as abundant as the research focusing on persistence in relation to academic variables and campus involvement. However, the research available seemed to indicate that being a first-generation college student does have an effect on persistence in ways that are different from those who are not first-generation students (Pascarella, 2004; Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996; London, 1996).

Within the retention literature, gender appeared to have only a moderate effect on retention (Kennedy & Sheckley, 1999). Additionally, studies revolving around gender and retention seemed to have mixed results. Some researchers have found that gender

was a significant predictor of persistence (Astin, 1975; Tinto, 1987; Peltier, et al., 1999), while others reported that gender alone was not a significant predictor of college persistence (St. John, Hu, Simmons, & Musoba, 2001; Pascarella & Terenzini, 1998). Due to the lack of consistent findings for gender as a predictor of college persistence, it is presented fourth.

This study employed an exploratory regression model based on the total sample and then examined the utility of the model for three separate groups, Whites, Hispanics, and African Americans. The variables described above are discussed first and then the literature revolving around the two racial and ethnic minority groups, Hispanics and African Americans, is presented. Each of the aforementioned variables will be applied to the total sample and then to regression models for White students, Hispanic students, and African American students. Consequently, research regarding minority student persistence is discussed separately in its own section.

#### *Academic Variables*

One rationale for colleges and universities to consider variables such as high school average in their admissions process is that it is an indication of the scholastic performance of a student (Camara & Echternacht, 2000). High school grade point average significantly correlates with success rates in college (Tross, Harper, Osher, & Kneidinger, 2000). Those students with high grade point averages are predicted to do well in higher education institutions.

In Astin's (1997) assessment of institutional performance based on retention rates, he discussed the effect of high school average on four-year graduation rates. He found that average high school grades were highly significant in predicting college retention.

For example, freshman students who enter the college or university with a high school average of A- have approximately a 65% likelihood of completing college within four years. Conversely, a student who enters college with a high school average of C- has less than a one in five chance of finishing college within four years (Astin, 1997).

Micerri (2001) conducted a college student retention study using 7 freshman cohorts consisting of 21,138 student at the University of South Florida to determine which, if any, pre-entry attributes significantly contributed to predicting college performance. The results of the study indicated that GPA-based variables such as high school GPA and class rank were the most significant predictors of college student performance and ultimately retention. Additionally, when GPA was a predictor variable in a model, no other predictor variable in the model added useful statistical significance to the retention prediction (Micerri, 2001).

A study conducted by McGrath and Braunstein (1997) utilized data from 632 full-time freshmen who were enrolled at Iona College in Rochelle, New York during the 1994-95 academic year. The participants were slightly more than half (55.2%) male, approximately two-thirds (65%) Caucasian, 14% Hispanic, 8% African American, 1% Asian, and 12% who classified themselves as “other” or did not respond to the question. Data were gathered using the *College Student Inventory (CSI)*, which contains 194 items consisting of five scales: 1) academic motivation, 2) social motivation, 3) general coping skills, 4) receptivity to support services, and 5) initial impressions of the institution

The researchers concluded that students who are retained from their freshman to sophomore year show higher high school grades, SAT scores, and first semester college grade point averages than those students who do not persist to their sophomore year.

Specifically, the single most important variable found to be the most effective in predicting persistence between the first and second years is the first semester college GPA (McGrath & Braunstein, 1997).

In a paper presented at the Annual Forum for the Association for Institutional Research by Zhu (2002), a study was presented that profiled the effect of first-year academic performance on college student persistence. The study, which employed a sample of 1,175 students who formed a cohort of first-time, full-time freshmen enrolled in fall 1995, indicated that good academic performance in the first year of college was a positive factor impacting persistence. Conclusions for the study indicated that maintaining at least a 2.0 GPA gave the student an opportunity to declare a major and receive financial aid. In essence, good academic performance gave the student the assurance they he or she could succeed (Zhu, 2002).

A study to find the factors that contributed to the persistence of first-time, full-time college freshmen enrolled in the fall of 1994 was conducted by Allen (1999) at a medium-sized, public, four-year institution in the Southwest. Allen found that the first-year college GPA was a statistically significant predictor of between-year retention for college freshman students, both minority and nonminority, and had the greatest direct effect on persistence.

#### *Effects of Living on a College Campus*

Tinto (1975) contended that students' background characteristics are what initially determine whether a student will develop a commitment to a college or university. However, students then need to become actively involved in the social and

academic system of the institution, interact with other students, and interact with faculty in order to develop a strong commitment to earning a degree.

Approximately 16% of the nation's 16 million university and college students live on campus (Horn, Peter, & Rooney, 2002). The majority of the body of research surrounding the effects of living on a college campus finds four distinct benefits (Flowers, 2004). First, those students who live on campus are more likely to persist as opposed to those who live off-campus or at home (Galick & McEwen, 1989; Thompson, Samiratedu, & Rafer, 1993). Second, students who live on campus are more likely to develop stronger social skills and a greater sense of accomplishment than those students who live off campus (Pike, 2002). Third, involvement in school activities and campus programs is greater for students who live on campus (Blimling, 1993; Pascarella, 1985). Lastly, students who live on campus attain higher grade point averages and standardized test scores (Kanoy & Bruhn, 1996; Nowack & Hanson, 1985).

A qualitative study conducted by Christie and Dinham (1991) revealed the influence of living in residence halls on college campuses. Of the 25 students interviewed, 20 lived on campus during their freshman year. Findings indicated that living on campus provided greater opportunities for students to integrate into the college social systems in four ways: 1) meeting other students, 2) developing student friendships, 3) gaining information about social opportunities on campus, and 4) shifting away from high school friends (Christie & Dinham, 1991). These opportunities seemed to lead to an easier transition from high school to the college environment, which ultimately leads to a greater retention rate.

The stronger the integration into and commitment to the university, the greater the



level of student persistence (Tinto, 1993). The link between institutional commitment and student persistence plays an important role for colleges and universities. By strengthening its forecasting abilities, an institution can better prepare its educational and administrative planning (Strauss & Volkwein, 2004).

#### *Cumulative Hours Taken by the Student*

“College impact models” assert that the college environment and the student’s interactions within that environment have a significant impact on a number of college outcomes (Elmers, 2001). Students’ involvement with peers, professors, and the academic program are all closely tied to their learning and development (Astin, 1993). Congruency between a student and a college or university involves establishing a compatibility between a student’s motivation, drive, and academic ability and the academic and social characteristics of the college or university (Glynn et al., 2003).

The course load a student attempts during the freshman year of college is directly related to the student’s integration into the academic and social environment of that college or university. Taking college classes affords students the opportunity to interact with both peers and faculty members. According to Kennedy and Sheckley’s (1999) review of retention literature, the variations in how students relate to others and the college environment accounted for approximately 10% to 20% of the variance associated with student persistence.

Strauss and Volkwein (2004) conducted a study of study of first-year students at 28 two-year and 23 four-year institutions to discover predictors of student commitment. Their study revealed that the strongest influence on institutional commitment comes not from pre-entry attributes, but from subsequent campus experiences. The balancing of

student academic and social experiences exerts a heavy influence on commitment, which is a strong predictor of student persistence (Strauss & Volkwein, 2004).

Research conducted by Kuo, Hagie, and Miller (2004) studied the factors that lead to college success. The study utilized data collected from a survey completed by undergraduate students at a research university in the western United States. The students indicated that their greatest challenge was balancing academic and personal life. However, when rating coping skills, decreasing credit hours only showed a mean of 2.13 on a 6 point scale and was therefore not a strategy employed by many students (Kuo et al., 2004).

Challenging course loads may lead to stressful situations for students, and individuals cope with stress in varying ways (Skowron, West, & Azen, 2004). Students use coping strategies to deal with stress, which in college includes academic integration into the college or university environment. A study conducted by Eaton and Bean (1993) of 262 students, primarily freshmen, indicated students who avoid difficult situations within the college environment are less likely to have a positive outlook on future academic progress. Additionally, college experience as measured by the total credit hours attempted speaks to the level of academic success of the student. The higher number of credit hours attempted suggests successful previous achievement whereas a lower than average number of credit hours attempted implies that the student may have difficulty in successfully handling a full course load (Jackson, Weiss, Lundquist, & Hooper, 2003).

Stage's (1989) study to research persistence as an outcome of various motivational factors used data from surveys completed by 316 first-year university

students at a Southwestern public university where the first-year attrition rate was 10% to 12%. He developed three subgroups that were categorized by their motivational level. Stage (1989) found that within each model academic integration, which included credit hours earned, was a significant predictor of persistence.

### *First-generation College Students*

Another outcome of the growing demographic diversity on college campuses is the increase in the number of first-generation college students. For these students, neither parent has earned more than a high school education. The research on these students is rapidly expanding, and typically falls into three general categories (Terenzini, et al., 1996).

The first type of study compares first-generation and other college students in relation to demographic characteristics, secondary school preparation, the college choice process, and college expectations (Warburton, Bugarin, & Nunez, 2001). This research indicated that first-generation college students appear to be at a disadvantage when compared to their peers. They have a more difficult time with basic knowledge about postsecondary education, level of family income and support, educational degree expectations and plans, and academic preparation in high school (Pascarella et al., 2004).

A second type of first-generation college student research investigates the transition from high school to postsecondary education (Terenzini et al., 1996). The evidence suggests that first-generation college students have a more difficult transition from high school to college than their peers who do not fall into this category. In addition to facing the anxieties and difficulties that all students face, first-generation

college students also encounter experiences quite different from their usual cultural and social environments (Terenzini et al., 1996).

The third kind of research on first-generation college students involves examining their persistence in college, degree attainment, and early career outcomes (Warburton et al., 2001). When compared to students whose parents graduated from college, the results of this research consistently indicate that first-generation college students are more likely to leave a four-year institution at the end of their first year, less likely to remain enrolled, less likely to be on track after three years, and less likely to earn a bachelor's degree after five years (Pascarella et al., 2004).

A study conducted by Somers, Woodhouse, and Cofer (2004) used the National Postsecondary Student Aid Survey of 1995-96 (NPSAS:96) to research the persistence of first-generation college students to graduation. The sample consisted of 8,290 first-generation students and 15,972 continuing-generation students. Logistic regression was used to determine which variables had the greatest impact on the persistence of first-generation college students.

The research found that the following background variables were significant predictors of persistence among first-generation students. Students who declared their ethnicity as "other" were 9.85 percentage points more likely to persist than White first-generation college students. Those over the age of 30 were 5.76 percentage points less likely to persist than students aged 22 to 30. Lastly, low-income students were 10.03 percentage points less likely to persist than students whose parents fall into the middle-income range (Somers et al., 2004). Achievement and aspiration variables studied by Somers et al. (2004) also had a significant impact on persistence. First-generation

students resolved to earning a baccalaureate degree were 17.11 percentage points more likely to persist, and those aspiring to degrees beyond the baccalaureate level were 9.46 percentage points more likely to persist.

During the first year of college first-generation students need academic and social support. They appear to get more discouraged with low grade point averages or academic performance. A lack of confidence may be the reason why they are more likely to drop out of college than continuing-generation students. However, when first-generation students live on campus or attend school full-time, their probability of persistence increases by 5.43 and 6.64 percentage points respectively (Somers et al., 2004).

Psychological barriers also appear to contribute to the lack of persistence by first-generation college students. London's (1996) interviews of first-generation college students revealed that separation from family can have adverse effects for these students. He contended that while separation concerns are present in all families, the type of anxieties vary between first-generation and continuing-generation students. London (1996) goes on to state that while issues revolving around continuing-generation students seem to focus on where to attend college and college major, the main issue of concern for first-generation college students is centered on whether or not to even attend college.

#### *Gender*

While students in minority racial and ethnic groups account for the majority of growth in higher education, the number of women attending college has also been increasing and will likely continue to increase (Woodard, Love, & Komives, 2000). In 1999, women composed 55% of the undergraduate population in the United States up 5%

from 1980. The number of women enrolling in higher education is growing more rapidly than the number of men, and the National Center for Education Statistics (2004b) predicts that between 2000 and 2013 the number of women attending institutions of higher education will increase by 21%.

Although the number of women entering higher education is increasing, the research on gender as a predictor of college success has met with less consistency than college entrance tests or high school GPA's. Astin (1975) and Tinto (1987) found that gender is definitely related to student retention. Peltier, Laden, and Matranga (1999) also report that gender is a significant predictor of college persistence, finding that women are more likely to persist than men. However, in a large retention study conducted by Reason (2003/2004), gender by itself failed to be a significant retention factor in a multivariate model. Conversely, in a simple model, gender was a factor, indicating that gender interacted with other variables and needed further study (Reason, 2003/2004).

St. John, et al. (2001) examined three inclusive regression models. They found that gender was not significant when included only with age, race, financial dependency on parents, family income, and SAT/Merit-Index. Gender was found to be significant when the variables related to first-semester college GPA, but then failed again to be significant when institutional variables were considered. The researchers concluded that there was a need for further research into the significance of gender in relation to persistence in college.

The interaction of variables found in the St. John et al. (2001) study was comparable to findings of other studies. Murrough, et al. (1999) and Leppel (2002) also contended that there was a relationship between gender and race that affected retention.

Leppel's study of 5,384 undergraduate students explained the influence of variables such as marital status and age on the persistence of men and women. The findings further supported the contention by Pascarella and Terenzini (1998) that the effect of gender varies depending on other variables, thus making research into the interaction of variables even more important as diversity in higher education continues to grow (Reason, 2003).

#### Research Regarding Minority Student Persistence

The civil rights legislation of the 1960's, educational reforms, and political actions led the way for students in minority racial and ethnic groups to have a much greater access to higher education. Since minorities have not participated in higher education at significant levels as long as their White counterparts, research literature pertaining to the retention of minority students is not as prevalent as the general retention literature. In the past, minorities were simply expected to adapt to their new and predominately White environments (Christoffel, 1986; Fleming, 1984). Christoffel (1986) and Fleming (1984) also suggested that the challenges new students face on college campuses combined with the additional barriers faced by minorities contribute to the high attrition rates for these minority students.

Retention studies using race and ethnicity as variables are quite prevalent in the literature (Peltier et al., 1999). For the studies discussed here, the term "race" will be used to refer to race and ethnicity. Astin (1997) contended that race was definitely a significant predictor of college retention. Additional studies concluded that different variables were significant predictors for different racial groups (Allen, 1999). Various racial groups tended to have different experiences related to education that affected how

other variables impacted their retention rates, making race a possible predictor and mediator of other variables (Reason, 2003).

In a study of almost 9000 students at Oregon State University in the early 1900's, Murtaugh et al. (1999) used regression analysis to create hazard ratios for several racial categories. The analysis indicated that Asian students were less likely to drop out of school than Caucasian students. However, Hispanics, African Americans, and American Indians were more likely than Caucasian students to withdraw from school. These disparities were found to be true when race was considered as an independent factor. However, when other variables such as age, college major, high school grade point average, and first- quarter college grade point average were included, much of the difference between racial groups disappeared or reversed.

Allen (1999) concluded that the variables that significantly predict retention for Caucasian students are different from those that predict retention for students in other ethnic groups. In a study of 581 first-year college students at a university in the southwest United States, Allen found that for minority students, high school rank, first-year college GPA, and a desire to finish college accounted for a 68% variance in the minority students' retention from their first to second year of college. In contrast, those same factors accounted for only 38% of the variance for Caucasian students.

Through the years, methods used for predicting retention by race have changed and studies now typically include other variables as well. While retention studies should continue to include race as a variable, the statistical analysis must be able to examine race with the interaction of other variables (Allen, 1999).



Malaney and Shiveley (1995) noted that minority students have different initial perceptions and expectations of student life than White students at the institution. In turn, those perceptions and expectations then impact the minority students' abilities and desires to integrate into the university culture, both academically and socially. Rather than expecting minority students to simply adapt to the college, the colleges must be prepared to meet the needs of this diverse group of students (Kleeman, 1994).

Cultural change continues to be reflected on college campuses where growing numbers of minority students are enrolling, but while colleges and universities are devoting more effort to the retention of minority students, a staggering 70% of African American students at predominately White institutions do not persist to graduation (Davis, et al., 2004). Although the discrepancy is often attributed to a lack of academic preparation on the part of the African American students, evidence suggests that academic concerns are not the main reason for the high attrition rate (Echols, 1998).

Echols (1998) revealed a range of family, social, academic, and institutional factors that help explain academic success of minority college students. The meta-analysis of 113 studies encompassed research on minority students from 1970 to 1997 and revealed that positive integrative experiences were a highly significant predictor variable of persistence. Additionally, negative or nonintegrative experiences such as loneliness and alienation were significant in relation to voluntary withdrawal from college (Echols, 1998).

A study conducted by Flowers (2004) examined the extent to which living on campus influenced the educational gains of African American college students. The main data source for this study was the 3<sup>rd</sup> edition of the *College Student Experiences*

*Questionnaire* (CSEQ) and included 6,092 African American students (64% females and 36% males) from 212 postsecondary institutions. The student sample consisted of approximately 43% freshmen, 23% sophomores, 15% juniors, and 19% seniors. Since this research aimed to focus on students living on campus, a sample of students with approximately 77% of those students living on campus was utilized.

Findings in the study indicated that African American students who did live on campus achieve greater gains in social and personal development than African American students who did not live on campus. Furthermore, African American students living on campus were more likely to report higher scores in the following areas: 1) developing personal values and ethical standards, 2) learning about and understanding oneself and others, 3) learning how to get along with different types of people, 4) learning how to participate in a team, and 5) developing habits that promote good emotional and physical health (Flowers, 2004). Keeping in mind the significant educational gains made by African American students who lived on campus, only 17% of African American undergraduates actually reside on college campuses (Horn et al., 2002).

Unlike continuing-generation students, first-generation minority college students are breaking away from, rather than continuing with, family tradition (Terenzini, et al., 1994). While some of these students receive a great deal of family support, others do not since their parents believe the students should remain at home with the rest of the family. Terenzini et. al. also stated that while White students seem to be more concerned with social integration, minority students are more concerned with becoming academically integrated into the college environment.

Criteria used for college admissions and the predictability of college performance for students in racial and ethnic minority groups are highly controversial issues (Sedlacek, 1996) that present a need for further research into the admission and retention of minority students. Sedlacek (1996) suggested using the Noncognitive Questionnaire (NCQ) as a more useful tool in predicting persistence for students of varying ethnic groups. He used Sternberg's (1985) triarchic theory of intelligence to explain how minority students may learn differently from their White counterparts. The theory is comprised of componential, experiential, and contextual intelligence. Componential intelligence is measured by traditional problem-solving approaches such as are found on standardized tests. Experiential intelligence engages the interpretation of information in changing environments. And lastly, contextual intelligence is present when one needs to adapt to environmental changes or determine system patterns (Sternberg, 1985).

Minority students who persist in college are most likely using contextual intelligence since they are concerned with long-range goals and objectives. Successful students in ethnic minority groups also utilize experiential intelligence to demonstrate knowledge in the field (Sedlacek, 1996). In research conducted by Herrnstein and Murray (1994), they claimed that African American students typically scored lower on standardized tests because this type of test is dependent on componential intelligence, and African Americans, like students in other ethnic minority groups, rely more heavily on experiential and contextual intelligence.

### Summary

Colleges and universities throughout the United States are faced with adapting to and meeting the needs of a much more diverse group of students than what they

encountered in the past. It is important that officials at these institutions of higher education understand the factors that best predict persistence for their students so that they are better able to provide the best programs that will help students to be successful through to graduation. This literature review has provided information from general research studies that included high school GPA, first-year college GPA, cumulative hours earned at the university during the freshman year, education level of the student's parents, and gender as predictor variables for all students. Additionally, information from studies relating to the two racial and ethnic minority groups in this study, Hispanics and African Americans, was presented separately.

Given the information cited above, the present study aims to expand the knowledge surrounding the persistence of college students from their freshman to sophomore year. While it is recognized that there are numerous ethnic and racial groups, a prediction model for all students will be developed and then used to examine its effectiveness for comparison of the following specific groups: 1) Whites, 2) Hispanics, and 3) African Americans. The campus where the sample for this study was obtained contained an adequate sample size of these two groups to give the study more reliability and validity. Therefore, other minority groups were not included in the study. However, the process to discover factors and combinations of factors leading to college freshman persistence can be duplicated for other groups and on other campuses.

## CHAPTER III

### RESEARCH METHODOLOGY

#### Introduction

This chapter outlines the techniques employed to discover the variables or combinations of variables that were statistically significant to the persistence of college students from their freshman to sophomore year. The study was ex post facto since the data had been previously collected. The chapter is subdivided into the following six sections: 1) sample population, 2) instrumentation, 3) procedures, 4) definition of key terms, 5) variables in the study, and 6) data analysis.

#### Sample

Subjects for this study were full-time freshman students who entered college during the fall semester in 2003. All participants were attending a four-year public university in South Central Texas that offers degrees at the bachelor's, master's, and doctoral levels. The subjects were all full-time students with a grade point average (GPA) of at least 2.0 on a 4.0 scale who completed the *Cooperative Institutional Research Program (CIRP) Freshman Survey* during orientation seminars prior to beginning their first semester at the university and agreed to allow their survey responses to be used for research purposes.

Total undergraduate enrollment at this institution during the 2003 – 2004 academic year was 22,040, which consisted of 3,139 freshmen. Approximately 39% of

the freshmen students were male and 61% were female. In addition, 99% of the total freshman class ranged between the ages of 17 and 20. The ethnic composition of the 2,349 freshmen, as categorized on the CIRP survey, was 78% White/Caucasian, 15% Hispanic (Mexican American/Chicano, Puerto Rican, and other Latino), 4% African-American, 1% American Indian, 2% Asian or Asian American, .5% Native Hawaiian or Pacific Islander, and 2% Other (Texas State University–San Marcos, Division of Student Affairs, 2003).

### Instrumentation

The survey instrument from which the data were collected was designed by the Cooperative Institutional Research Program at the University of California at Los Angeles (UCLA) and distributed to colleges and universities by the Higher Education Research Institute. Approximately 1800 U. S. institutions of higher education use this instrument to collect information concerning their incoming freshmen. While the instrument contains four pages of questions revolving around demographics, college expectations, secondary school experience, degree goals and career plans, financial status, attitudes and values, and college attendance reasons, it also allows for each campus to add 21 of its own questions (CIRP, 2004).

Each year, campuses participating in the *CIRP Freshman Survey* receive a detailed report outlining their students' responses. The report provides in-depth profiles of an institution's freshmen by gender and by freshmen combined. In addition, profiles for transfer students and part-time students are provided. Along with results from the specific university, comparative normative data are provided for freshmen from similar universities (CIRP, 2004).

## Procedure

Approval to conduct the study was obtained from the Institutional Review Board (IRB) of Texas State University–San Marcos. Data from full-time freshman students who completed the survey and matriculated to their sophomore year was obtained through the Student Affairs Department at the university. No additional survey instruments were designed or administered to these students for the purposes of this study. Further, no information was gathered that would identify the freshman students. Persistence for each participant was determined from institutional records in the spring of 2005.

## Variables in the Study

Institutional variables were not included in this research study. Instead, this investigation sought to examine only those factors directly relevant to students as the units of this study. However, a description of the university was included in order to illuminate the socio-cultural setting. The following variables were used for the purpose of obtaining quantitative data during the course of this investigation.

### *Independent (Predictor) Variables*

*Letter grade in high school.* This category was divided into seven ordinal level categories, A+ or A, B+, B, B-, C+, C, and D. Prior to statistical analyses, the alphabetical letters were recoded according to the following scheme: A+ or A = “1”, B+ = “2”, B = “3”, B- = “4”, and C+ = “5”, C = “6”, and D = “7”.

*First-year college GPA.* This variable was a continuous level variable ranging in scale from 2.00 to 4.00.

*Residence location during freshman year.* Where students live may have an effect on students' integration into the university or college setting. Therefore, this study employed the response on the survey that indicated where the freshman student planned to live during the fall semester 2003. The following categorical coding scheme was used for where the student lived during the freshman year: with family or other relatives = "1", a private home, apartment, or room = "2", college residence hall = "3", fraternity or sorority house = "4", and other campus student housing = "5".

*Cumulative hours earned during the freshman year.* All students in this study were full-time students and therefore were required to take a minimum of 24 credit hours during their freshman year. The variable was a continuous measure and ranged from 24.0 hours to 41.0 hours.

*Highest level of formal education obtained by parents.* Student responses in this section were used to discover the level of education of the freshman students' parents. This variable was used to determine the effects for first-generation college students. The ordinal coding scheme consisted of grammar school or less = "1", some high school = "2", high school graduate = "3", postsecondary school (not college) = "4", some college = "5", college graduate = "6", some graduate school = "7", and graduate degree = "8".

*Gender.* Separate information profiling males and females was gathered and analyzed. Gender served and was analyzed as a categorical level variable.

### Model Development and Data Analytic Strategy

The purpose of this study was twofold. The first purpose was exploratory in nature in that the study sought to determine what contribution (statistical and practical) certain variables made to the prediction and explanation of successful matriculation of



college freshmen. Using this information, the second purpose of this investigation was to develop a regression model to be used by college and university officials in order to more fully predict and understand factors associated with the retention or attrition of college freshmen. Ultimately, the regression-based predictive model developed herein is intended to enable personnel at colleges and universities to be more effective at helping students matriculate beyond their freshman year.

A regression model was first developed using freshman students as an entire group using the following variables: 1) letter grade in high school, 2) first-year college GPA, 3) residence location during the freshman year, 4) cumulative hours earned during the freshman year, 5) mother's education level, 6) father's education level, and 7) gender. Next, the model previously derived was used to conduct statistical comparisons of its predictive accuracy using a sample of White, Hispanic, and African American students respectively with students drawn from the original sample that included all students.

Logistic regression was the statistical method of choice for this investigation because it allowed the researcher to focus on those variables or combinations of variables that best explain or predict persistence of college freshmen to their sophomore year. Specifically, logistic regression assumes that the dependent variable (persistence, in this instance) varies as a function of the independent or predictor variables, which in this study included letter grade in high school, first-year college GPA, residence location during the freshman year, cumulative college hours earned during the freshman year, highest level of education obtained by parents, and gender. Finally, the results of the logistic regression analysis provided evidence regarding the statistical and practical

contribution of each independent or predictor variable to the prediction of whether or not college freshmen matriculated beyond their freshman year of college.

#### Key Terminology Related to Logistic Regression Modeling

*Logit.* The logit is the natural log of the odds ratio and like the odds, it measures the strength of the relationship between variables. A positive logit indicates that the independent variable has the effect of increasing the odds that the dependent variable equals a specified value. A negative logit, on the other hand, indicates that the independent variable has the effect of decreasing the odds that the dependent variable equals a specified value (Tabachnick & Fidell, 2001).

*Dichotomous Outcome Variable.* A dichotomous outcome variable is a variable that has only two possible outcomes. In this research study, the dichotomous outcome variable was persistence, and the two outcomes were persistence and nonpersistence (Tabachnick & Fidell, 2001).

*Attenuated Correlations.* There are some drawbacks with using correlations. For example, a correlation does not show which way causation flows. Further, if there is a nonlinear relationship between two variables being correlated, correlation will understate the relationship. These problems may occur due to a lack of a large enough range for the sampling of cases. However, when researchers know the reliability between measures, they can correct the correlation for attenuation (StatSoft, Inc., 2004).

*Mahalanobis Distance.* The Mahalanobis distance is mainly used as a multivariate outlier statistic. The measurement addresses the question of whether or not a specific case should be considered to be an outlier relative to the group set of data (Tabachnick & Fidell, 2001).

*Tolerance.* Tolerance is a statistical measure of the strength of the interrelationships between the variables and is used as a criterion for determining which variables should be considered. The more closely related variables are to each other, the closer the tolerance is to zero (Tabachnick & Fidell, 2001).

*Variance Inflation Factor.* The variance inflation factor (VIF) is a measure of how highly correlated each independent variable is with the other predictors in a model. The VIF is used as an indicator for multicollinearity. If the independent variables are uncorrelated, the diagonal values in the inverse correlation matrix will equal 1.0. Therefore, for correlated variables, the values in the matrix represent an “inflation factor” for the variance of the regression coefficients (StatSoft, Inc., 2004).

*Direct Logistic Regression.* When direct logistic regression is employed, all independent variables (predictors) enter the equation simultaneously as long as the tolerance level is not violated. No independent variable is considered more important than any of the others, and each is evaluated as if it entered the equation last (Tabachnick & Fidell, 2001).

*Chi-square Goodness-of-fit Test.* The chi-square goodness-of-fit test uses frequencies to confirm that the sample data come from a specified distribution. The test answers the question about how well the observed frequencies in a sample fit the population frequencies specified by the null hypothesis (Gravetter & Wallnau, 2000).

*Likelihood Ratio Test.* Using this test, models are compared with and without each predictor. When the predictor is added to the model, the predictor is evaluated for its improvement in the model fit or its decrease in the model fit (Tabachnick & Fidell, 2001).

*Adequacy of Model Fit.* Model fit refers to the process of measuring invariance to see that the model is applicable across groups. If the chi-square difference test shows no significant difference between the original model and the other models, then the conclusion is an adequacy of model fit, and the model applies across groups (Tabachnick & Fidell, 2001).

*Parameter Estimate.* In logistic regression, a parameter estimate is the effect size and is used to explore the relative importance of the independent variables. Standardized parameter estimates can be utilized to find which values of which variables in the model are most or least important to the interactions in the model (Tabachnick & Fidell, 2001).

*Wald Test.* The Wald test is used to evaluate the significance of particular predictors to a model. For each predictor in the model there is an associated parameter. If an individual predictor or combination of predictors reveals a Wald test significance greater than zero, the predictors should be included in the model. Likewise, if the significance level is less than zero, the predictors should not be included in the model (Tabachnick & Fidell, 2001).

*Odds Ratio.* The odds ratio is the rate of change in the outcome category when the value of the predictor is increased by one unit. An increase occurs when the odds ratio is greater than one, whereas a decrease occurs when the odds ratio is less than one (Tabachnick & Fidell, 2001). An odds ratio of 1.0 (or very close to 1.0) is indicative of no practical effect although a predictor may be statistically significant.

*p-value.* The p-value represents statistical significance, and statistical significance is the probability that an observed relationship occurred simply by chance alone. The higher the p-value, the less reliable the observed relationship. For example, a

p-value of .05 indicates that there is a 5% chance that the relationship between the observed variables occurred only by chance (Gravetter & Wallnau, 2000).

*Standard Error (S.E).* The standard error refers to the range of means that could be expected within a specified confidence interval if the model was tested repeatedly with different samples. It is the standard deviation of the distribution of sample means and measures how much difference should be expected on average between the population mean and the sample mean (Gravetter & Wallnau, 2000).

*Strength of Association.* The purpose of assessing the strength of association is to determine the strength of the relationship between the outcome and the set of predictors chosen for the model. The goal is not simply to discover significance, but to ascertain nonsignificance as well (Tabachnick & Fidell, 2001).

*Classification of Cases.* Type I errors, incorrectly rejecting the null hypothesis, and Type II errors, incorrectly failing to reject the null hypothesis, can occur in hypothesis testing. Classification of cases is used to assess the success of a model by evaluating the model's ability to accurately predict the outcome category for cases in which the outcome is already known. Cases are categorized based on their predicted probability (Tabachnick & Fidell, 2001).

#### Data Screening for Model Assumptions

Prior to fitting the logistic regression model to the sample data the following screening procedures were conducted in order to insure that the requisite statistical assumptions are tenable.

*Ratio of Sample Size to Variables.* A ratio of 15 subjects for each predictor variable indicates that there are an adequate number of cases relative to the number of

predictor variables. In logistic regression, if there are too many very large parameter estimates and standard errors it indicates that there may be a problem with the ratio of sample size to variables. If either of these happens, the researcher may increase the number of cases or eliminate one or more of the predictors (Tabachnick & Fidell, 2001).

*Statistical Power Considerations.* Power refers to the probability that a study will correctly reject the null hypothesis. When the resulting probability is high, the test is considered to be powerful. Power considerations are important prior to the start of a study, and the researcher determines the confidence intervals to be used in the study. There are five factors that affect power: 1) sample size – the larger the sample size, the greater the power, 2) raw effect size – the greater the raw effect size, the greater the power, 3) standard deviation – the lower the standard deviation, the greater the power, 4) level of significance (confidence intervals) – increasing the stringency of the confidence interval decreases power, and 5) type of test – a directional test is more powerful than a non-directional test (Tabachnick & Fidell, 2001).

*Multicollinearity.* Multicollinearity occurs when independent variables are too highly correlated, causing both logical and statistical problems. Including redundant variables in the sample analysis inflates the size of the error terms, thus weakening the analysis. Statistically, multicollinearity produces unsound results when using division. The determinant becomes so close to zero that very large and unstable numbers are produced. In regression analysis, the errors may get so large that none of the coefficients indicate significance (Tabachnick & Fidell, 2001).

*Outlier Screening.* Outliers are cases with extreme values. They are found by examining the residuals, which can also help when interpreting the results of the logistic

regression model. Once identified, the impact of the outliers can be reduced by deleting the variable that is responsible for most of the outliers. Cases determined not to be a part of the intended sample may also be deleted. If the outliers are indeed part of the intended sample, they should remain in the analysis but their impact reduced (Tabachnick & Fidell, 2001).

*Independence of Errors.* In logistic regression, the assumption is made that the results of the various events are independent of each other. Two events (or observations) are independent if the occurrence of the first event has no influence on the probability of the second event (Gravetter & Wallnau, 2000).

#### Summary

The first focal point of this analysis was the variables or combinations of variables that were statistically significant to the persistence of college freshmen. Logistic regression can be used to fit and compare models (Tabachnick & Fidell, 2001), and in this case a full model for the entire sample was developed first. Three separate models were then developed – one each for Whites, Hispanics, and African Americans. In all three models, the independent or predictor variables were tested for statistical and practical significance. Prior to developing the models, data screening was conducted to make certain that data obtained met the requisite assumptions for logistic regression analysis.

Finally, while this study used data from students at one university, Texas State University – San Marcos, the information gained from the formulated models may be used to help other college and university personnel more fully understand the impact of the variables included in relation to their specific institutions. The goal, therefore, was to

provide information that will help colleges and universities to increase the matriculation rates of their college freshmen.



## CHAPTER IV

### ANALYSIS OF THE DATA

#### Introduction

The first objective of this chapter is to provide descriptive information regarding the sample for this study. Secondly, the results of the data analyses are presented for the entire sample collectively, then for the White student sample, the Hispanic student sample, and the African American student sample respectively.

Logistic regression was employed to determine the magnitude and significance of each independent variable as related to the persistence of full-time college freshman students to their sophomore year. The variables for each group in the study included 1) letter grade in high school, 2) the first-year college grade point average (GPA), 3) residence location during the freshman year, 4) the first-year total cumulative hours earned by the student 5) the highest level of education obtained by the student's mother, 6) the highest level of education obtained by the student's father, and 7) gender. Each predictor variable was tested for its statistical and practical effect using the entire sample and then for each of the three groups separately, Whites, Hispanics, and African Americans.

#### Data Screening

A demographic review of the full-time freshman students at Texas State University revealed that 99% of the students were 20 years of age or younger. Therefore,

non-traditional age students were not included in the study and age was not used as a predictor in any of the logistic regression models. In addition, some of the students did not report either the Scholastic Aptitude Test (SAT) or American College Test (ACT) in order to be accepted into the university. This was because Texas allows the top 10% of high school seniors to enter a Texas public university without having to submit a college entrance exam score. Consequently, college entrance exam scores were not used as predictors for the persistence of the college freshmen in this study.

Data screening was conducted in each of the four models to insure that no multicollinearity existed between any of the predictor variables. A correlation value between any two predictor variables that is greater than .8 indicates that the two predictor variables are highly correlated or that multicollinearity is present. Results of the data screening and a correlation matrix are presented for all four models in this study.

#### Description of the Sample

The participants in the study were fulltime freshman students at Texas State University–San Marcos during the fall semester of 2003. All students in the study, whether they persisted or did not persist, achieved a minimum GPA of 2.0 at the end of their freshman year. Table 2 includes the demographic characteristics for the entire group of 1014 students included in the study prior to creating models for the three ethnic groups, Whites, Hispanics, and African Americans.

Table 2

#### Participant Demographic Data

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Predictor Variable	Frequency	Percent (%)
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Gender		
Male	346	34
Female	668	66
Ethnicity		
White	842	83
Hispanic	128	13
African American	44	4
Persistence		
Persisted	833	82
Did not persist	181	18

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Of the 3,139 students in the freshman class of 2003, 2,556 students completed the *Cooperative Institutional Research Program (CIRP) Freshman Survey*, but only 2,439 of the surveys were coded correctly and used in the university's data analysis. After all unusable subjects were eliminated from the data set, 1014 students were included in the final sample. In each of the three additional models, White students, Hispanic students, and African American students, there were 842, 128, and 44 students respectively. Participation in the survey was completely voluntary, and the data gathered for this study represented the information from students who agreed to allow their responses to be used for research purposes.

Of the participants in the survey, 23% entered Texas State with a high school average of "A" or "A+", 25% a "B+" average, and 13% a "B" average. Therefore, 61%

of the students who entered the university in the fall of 2003 had a “B” or better average in high school. The remaining participants entered the university with a high school letter grade average below “B.”

Texas State University–San Marcos requires its freshman students to live on campus unless they obtain an exemption. Less than 10% of the students in this study did not live on campus while 92% lived in a university residence hall and less than 1% lived in other campus housing.

The level of education for the students’ parents was similar for both the mothers and the fathers. Only 3% of mothers and 4% of fathers had not completed high school, and the category with the highest frequency for both mothers and fathers was college graduate, with 33% and 32% respectively.

At the end of the spring semester 2004, the average Texas State University–San Marcos cumulative GPA for the students in the study was 2.94. The average number of cumulative college hours completed by students in the study was 26.76. These values represent totals after the students’ freshman year at the university.

## Findings

### *Model 1: Total Sample*

#### *Overall Model Fit*

Data screening using the Mahalanobis distance yielded no outliers or unusual cases. For the total sample ( $N=1014$ ), the  $\chi^2(1) = 175.00, p < .001$  indicated a statistically reliable fit to the model. The Nagelkerke R-square statistic was equal to .260, indicating that 26% of the variability in the dependent variable, in this case persistence, could be accounted for by all the independent variables in the equation. The

Hosmer and Lemeshow Test, with a significance level of  $p = .031$ , indicated an acceptable model fit to the data. The model correctly classified 87% of the cases for this sample.

### *Collinearity Diagnostics*

Review of the correlation matrix derived from the independent variables indicated that no multicollinearity existed. The tolerance and variance inflation factors also indicated that no multicollinearity existed between any of the predictor variables. Therefore, it was not necessary to eliminate any predictor variables from the proposed model. Table 3 illustrates the results of screening for multicollinearity.

Table 3

Correlation Matrix for Variables in the Model Containing All Students

Predictor Variable	1	2	3	4	5	6	7
1. High school average	--						
2. Residence location	-.05	--					
3. Mother's education	.03	.01	--				
4. Father's education	-.03	-.05	-.51	--			
5. Gender	.03	.07	-.01	-.00	--		
6. First-year college GPA	.11	-.03	-.00	-.07	.21	--	
7. Cumulative hours	.05	-.06	-.10	.03	-.04	-.23	--

### *Significance of Variables*

Table 4 displays the predictor variables used for this model encompassing all students, their appropriate measure and the corresponding chi-square or *t* value. The values are displayed for two separate categories, persistence and non-persistence.

Table 4

Mean, Median, or Frequencies for Predictor Variables as a Function of Persistence or Non Persistence for All Students

Predictor Variable	Persisted	Did Not Persist	Likelihood Chi-square (1) or <i>t</i> (1012)
	(median)	(median)	
High school average	3.00	3.00	3.04
Residence location	3.00	3.00	2.84
Mother's education level	6.00	5.00	8.48
Father's education level	6.00	5.00	8.05
Gender (%)			1.01
	(%)	(%)	
Male	35	31	
Female	65	69	
	(M/SD)	(M/SD)	
First-year college GPA	2.93/.51	2.94/.56	.35

Cumulative hours	27.79/4.20	21.76/7.53	14.87 **
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*Note.* Chi-square test used for high school average, residence location, mother's education level, father's education level, and gender; *t* – test used for all other variables. Values for high school average are: A+ or A = "1," B+ = "2," B = "3," B- = "4," and C+ = "5," C = "6," and D = "7". Values for residence location are: with family or other relatives = "1," a private home, apartment, or room = "2," college residence hall = "3," fraternity or sorority house = "4," and other campus student housing = "5". Values for mother's education level and father's education level are: grammar school or less = "1," some high school = "2," high school graduate = "3," postsecondary school (not college) = "4," some college = "5," college graduate = "6," some graduate school = "7," and graduate degree = "8".

\*\* $p < .01$ .

According to the *t* statistic, one predictor variable was a statistically significant predictor of the persistence of college freshmen in the model containing all students. Cumulative hours was statistically significant at the  $p < .01$  level. No other variables were found to be statistically significant to the persistence of college freshmen in the sample containing all students in the study according to the *t* statistic.

Regression coefficients are provided in Table 5 using a 95% confidence interval. The Wald statistic also indicated that cumulative hours earned by the student during the first year of college significantly predicted college persistence at the  $p < .01$  level. Additionally, first-year college GPA significantly predicted college persistence at the  $p < .05$  level. Specifically, the odds ratio for the predictor variable cumulative hours indicated that when students' increased their course load by 1 credit hour, they were 1.2 times more likely to matriculate to their sophomore year. However, from a practical viewpoint, an odds ratio of 1.2 (very close to 1.0) is indicative of very small practical

effect. The odds ratios for the remaining predictor variables were observed to be centered at approximately 1.0 indicating very little practical effect on persistence.

Table 5

## Summary of Logistic Regression Analysis Predicting College Freshman Persistence

Predictor Variable	B	SE	Odds Ratio	Wald Statistic
High school average	-.01	.04	.99	.11
Residence location	-.09	.17	.92	.23
Mother's education level	-.02	.06	.99	.06
Father's education level	.07	.06	1.07	1.32
Gender	.86	.20	1.09	.18
First-year college GPA	-.44	.19	.64	5.49 *
Cumulative hours	.20	.02	1.23	125.64 **

\* $p < .05$ , \*\* $p < .01$ .

*Model 2: White Students**Overall Model Fit*

Using the Mahalanobis distance, data screening for this group did not identify any outliers or unusual cases. For the sample containing White students only (N=842), the  $\chi^2(1) = 165.19, p < .001$  indicated a statistically reliable fit to the model. The Nagelkerke-R square statistic was equal to .289, indicating that 29% of the variability in persistence, the dependent variable, could be accounted for by all the independent variables in the equation. The results of the Hosmer and Lemeshow test indicated indicated an



acceptable model fit to the data ( $p = .35$ ). The model correctly classified 87% of the cases for this sample.

### *Collinearity Diagnostics*

Results displayed in the correlation matrix derived from the independent variables indicated that no multicollinearity existed in the model containing White students only. Furthermore, the tolerance and variance inflation factors indicated that no multicollinearity existed between any of the predictor variables. Therefore, it was not necessary to eliminate any predictor variables from the proposed model. Table 6 illustrates the results of screening for multicollinearity.

Table 6

Correlation Matrix for Variables in the White Students' Model

Predictor Variable	1	2	3	4	5	6	7
1. High school average	--						
2. Residence location	-.08	--					
3. Mother's education	.03	.01	--				
4. Father's education	-.02	-.03	-.46	--			
5. Gender	.04	.06	-.01	.03	--		
6. First-year college GPA	.07	-.04	.00	-.07	.21	--	
7. Cumulative hours	.07	-.04	-.06	.05	-.00	-.24	--

### *Significance of Variables*

Table 7 displays the predictor variables used for this model, their appropriate measure and the corresponding chi-square or *t* value. Values for both possible outcomes, persistence and non-persistence are presented.

Table 7

Mean, Median, or Frequencies for Predictor Variables as a Function of Persistence or Non Persistence of White Students in the Sample

Predictor Variable	Persisted	Did Not Persist	Likelihood Chi-square (1) or t (840)
	(median)	(median)	
High school average	3.00	3.00	3.84
Residence location	3.00	3.00	2.99
Mother's education level	6.00	6.00	11.39
Father's education level	6.00	5.00	8.41
Gender(%)			1.31
	(%)	(%)	
Male	36	31	
Female	64	69	
	(M/SD)	(M/SD)	
First-year college GPA	2.94/.51	2.94/.56	-1.96

Cumulative hours	28.10/4.13	21.80/7.56	14.36 **
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*Note.* Chi-square test used for high school average, residence location, mother's education level, father's education level, and gender; *t* – test used for all other variables. Values for high school average are: A+ or A = "1," B+ = "2," B = "3," B- = "4," and C+ = "5," C = "6," and D = "7". Values for residence location are: with family or other relatives = "1," a private home, apartment, or room = "2," college residence hall = "3," fraternity or sorority house = "4," and other campus student housing = "5". Values for mother's education level and father's education level are: grammar school or less = "1," some high school = "2," high school graduate = "3," postsecondary school (not college) = "4," some college = "5," college graduate = "6," some graduate school = "7," and graduate degree = "8".

\*\* $p < .01$ .

The *t* statistic indicated that cumulative hours earned by the student during the first year of college was a statistically significant ( $p < .01$ ) predictor of the persistence of college freshmen within the White students' only model. No other variables were found to be statistically significant according to the *t* statistic.

Regression coefficients are illustrated in Table 8 using a 95% confidence interval. The Wald statistic, like the *t* statistic, indicated that the number of cumulative hours earned by the student during the first year of college was a statistically significant predictor of college freshman matriculation. First-year college GPA was a statistically significant predictor to the persistence of college freshman in the White students' model at the  $p < .05$  level. The odds ratio for the number of cumulative hours earned indicated that when White students increased their course load by 1 credit hour, they would be 1.2 times more likely to matriculate to their sophomore year. However, from a practical viewpoint, an odds ratio of 1.2 (very close to 1.0) is indicative of very small practical

effect. The odds ratios for the remaining predictor variables were observed to be centered at approximately 1.0 indicating very little practical effect on persistence.

Table 8

Summary of Logistic Regression Analysis Predicting College Freshman Persistence for White Students in the Sample

Predictor Variable	B	SE	Odds Ratio	Wald Statistic
High school average	-.02	.04	.98	.30
Residence location	.08	.19	1.09	.20
Mother's education level	.01	.07	1.00	.01
Father's education level	.11	.07	1.12	2.98
Gender	.23	.22	1.30	1.06
First-year college GPA	-.44	.21	.64	4.57 *
Cumulative hours	.21	.02	1.24	109.44 **

\* $p < .05$ , \*\* $p < .01$ .

### *Model 3: Hispanic Students*

#### *Overall Model Fit*

Data screening using the Mahalanobis distance did not yield any outliers or unusual cases. For the total sample (N=128) of Hispanic students only, the  $\chi^2(1) = 24.19$ ,  $p < .001$  indicated a statistically reliable fit to the model. The Nagelkerke R- square statistic was equal to .31, indicating that 31% of the variability in the dependent variable, persistence, could be accounted for by all the independent variables in the equation. The

Hosmer and Lemeshow Test, with a significance level of  $p = .16$ , indicated an acceptable model fit to the data. The model correctly classified 88% of the cases for this sample.

#### *Collinearity Diagnostics*

Review of the correlation matrix derived from the independent variables in this model indicated that no multicollinearity existed. The tolerance and variance inflation factors also indicated that no multicollinearity existed between any of the predictor variables. Therefore, it was not necessary to eliminate any predictor variables from the proposed model. Table 9 illustrates the results of screening for multicollinearity.

Table 9

Correlation Matrix for Variables in the Hispanic Students' Model

Predictor Variable	1	2	3	4	5	6	7
1. High school average	--						
2. Residence location	.00	--					
3. Mother's education	-.04	.00	--				
4. Father's education	-.01	.00	-.59	--			
5. Gender	.01	.00	-.08	.02	--		
6. First-year college GPA	.33	.00	.01	-.03	.11	--	
7. Cumulative hours	.06	.00	-.39	-.01	-.14	-.27	--

#### *Significance of Variables*

Table 10 displays the predictor variables used for this model, their appropriate

measure and the corresponding chi-square or *t* value. Results are displayed for both persistence and non-persistence groups.

Table 10

Mean, Median, or Frequencies for Predictor Variables as a Function of Persistence or Non Persistence of Hispanic Students in the Sample

Predictor Variable	Persisted	Did Not Persist	Likelihood Chi-square (1) or <i>t</i> (126)
	(median)	(median)	
High school average	3.00	3.00	1.13
Residence location	3.00	3.00	5.57
Mother's education level	5.00	5.00	6.24
Father's education level	5.00	5.00	3.94
Gender(%)			.25
	(%)	(%)	
Male	34	28	
Female	66	72	
	(M/SD)	(M/SD)	
First-year college GPA	2.85/.49	2.94/.57	-.83
Cumulative hours	26.61/4.04	21.44/7.07	4.46 **

*Note.* Chi-square test used for high school average, residence location, mother's education level, father's education level, and gender; *t* – test used for all other variables. Values for high school average are: A+ or A = "1," B+ = "2," B = "3," B- = "4," and C+ = "5," C = "6," and D = "7". Values for residence location are: with family or other relatives = "1," a private home, apartment, or room = "2," college residence hall = "3," fraternity or sorority house = "4," and other campus student housing = "5". Values for mother's education level and father's education level are: grammar school or less = "1," some high school = "2," high school graduate = "3," postsecondary school (not college) = "4," some college = "5," college graduate = "6," some graduate school = "7," and graduate degree = "8".

\*\* $p < .01$ .

Based on the *t* statistic the only predictor variable that was a statistically significant ( $p < .01$ ) predictor of the persistence of college freshmen within the model including Hispanic students only was the cumulative hours earned by the student during the first year of college. No other predictor variables were statistically significant predictors to the persistence of college freshmen to their sophomore year within the model including Hispanic students only.

Regression coefficients are illustrated in Table 10 using a 95% confidence interval. The Wald statistic further indicated that cumulative hours earned by the student significantly predicted college persistence for students in the model incorporating Hispanic students only. The odds ratio for cumulative hours indicated that increasing the students' course load by 1 hour lead them to be 1.3 times more likely to matriculate to their sophomore year. However, from a practical viewpoint, an odds ratio of 1.3 (very close to 1.0) is indicative of very small practical effect. The odds ratios for the remaining predictor variables were observed to be centered at approximately 1.0 indicating very little practical effect on persistence.

Table 11

Summary of Logistic Regression Analysis Predicting College Freshman Persistence for Hispanic Students in the Sample

Predictor Variable	B	SE	Odds Ratio	Wald Statistic
High school average	.03	.12	1.03	.06
Residence location	-9.97	4722.26	1.00	.00
Mother's education level	-.05	.22	.95	.05
Father's education level	-.07	.19	.94	.12
Gender	-.37	.63	.69	.34
First-year college GPA	-.96	.65	.38	2.16
Cumulative hours	.23	.06	1.26	12.77 **

\*\*  $p < .01$

*Model 4: African American Students*

*Overall Model Fit*

Using the Mahalanobis distance, data screening for the African American student model did not yield any outliers or unusual cases. For the sample containing African-American students only (N=44), the  $\chi^2(1) = 7.77, p > .005$  indicated a marginally tenable fit to the model. The Nagelkerke R-square statistic was equal to .28, indicating that 28% of the variability in persistence could be accounted for by all the independent variables in the equation. The Hosmer and Lemeshow Test, however, with a significance level of  $p =$



.98, indicated an acceptable model fit. The model correctly classified 86% of the cases for this sample.

### *Collinearity Diagnostics*

Table 12 illustrates the correlation matrix derived from the independent variables, which indicated that no two variables were highly correlated and that no multicollinearity existed between any of the predictor variables. The tolerance and variance inflation factors also indicated that no multicollinearity existed between any of the predictor variables. Therefore, it was not necessary to eliminate any predictor variables from the proposed model.

Table 12

Correlation Matrix for Variables in the Model Containing Only African American Students in the Sample

Predictor Variable	1	2	3	4	5	6	7
1. High school average	--						
2. Residence location	-.04	--					
3. Mother's education	-.02	.57	--				
4. Father's education	.08	-.41	-.84	--			
5. Gender	-.33	.58	.63	-.61	--		
6. College GPA	.00	-.52	-.70	.51	-.46	--	
7. Cumulative hours	-.01	-.53	-.45	.41	-.46	-.55	--

### *Significance of Variables*

Table 13 displays the predictor variables used for this model, their appropriate measure and the corresponding chi-square or *t* value. Values are presented for both the persistence and non-persistence groups.

Table 13

Mean, Median, or Frequencies for Predictor Variables as a Function of Persistence or Non-persistence of African American Students in the Sample

Variable	Persisted	Did Not Persist	Likelihood Chi-square (1) or <i>t</i> (42)
	(median)	(median)	
High school average	3.00	3.00	3.34
Residence location	3.00	3.00	.71
Mother's education level	5.00	6.00	4.93
Father's education level	5.00	5.00	12.19
Gender(%)			.95
	(%)	(%)	
Male	24	43	
Female	76	57	
	(M/SD)	(M/SD)	
First-year college GPA	2.93/.46	2.77/.63	.81

Cumulative hours	25.57/4.25	21.71/9.27	1.77
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*Note.* Chi-square test used for high school average, residence location, mother's education level, father's education level, and gender; *t* – test used for all other variables. Values for high school average are: A+ or A = "1", B+ = "2", B = "3", B- = "4", and C+ = "5", C = "6", and D = "7". Values for residence location are: with family or other relatives = "1", a private home, apartment, or room = "2", college residence hall = "3", fraternity or sorority house = "4", and other campus student housing = "5". Values for mother's education level and father's education level are: grammar school or less = "1", some high school = "2", high school graduate = "3", postsecondary school (not college) = "4", some college = "5", college graduate = "6", some graduate school = "7", and graduate degree = "8".

Based on the chi-square and *t* statistic in the model including African American students, there were no statistically significant predictors of the persistence of African American college freshmen to their sophomore year.

Regression coefficients are illustrated in Table 14 using a 95% confidence interval. The Wald statistic further indicated that no predictor variables used in this study were statistically significant predictors of the persistence of African American freshman college students to their sophomore year.

Table 14

Summary of Logistic Regression Analysis Predicting College Freshman Persistence for African American Students in the Sample

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Variable	B	SE	Odds Ratio	Wald Statistic
High school average	.12	.23	1.12	.27
Residence location	-1.34	1.01	.26	1.77

---

Mother's education level	- .79	.63	.45	1.58
Father's education level	.50	.45	1.65	1.26
Gender	- 2.20	1.45	.11	2.31
First-year college GPA	2 .13	1.47	8.41	2.10
Cumulative hours	.18	.09	1.19	3.99

---

### Summary

Using the results of the Wald statistic, *t* statistic, and odds ration, three of the four models in this study indicated that one predictor variable was statistically significant to the persistence of college freshman to their sophomore year. In the models that included all students, White students only, and Hispanic students only, cumulative hours earned during the freshman year of college was statistically significant at the  $p < .01$  level. Although the Wald statistic indicated that first-year college GPA was significant to persistence in the all students model and White students model, this variable failed to show significance with the *t* statistic or odds ratio. No other predictor variables were statistically significant in any of the four models.

For the model containing African American students only, no predictor variable was statistically significant to the persistence of college freshmen in the group. Having a larger sample size for the African American students' sample may lead to more statistically significant findings for this group.

Overall, of the variables used in this study, the most statistically significant and consistent predictor variable correlated with the persistence of college freshmen was the number of college hours the student earned during the first year of college. This was the

only variable that fell within a 95% confidence interval for three of the four models: 1) all students, 2) White students, and 3) Hispanic students. However, although the results of the study indicated statistically significant variable in three of the models, there were no practically significant predictor variables in any of the four models. Including other variables in future models may lead to the finding of both statistically and practically significant predictor variables that explain the variance between those who persist and those who do not.

## CHAPTER V

### DISCUSSION AND CONCLUSIONS

#### Introduction

College student retention theories discussed in Chapter II examined the variables and combination of variables that are statistically significant to the persistence of college students from their freshman to sophomore year. As more students enter into higher education, it is important for colleges and universities to understand the factors that lead to their persistence and ultimately to their graduation. This research study concentrated on freshman persistence from fall to fall since this is the college year that has the highest attrition rate.

This chapter includes six sections. The purpose for this study is restated, findings obtained from the literature are summarized, a discussion of the results is outlined, conclusions based on the findings are restated, limitations of the study are discussed, and implications for further research are reviewed.

#### Review of the Research Study

The first purpose of this study was to determine both the statistical and practical significance certain variable have for the successful matriculation of college freshmen. Second, using the information gathered, a regression model was developed for use by college and university officials so that they may more fully understand those factors associated with the persistence and attrition of college freshmen.

This study employed logistic regression to identify which of the following predictors were statistically significant to college freshman persistence at Texas State University–San Marcos: 1) letter grade in high school, 2) first-year college grade point average (GPA), 3) residence location during the freshman year, 4) cumulative hours earned during the freshman year, 5) highest level of education obtained by the student’s mother, 6) highest level of education obtained by the student’s father, and 7) gender.

### Review of the Literature Findings

An analysis of the related literature suggests that colleges and universities are looking for ways to improve their level of student persistence and minimize attrition rates. High student attrition rates are a challenging problem for institutions of higher learning. Since the freshman year fall to fall enrollment exhibits the highest percentage of student departures, many research studies have focused on this particular year. Colleges and universities are working to decrease the attrition rates of freshmen in hopes of increasing their overall graduation rates.

The retention rates for all students, Hispanic students, and African American students varied for freshman entering in fall 2003. The overall fall to fall retention rates for each of the aforementioned groups was 76%, 73%, and 83% respectively (Texas State University–San Marcos, 2004a). To better understand freshman retention predictors for Hispanics and African Americans, a separate section in the literature review included studies related only to minority racial and ethnic groups.

#### *All Students*

The theories currently developed for studying college attrition include factors related to demographic variables, academic and personality variables, and interactions

between students and the college environment. Overall, the literature suggests that demographic variables have the least effect on whether or not a student persists in college. Academic variables, which include high school average and first-year college GPA, have been found to explain approximately 20% of the variance associated with student persistence (Kennedy & Sheckley, 1999). Interactions between students and the college, which include living on campus and cumulative hours earned by the student, have been shown to have a major effect in explaining the persistence of college freshmen.

### *The Role of Ethnicity*

Predicting retention solely by race is ineffective based on numerous previous studies. The research revealed that factors that may be significant in predicting retention for one racial and ethnic group may not be significant in predicting retention for other racial and ethnic groups. Students in both the Hispanic and African American populations tend to have different experiences related to education that affect their persistence, especially when those experiences work in concert with other predictor variables.

### Discussion of the Results

The findings are summarized for each of the four models developed for use in this study. The four model analyses were: 1) all students in the sample, 2) White students only, 3) Hispanic students only and 4) African American students only. Variables used in each model included high school average, first-year college GPA, residence location during the freshman year, cumulative hours completed during the freshman year, mother's education level, father's education level, and gender. The analyses of the data for full-time freshman students who participated in the *Cooperative Institutional*



*Research Program (CIRP) Freshman Survey* at Texas State University–San Marcos prior to beginning their fall semester 2003 revealed that:

1. There were no outliers for any of the four models.
2. There were no highly correlated variables in any of the four models.
3. Within the models that included all students, White students, and Hispanic students, cumulative hours earned during the first year of college was a statistically significant predictor that indicated an increase in the likelihood of persistence with an increase in the number of college hours earned.
4. No predictor variables were found to be statistically significant to the persistence of African American freshman students to their sophomore year.
5. No predictor variables were found to be practically significant to the persistence of college freshmen to their sophomore year in any of the four models.

#### Summary of the Findings

Retention theories propose two types of factors relating to whether or not a student remains in college: 1) pre-entry attributes and 2) interactional factors the student experiences after entering the college or university (Tinto, 1993). Table 15 summarizes the predictor variables and the model for which they were statistically significant in this research study. Pre-entry attributes included high school average, mother's education level, father's education level and gender while post-entry attributes included residence location during the freshman year, first-year college GPA, and cumulative hours earned during the freshman year of college. Although the Wald statistic in the all students sample and White students sample indicated that the first-year college GPA was statistically significant to freshman persistence, the  $t$  statistic and odds ratio failed to

indicate statistical or practical significance to freshman persistence. Therefore, the first-year college GPA was not reported in Table 15 as a statistically significant variable.

Table 15

Predictor Variables and Their Significance in Each of the Four Models

Predictor Variable	All	White	Hispanic	African American
High school average				
Residence location				
Mother's education level				
Father's education level				
Gender				
First-year College GPA				
Cumulative hours	**	**	**	

\*\*  $p < .01$ .

*Pre-entry Variables*

Unlike much of the retention research that stresses the importance of high school academic achievement (Kennedy & Sheckley, 1999; Reason, 2003; Astin, 1997), this study found that high school average was not a statistically significant predictor of retention for students in any of the four models. As a matter of fact, the median value for high school average of both persisters and non-persisters was 3.0, equivalent to a letter grade of "B". This particular predictor variable, high school average, might be better

utilized for university studies that include a larger number of students who had less than a “B” average in high school.

Gender also failed to be a significant predictor of retention for students in all of the four models. This lack of significance in the variable gender does not coincide with the findings of Astin (1975), Peltier, Laden, and Matranga (1993), and Tinto (1987) who asserted that gender was definitely related to retention. The effect of gender on the persistence of college freshmen may very well depend on other variables, as stated by Pascarella and Terenzini (1998).

Although Terenzini, et al. (1994) and Pascarella et al. (2004) noted that first-generation minority college students might have a more difficult time integrating into the college environment, the results in this study were the same for first-generation racial and ethnic minority students and White students. The results indicated that neither the educational level of the students’ mother nor father was statistically significant in predicting the persistence of students in any of the four models.

#### *Post-entry Variables*

Experiences that college students encounter after entering a college or university tend to have a greater influence on persistence than pre-entry attributes (Tinto, 1993). Furthermore, students from different racial groups, such as the Hispanic and African American students used in this study, might well have considerably different expectations of the college environment than their White student counterparts. Differences in expectations may well lead to a lack of integration into the college or university setting.

The results of this study coincided with the findings of Stage (1989) who found that credit hours earned was a significant predictor of persistence. Cumulative hours

earned by the student during the freshman year at Texas State University–San Marcos was the post-entry predictor variable that was found to be the most consistent statistically significant predictor of persistence for students in three of the four models. The only group in which cumulative was not a statistically significant variable to the persistence of college freshmen was the African American group. Although the findings indicated that increasing the number of college hours taken by the freshman student increased the likelihood of persistence, the finding does not definitively imply a cause and effect relationship.

The fact that the residence location of the freshman students was not statistically significant to their persistence in any of the four models was surprising. Prior research outlined in Chapter II indicated a link between living on campus and persistence, especially for African American students (Flowers, 2004). Consequently, living on a college campus may be more associated with social integration, but in this particular study the variable did not appear to be statistically significant to the persistence of college freshman students.

Previous studies found the first-year college GPA to be a statistically significant predictor of college freshman persistence (Zhu, 2002; Allen, 1999). This study found that the first-year college GPA was not consistently a statistically significant predictor for the persistence of college freshmen in any of the four models since the Wald indicated significance in the all students and White students models, but the *t* statistic and odds ratio indicated no statistical or practical significance in any of the four models. However, this study only employed students who had met the minimum GPA requirement of 2.0 for Texas State University–San Marcos. Therefore, this predictor variable might yield more

information for others groups in a study that included students who had not maintained the minimum GPA requirements and were instead on academic probation.

#### Variability Across the Four Models

The predictor variables in this study did not explain a large percentage of the variance that contributed to the persistence of college freshmen. The degree of variability for each of the four models, all students, White students, Hispanic students, and African American students was 26%, 29%, 31%, and 28%, respectively. The differences in the percentages of variability are due to the different sample sizes, partial correlation coefficients among predictor variables,, and standard errors within each model. All four models were quite close in the number of cases correctly classified, all students - 87%, White students – 87%, Hispanic students – 88%, and African American students - 86%.

#### Limitations of the Study

Information was limited to students at one particular public university, Texas State University – San Marcos, who completed the *Cooperative Institutional Research Program (CIRP) Freshman Survey* and agreed to allow their information to be used for research purposes. Therefore, not all freshman students who began at this particular university in the fall of 2003 were included in the research study.

This study was conducted from an institutional perspective and as a result, it was not determined whether the students who did not persist dropped out or transferred to another institution of higher education. Therefore, some of the non-persisting students in the study may not have dropped out of college, but simply transferred to another institution.

The only students included in this study were freshman students. While the

results may assist university and college officials in its early efforts to retain students, the results should not necessarily be applied to students who are beyond their freshman year in college.

The students included in this study were only attending the university on a full-time basis. The results of the *CIRP Freshman Survey* revealed that 99% of the students who completed the survey were in the range 17 years of age to 20 years of age. Part-time students are more likely to be older than 20 years of age and often bring other experiences to the college environment that traditional age students do not. For example, some students are married and have children and many are also typically working either full-time or part-time.

#### Implications for Future Research

The findings observed in this study indicated that additional research would be quite useful. First, the present study should be replicated for upcoming groups of freshman students at this university, which may include non-traditional age students or part-time students. A replication of the study would establish support or lack of support for the model developed in this study via cross-validation.

There are numerous predictor variables that can be employed using logistic regression. This study could be repeated using additional relevant predictor variables. Additional pre-entry predictor variables such as those related to the socioeconomic status of the students, students' commitment levels, and learning styles might lead to greater insight into the persistence of college freshmen. Further, the inclusion of additional variables could improve the overall persistence model by explaining more completely the variance relating to persistence.

Other predictor variables that assess a student's outside commitments may identify factors that contribute to the lack of persistence for some students. These predictor variables might include such factors as marital status and number of hours per week the student works. These types of predictor variables could add to the results of this study, which found that cumulative hours had the greatest statistical significance on college freshman persistence.

Predictor variables incorporating features of the college or university, such as freshman seminars, mentoring programs, and class size restrictions could be included and might yield results that would assist personnel at an institution in establishing policies for their freshman students.

The model employed in this study could be conducted at other colleges and universities. This replication process could lead to the understanding of college freshman persistence for university and college officials at various types of higher education institutions. Each college or university could tailor the model to fit its specific information needs based such factors as its level of ethnic/racial diversity and retention rates.

Furthermore, a qualitative study could offer additional insight into the persistence of college freshmen. Using the qualitative framework, a researcher might gain a unique perspective on persistence factors by including in-depth interviews concerning and observations of the academic and social environment of the student. Moreover, a qualitative study might lead to findings related specifically to a particular racial group, such as Hispanics or African Americans. For example, Benn's (2002) qualitative study revealed several emergent themes for the persistence of African American freshman

students that included having a sense of community, fitting in, and campus involvement. Differences among various racial groups might well lead to a better understanding of how to engage these students in the cultural setting of the college or university.

### Summary

The study of the factors that lead to the persistence of college freshmen is complex. However, building a retention model for a college or university is likely to assist the officials at that institution in obtaining a better understanding of the factors that lead to the persistence of their college freshmen. The model should encompass a sufficient number of appropriate variables so that statistically significant persistence factors emerge. Future studies may also lead to finding predictor variables that are not only statistically significant, but also practically significant to the persistence of college freshmen. Access to data relevant to the persistence of college freshmen may present guidance to college and university personnel in developing effective retention programs. These retention programs could be established for the entire freshman class and also developed to meet the needs of the different racial groups on the campus. Effective retention programs will help integrate all students, regardless of race, into the college or university setting.



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