BEYOND THE UNDERGRADUATE: FACTORS INFLUENCING FIRST – GENERATION STUDENT ENROLLMENT IN AND COMPLETION OF GRADUATE EDUCATION

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ABSTRACT

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BEYOND THE UNDERGRADUATE: FACTORS INFLUENCING FIRST-GENERATION STUDENT ENROLLMENT IN AND COMPLETION OF GRADUATE EDUCATION (157 pp.)

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First-generation students have a unique set of barriers that may prevent them from enrolling in higher education. The influences of these barriers at the graduate level are not well known. This study was designed to determine if barriers that influence first-generation student enrollment in and completion of undergraduate education have a similar influence on first-generation student enrollment in and completion of graduate education. To accomplish this three student groups were selected: (a) first-generation non-graduate, (b) first-generation graduate, and (c) continuing-generation graduate. Three categories of variables were utilized for the analysis and they were (a) educational background, (b) socioeconomic status, and (c) total undergraduate debt. The study data came from secondary analysis of Baccalaureate and Beyond 1993/2003 (B&B:93/03). A combination of descriptive statistics and logistic regression was utilized to analyze the data.

Major findings of the study include: (a) being a first-generation student, when combined with the variables in the model, does have a significant but weak influence on matriculation into and completion of graduate school; (b) approximately half of all the respondents who attended graduate school were first-generation, which is higher than the
40% reported in previous research; (c) there are similar barriers for first-generation students that influence both their entrance into undergraduate and graduate education; (d) the factors that influence undergraduate completion rates for first-generation students do not appear to influence the graduate completion rates for these students; (e) first undergraduate institution type attended does influence the matriculation into graduate education; (f) graduate institution type attended does have influence on the completion and attainment rate for first-generation students; (g) undergraduate major selected by first-generation students does have influence on enrollment in graduate education for these students.

Approved: ________________________________

Valerie Martin Conley

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CHAPTER ONE

Introduction

At one point in American history a high school diploma was the mechanism that facilitated upward social mobility to the middle class (London, 1996). However, as a result of the transition from an industrial to a knowledge-based economy, a high school diploma is no longer sufficient (Hurley, 2002). As the transition to the knowledge-based economy continues, the majority of jobs that will be available in the next decade will require education beyond what students will acquire in high school (Pike & Kuh, 2005). Therefore, completing a baccalaureate degree is now seen as the primary means of upward social mobility, and represents an important educational goal in terms of private and public benefits (Pascarella & Terenzini, 1991; Walpole, 1998; Thomas, 2000).

Social mobility for some individuals through education and learning can be more difficult because of their social class (Bourdieu, 1967; Bourdieu & Passeron, 1977). This difficulty comes from the cultural capital that is prevalent in the dominant culture in society and is lacking in the lower social classes (Bourdieu; Sullivan, 2001). Bourdieu would argue that education, particularly higher education, continues to reproduce the social classes through the passing of cultural capital from one generation of the dominant culture to the next. This reproduction is due in part to the cultural capital and linguistic competence of each student and the class from which they originate: “working-class and middle-class students who reach higher education have necessarily undergone more stringent selection, precisely in terms of the criterion of linguistic competence (Bourdieu & Passeron, p. 73).”
The selection process based on class, in conjunction with an increasing number of students undertaking higher education, will make the sorting of individuals within higher education more important (Karabel & Astin, 1975). The educational system will replicate the social selection process that took place between elementary and high school many years ago, and between high school and college more recently (Karabel & Astin). Despite this educational selection process, the act of enrolling in higher education is still perceived as a method for gaining cultural capital and as an opportunity to move ahead (Hurley, 2002; Raines, 2006).

The value placed on education in the United States can be traced through history. The many programs that have been created to assist students with the entrance to postsecondary education are results of the perceived value of education. The philosophy of these programs dates back to the beginning of the United States, and has increased access to education and higher education for a whole new demographic population of the United States. These beliefs and government programs were the impetus for the growth of enrollment and access to higher education.

_Egalitarianism_

American higher education institutions prior to the Revolutionary War were designed to educate the elite in society, primarily in the field of religion (Geiger, 1999). However, as the United States gained independence from Great Britain the idea of an educated citizenry became more prominent. Thomas Jefferson was one of the proponents of an educated citizenry. Jefferson believed that education was the foundation for democracy, and that a system of self government could not exist without an educated
population (Honeywell, 1964; Jewett, 1996; Mapp, 1991; Padover, 1952). Jefferson’s belief in education went so far that he submitted an amendment to the constitution to gain federal support for education (Honeywell; Jewett; Padover). While his amendment was not accepted he took his beliefs back to his home state of Virginia and created a comprehensive education plan (Honeywell; Jewett; Padover). This education plan included primary, secondary, and higher education institutions. Although Jefferson’s plan for federal support of education did not come to fruition; another federal act helped to ensure individuals in the frontier of America would have access to education.

The Northwest Ordinances of 1785 and 1787 have been considered by many as the founding documents of public education in the Northwest Territory (Kaestle, 1988; Miller, 1988). In the 1785 Northwest Ordinance it was decreed that a section of each township be set aside for support of public schools (Kaestle; Miller). Additionally, the 1787 Ordinance defined the purpose of education in the new territory as “Religion, morality and knowledge, being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.” (Swift, 1911 in Kaestle; Miller). This encouragement of education was the motivation for public education in the Northwest Territory and for the nation (Kaestle; Miller).

A few years prior to the Civil War the Morrill Act was proposed to create institutions that would expand higher education to a much broader population base (Zimdahl, 2003). The Morrill Act was initially rejected by the U.S. Congress; however, after the start of the Civil War the issue was once again brought before the United States Congress. At this time it was passed largely due to the absence of the southern
Congressmen, and Abraham Lincoln signed the act into law (Zimdahl). The Morrill Act established the nature of the new practical education (Geiger, 1999). This first Morrill Act specified the creation of a minimum of one college in each state that would teach agricultural and mechanical education to residents of the state (Geiger, Zimdahl). In addition to practical education the institutions were to educate students “without excluding other scientific and classical studies” (Geiger, p. 55). The Morrill Act of 1890 expanded the legislation to historically black colleges and universities, primarily in the south, and created direct annual funding from the federal government (Geiger; Zimdahl). With the passage of the Morrill Acts, higher education became accessible to a diverse group of individuals, which began mass access to higher education (Trow, 1973).

In addition to the Morrill Acts other federal legislation paved the way to mass access to higher education. One such piece of legislation was the Servicemen’s Readjustment Act of 1944 (G.I. Bill). The G.I. Bill allowed for another new demographic population of individuals to attend college. The bill was passed in an effort to reward those who served their country during the war, and help them catch up with their peers who had not been in military service (Gladieux & King, 1999). The returning soldiers took so much advantage of the bill that in 1947 over 1 million former soldiers were enrolled in college, as compared to 1.5 million total students prior to the war (Geiger, 1999).

Another piece of legislation that was integral to increasing access was the Higher Education Act of 1965 (HE Act). The HE Act was part of President Johnson’s Great Society and came out of the War on Poverty (Gladieux & King, 1999). The HE Act was
an attempt by the federal government to equalize college opportunities for students with financial need (Gladieux & King). The legislation consisted of multiple programs designed to achieve this goal including (a) grants, (b) work study programs, and (c) federal student loan programs. Additional legislation in the 1970s created the Basic Education Opportunity Grants (BEOG). Basic Education Opportunity Grants were later renamed Pell Grants after Senator Clairborne Pell. Additionally, the HE Acts and reauthorizations created State Student Incentive Grants, which completed the main student aid programs under Title IV of the HE Act (Gladieux & King).

The transition of higher education from elite to mass access continues today, as college enrollment has become more egalitarian (Chickering, 2003). This increase in college enrollment has brought about numerous challenges to higher education institutions. This increasing enrollment has resulted in a demographic diversity of undergraduate students at postsecondary institutions, which has been documented in much higher education research (Choy, 2001).

As enrollment in higher education increases the student demographic has become increasingly diverse (Willett, 1989). With this increase in diversity, institutions have been required to serve a larger number of students with a vast collection of background characteristics and requirements (Ishitani, 2002). A result of the increased diversity in higher education is an increase in the number of first-generation students (Pascarella, Wolniak, Pierson, & Terezini, 2004). First-generation students make up approximately half of the undergraduate student population and roughly 41% of the graduate population in America. Approximately 27% of the United States population holds a baccalaureate or
higher, while 73% of the population have less than a baccalaureate degree (U.S. Census, 2007). When examined in this context it is evident that while the percentage of the population from which first-generation students are drawn consists of over two-thirds of the U.S. population, they only make up half of the undergraduate population. As the numbers of first-generation students attending higher education have increased, much research has been conducted on these students. The research has focused on multiple issues that are inherent to first-generation students.

**First-Generation Students**

First-generation college students are defined differently depending on the researcher, but typically they are defined as those students with both parents having less than a baccalaureate degree (Choy, 2000; Ishitani, 2002; McConnell, 2000; Pascarella et. al., 2004). This definition holds true even when other family members may have a baccalaureate degree. Research has shown that first-generation students possess unique experiences and have distinct obstacles, separate from continuing-generation college students (i.e., those who have at least one parent with at least a baccalaureate degree). These experiences and obstacles play a vital role in first-generation students’ academic experiences and successes at the postsecondary level (Brown & Burkhardt, 1999; Carter & Robinson, 2002; Choy, 2000; Choy, 2001; Filkins & Doyle, 2002; Ishiyama & Hopkins, 2005; Naumann, Bandalos, & Gutkin, 2003; Nunez & Cuccaro-Alamin, 1998; Pascarella et. al., 2004; Pike & Kuh; 2005; Somers, Woodhouse, & Cofer, 2004).

There are three main areas of research on first-generation students: (a) comparisons of first-generation college students and continuing-generation college
students on variables such as demographics, secondary school preparation, college choice process, college expectations, and financial aid; (b) the description and understanding of the transition from high school to postsecondary education; and (c) first-generation college students persistence and degree attainment in college (Pascarella et al.). It is therefore appropriate to use this framework to review available research on first-generation students.

First-generation students typically start out less academically prepared for postsecondary education, because they are less likely to complete preparatory classes in high school, have lower high school grade point averages (GPA’s), and have less involvement with high school teachers (Carter & Robinson, 2002; Filkins & Doyle, 2002; Warburton, Bugarin, & Nunez, 2001). Once an eventual first-generation college student decides to pursue a postsecondary education the journey does not become easier. First-generation students are more likely to enroll in a two-year institution, or enroll in public comprehensive institutions (Hurley, 2002; Tinto, 2004; Warburton et al., 2001). First-generation students typically delay their enrollment or enroll on a part-time basis in order to deal with outside responsibilities (Filkins & Doyle, 2002). They have higher dropout rates during their first semester or first year, and are less likely to complete a degree program and attain a baccalaureate degree than those students who have at least one parent with a four-year degree (Brown & Burkhardt, 1999; McConnell, 2000; Mitchem, 1997; Thayer, 2000; Warburton et al., 2001).

First-generation students also face different social pressures than their counterparts, as the transition to the college culture from the students’ culture is often
very difficult (Brown & Barkhardt, 1999; London, 1989; Striplin, 1999; Tinto, 1993). For most first-generation students the achievement of social mobility through attainment of a college degree requires them to trade the identity with which they were raised, and acquire another (Hurley, 2002). Researchers have found that first-generation students were concerned about getting lost on campus, meeting new and more people, potential cultural clashes, and some students even suggested removing everyone else from campus to make their transition easier (Carter & Robinson, 2002).

**First-Generation Graduate Student**

First-generation graduate students are those individuals who have enrolled in graduate education and have both parents with less than a baccalaureate degree. This definition holds true even if another individual in the family has earned a baccalaureate degree or higher (e.g., siblings, grandparents, aunts, uncles, etc.). First-generation student enrollment in graduate education is important as it relates to their potential social mobility upon completion of the degree. The value of a graduate education is both important to the student and to society (Bowen & Bok, 1998; Zhang, 2005). For students, graduate education is a prerequisite to prestigious jobs that also have higher economic benefits (Bowen & Bok; Zhang; Thomas, 2000). For society, graduate education is the mechanism through which the most complex information in our society is transmitted (Bourdieu & Passeron, 1977). Consequently, as knowledge increases society relies more upon professionals (Zhang).

Despite the breadth of research conducted on undergraduate first-generation students, relatively little research has been conducted on the first-generation students
matriculating into graduate school (Hurley, 2002; Tinto, 1993). First-generation students are 24% less likely to attend graduate school as compared to continuing-generation students (Hurley, 2002). An additional finding indicates low socioeconomic students were less likely to attend graduate school and if they did, they were more likely to attempt a master’s degree instead of a doctoral degree, as opposed to higher socioeconomic status students (Mullen et al., 2003).

According to 2000 data from the National Center for Education Statistics (NCES) National Data Resource Center (NERDC), approximately 41% of all graduate degree-seeking students are first-generation students. Additionally, research suggests that these students may be less successful in completing graduate education (Seburn, Chan, & Kirshstein, 2005). With all of the potential obstacles first-generation students may face, it has become increasingly important for higher education institutions to understand first-generation students and how their backgrounds are related to their success in higher education, particularly graduate education. While undergraduate issues are important, higher education institutions, state legislatures, and the federal government need to begin to look beyond the undergraduate level.

While there are many studies on graduate students there are very few that have specifically studied first-generation students. Consequently, it is difficult to follow proven models when studying the first-generation graduate population. Much of the understanding of first-generation student issues comes from research on undergraduate students. Tinto (1993) posited the idea of using undergraduate models for student persistence as a framework to study graduate student persistence. Tinto suggested that
doctoral persistence models could be derived from those used to determine institutional models of undergraduate persistence. Additionally, Girves and Wemmerus (1998) have utilized undergraduate retention models to study graduate student retention. Therefore, the framework of issues that have been used to study first-generation undergraduate students can be used to study first-generation graduate students.

Statement of the Problem

There are multiple variables within the areas of educational background, socioeconomic status, and educational debt that may influence first-generation graduate students’ continuation and completion of their education. With the increasing enrollment in graduate education it is important to gain a better understanding of these variables and the influence they may have on first-generation students matriculating into graduate school.

Research Questions

The following research questions are derived from the statement of the problem:

1. How do the variables within the categories of educational background (first undergraduate institutions attended and Carnegie 1994 classification, first undergraduate major), socioeconomic status (age, marital status, number of dependents, and income), and educational debt (total undergraduate debt) differ between first-generation graduate students and first-generation non-graduate attendees?

2. How do the variables within the categories of educational background (first undergraduate institutions attended and Carnegie 1994 classification, first
undergraduate major), socioeconomic status (age, marital status, number of dependents, and income), and educational debt (total undergraduate debt) differ between first-generation graduate students and continuing-generation graduate students?

3. Do the variables within the categories of educational background (first undergraduate institutions attended and Carnegie 1994 classification, first undergraduate major, graduate institution Carnegie 1994 classification, and graduate major), socioeconomic status (age, marital status, number of dependents, and income), and educational debt (total undergraduate debt) help predict graduate school enrollment for first-generation students?

4. Do the variables within the categories of educational background (first undergraduate institutions attended and Carnegie 1994 classification, first undergraduate major, graduate institution Carnegie 1994 classification, and graduate major), socioeconomic status (age, marital status, number of dependents, and income), and educational debt (total undergraduate debt) help predict the completion of graduate school for first-generation graduate students?

**Purpose of the Study**

A limited amount of research has been conducted on first-generation graduate students (Hurley, 2002; Tinto, 1993). The current research studied the characteristics of first-generation college students who have attempted a graduate education and compared them to first-generation non-graduate attending and continuing-generation graduate students.
students. The results of the current study will lead to an informed understanding of the relationship of first-generation status on continuing and completion of a graduate education. Additionally, this study presented the descriptive statistical information for each group, in order to create a clearer picture of the three groups of students.

**Significance of the Study**

Currently there is very little research on first-generation graduate students; therefore, any research in this area will add to the body of knowledge concerning first-generation graduate students. This current research differs from other previous research on first-generation students as it utilized the Baccalaureate and Beyond 93:03 (B&B:93/03) dataset. Hurley (2002) utilized the Cooperative Institutional Research Program (CIRP) for her research; therefore the results of this current research add to the body of knowledge on first-generation graduate students. Strayhorn (2005) did utilize the B&B:93/97 dataset; however his research was on the relationship finances had on graduate student persistence and did not specifically focus on first-generation graduate students. Most recently the National Center for Education Statistics (NCES) (Nevill, Chen, & Carroll, 2007) published a report utilizing the B&B:93/03 that provides copious amounts of information on respondents who have participated in graduate education. However, this report also does not specifically address first-generation graduate students.

Tinto (1993) proposed several lines of research to be undertaken to study the persistence of graduate students. These research areas include (a) a longitudinal study of graduate work that explores the experiences and differential outcomes of a representative sample of beginning doctoral students, (b) understanding the faculty relationship in
doctoral completion, (c) studying and contrasting experiences of persistence of students in different fields of study and institutions, and (d) determine how commitments and communities, such as family and work, influence graduate persistence. Tinto also states that this research must be able to help institutions address policy questions and how institutions can increase graduate persistence and completion.

While this current research study addressed some areas suggested by Tinto, it does not address all areas. However, the information that was gained from this research can be utilized in multiple ways. Specifically the results can be used by graduate schools to acquire a better understanding of the reasons for enrollment in and completion of graduate education differences between first-generation and continuing-generation college students. Institutions can use this research to determine what types of assistance and programs could or should be offered to these students. Many federal and state agencies, private corporations and higher education institutions could also utilize this research as it relates to issues of enrollment and attainment.

The information gained from this research can also benefit faculty members in various ways. Faculty members who are aware they are advising first-generation doctoral students could utilize the research to better understand the issues these students face. With this understanding faculty members will be better prepared to advise first-generation students and assist them in finding avenues to overcome the barriers they may face.

The research can be useful for first-generation students who are considering enrollment in a graduate education program. The information gained by reading the
research could help first-generation students understand the possible barriers they may face as they begin the process. It could additionally help them pursue a graduate education by navigating through these potential barriers.

Definitions of Terms

The following terms are defined for the purpose of this study:

**Baccalaureate and Beyond Longitudinal Study 93/03**

The 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03), was sponsored by the U.S. Department of Education National Center for Education Statistics (NCES, 2005). Baccalaureate and Beyond 93/03 followed a cohort of students who earned bachelor’s degrees during the 1992–93 academic year. These students were first interviewed in 1993, as part of the 1993 National Postsecondary Student Aid Study (NPSAS: 93). The following year, a follow-up interview was conducted (B&B:93/94) and transcripts were collected from students’ undergraduate institutions and coded. In 1997, a second follow-up interview was conducted (B&B:93/97). Baccalaureate & Beyond:93/03 is the third and final follow-up interview with the class of 1993. The final interview in 2003 focused on post-baccalaureate education, employment/career development, family formation, and finances.

**First-Generation Student**

A first-generation student is defined as a student with neither parent having a baccalaureate degree or higher. This definition is the standard by which participation in U.S. Department of Education TRIO programs is determined. A student’s parents may have associate degree(s) or have attended college but not completed a baccalaureate
degree program and still be defined as a first-generation college student. Additionally, this definition holds true even if other relatives may have earned a baccalaureate degree or higher. This definition does not hold true if a student has over 50% of their upkeep provided by an individual who is not a parent and this individual has a baccalaureate degree or higher.

**First-Generation Graduate Student**

First-generation graduate students are those individuals who have both parents with less than a baccalaureate degree. This definition holds true even if another individual in the family has earned a baccalaureate degree or higher (e.g., siblings, grandparents, aunts, uncles, etc.).

**Continuing-Generation Student**

A continuing-generation student is defined as an individual whose parent(s) have completed at minimum a baccalaureate level degree, but who may also possess advanced degrees (Ishiyama & Hopkins, 2003).

**Continuing-Generation Graduate Student**

A continuing-generation graduate student was defined as an individual who enrolls in graduate education and whose parent(s) have completed at minimum a baccalaureate level degree, but who may also possess advanced degrees.

**Socioeconomic status**

The socioeconomic status definition consists of the following variables:

*Parental educational attainment.* For this study parental educational attainment was defined as the highest educational attainment of either parent based on the available
responses from the NPSAS CATI. The responses will be coded into two categories based on the first-generation and continuing student definitions listed previously.

Marital status. For this study marital status was defined based on the available responses from the B&B:93/03 study: (a) married, (b) divorced, (c) widowed, (d) separated, or (f) never married (B&B, 2003).

Number of dependents. For this study a dependent was defined as someone other than the respondent or their spouse whom they provide with at least one half of their financial support during the 92-93 school year (B&B, 2003).

Educational background

The educational background definition consists of the following variables.

Baccalaureate major. For this study the baccalaureate major was categorized into the following areas: (a) arts and humanities, (b) social and behavioral sciences, (c) life and physical sciences, (d) engineering/math/computer sciences, (e) education, (f) business and management, (g) medicine/health, (h) law, and (i) other.

Graduate major. For this study the graduate major was categorized into the following areas: (a) business and management, (b) education, (c) engineering, (d) health professions, (e) public affairs/social services, (f) biological sciences, (e) mathematics and science, (g) social science, (h) history, (i) humanities, (j) psychology, (k) other.

Institutional classification. For this study institutional classification was defined two ways: (a) as institutional type for both undergraduate and graduate schools and (b) as the 1994 Carnegie classification for undergraduate and graduate schools. The following system was utilized for classification of the institution type: (a) public four year, (b)
private not for profit four year, (c) private for profit four year, (d) public two-year, (e) private not for profit two-year, (f) private for profit two-year, and (g) private for profit less than two-year (B&B, 2003).

The following system was utilized for Carnegie 1994 classification of the institution: (a) research, (b) doctoral granting, (c) comprehensive, (d) liberal arts, (e) two-year, (f) religious, (g) medical, (h) other health, (i) business, (j) fine arts, and (k) law.

**Delimitations of the Study**

As with any study this research had delimitations. The first delimitation is that the B&B:93/03 data source consisted of the individuals who could be found and who responded to the both the initial 1993 survey and the 2003 follow-up. Therefore the sample size was reduced from the original 1993 sample. The individuals studied represent a sub-sample of the total population eligible for the NPSAS study.

A second delimitation is that the current study was based on a one-year follow up of the B&B:93/03 dataset. Therefore, the results were time limited and could perhaps be an anomaly. However, since the data consist of the same individuals who were in the initial interview that data should be consistent.

Finally this study examined the ability of various factors to explain the differences between first-generation and continuing-generation students in their enrollment in and completion of graduate education. The results of this study, while generalizable do not take into account other factors that may contribute to enrollment in and completion of graduate education for first-generation and continuing-generation students.
Limitations of the Study

This study additionally has limitations. The first limitation of this current study is that the respondents to the B&B:93/03 may not answer all questions appropriately or accurately. This may create a false positive when factors are tested for significance.

Secondly, the respondents to the survey have decreased over the longitudinal study timeframe. While the initial number of participants in B&B:93 was approximately 16,000, the number of respondents to the B&B:03 follow-up was approximately 10,640. This number however is still sufficient to ensure an appropriate sample size.

Additionally, the statistical methodology used has multiple assumptions that must be met to ensure accurate analysis. If the data are unable to meet these assumptions all results must be interpreted cautiously.

The research conducted is based on correlations; therefore any results must be examined with this in mind. With this type of research it is more difficult to definitively draw conclusions particularly in regards cause and effect. Logistic regression is a form of multiple regression correlation which is used to provide the significance of a prediction based on the individual scores on a dependent variable as it relates to group membership (Grimm & Yarnold, 1998).

The B&B:93/03 survey questionnaire may not collect the appropriate information to give an accurate picture of the current study populations. While the B&B:93/03 questionnaire may obtain quality data, it may not have actually been assessing the true differences between the populations studied.
Finally, the B&B:93/03 questionnaire measured many variables for the current study including student preparedness economically and academically, and their success rates. However, the dataset does not measure emotional changes, and therefore will not be addressed in the methodology of this study.

**Organization of the Study**

This dissertation is organized in five chapters. Tables, references, and appendices are also included. Chapter One includes (a) an introduction to the study, (b) the statement of the problem, (c) the sub-problems, (d) the purpose of the study, (f) the significance of the study, (g) the definition of terms, (h) the delimitations and limitations, and (i) the organization of the dissertation.

Chapter Two contains a review of the literature and research related to challenges, obstacles, and characteristics of first-generation undergraduate and graduate students.

Chapter Three contains methodology of the study including, information on the survey instrument, definition of variables, data collection and data analysis procedures, and identification of the population and selection of the sample.

Chapter Four includes the presentation of the data and the significance of each hypothesis based on the data analysis.

Chapter Five includes a summary of the study, conclusions, and recommendations for future research.
Graduate education has become a very important segment of higher education in America, both to individuals and society (Bowen & Bok, 1998; Zhang, 2005). At present there are approximately 1.8 million students in graduate education (Baird, 1993; LaPidus, 2001). Students who complete graduate work can reap economic, educational, and more altruistic benefits (Bowen & Bok; Zhang). Additionally, graduate education is important to society as a conduit for such important jobs as health professionals, managers, professors, and other higher level careers (Baird; Bowen & Bok; Zhang). With this position of importance the cost of graduate education is greater than any other area of higher education (Baird). An example of this cost is the estimated $250,000 required to train a science doctoral student (Fischer & Zigmond, 1998). The growth in numbers and financial aspects of graduate education can be traced back to investment by the federal government research and development.

Growth of Graduate Education

The growth of higher education in the decades following World War II provided educational prospects to many Americans who previously could not have attended college (Astin & Oseguera, 2004). A part of the growth in higher education was an increase in the number of students in graduate education, which corresponded with a push to continue federal post-war support of scientific research (National Science Foundation, 1994). This push resulted in the creation of the proposal Science-The Endless Frontier by
Van nevar Bush (National Science Foundation). This proposal led to the development of the National Science Foundation (NSF) in 1950 (Geiger; National Science Foundation). Despite the creation of the NSF there continued to be a push for increased investment in research and graduate education (Geiger).

The launch of Sputnik by the Soviet Union marked a critical time in the history of American higher education (Geiger, 1999). Due in large part to this event Congress passed the National Defense Education Act (NDEA) in 1958 (U.S. Department of Education, 2006). The purpose of the NDEA was to provide for highly trained individuals to ensure America could compete with the Soviet Union in science and technical fields (U.S. Department of Education). This competition was fueled by a seven-fold increase in federal spending on university research within a decade after the launch of Sputnik (Geiger). Additionally, the increase in federal fellowships resulted in a tripling of the output of Ph.D.s during the 1960s (Geiger).

The amount of federal and private funding of research in higher education has continued to increase since the 1960s. In 1995 the federal government invested $171 billion in all research and development (Hinchkey & Kimmel, 2000). Federally funded research at the Association of American Universities was approximately $13 billion in 2002 (Association of American Universities, 2006). The vast sums of money being directed towards research point to the importance of graduate education.

Education at the baccalaureate level can provide a benefit to those who attain it; however, it is now becoming apparent that it may not be sufficient for many careers today (Bowen & Bok, 1998; Zhang, 2005). Consequently, many students have decided to
continue their education at the graduate and first professional degree level (Bowen & Bok; London, 1996; Zhang). This desire is evidenced by the increase in the number of students pursuing graduate education. Between 1990 and 2000 the number of master’s, professional, and doctoral degrees earned increased by 46%, 13% and 17%, respectively (Titus, 2004). This increase in individuals attending and earning graduate and first-professional degrees becomes very pertinent when it is combined with research that finds students from low socioeconomic backgrounds who have less educated parents are less likely to attempt graduate education (Hurley, 2002; Walpole, 1998; Zhang). Therefore, low socioeconomic students may not realize the social mobility advantages gained from graduate work, and a majority of first-generation students fall into this category (Mullen, Goyette, & Soares, 2003; Zhang).

Credential Inflation

Factors within the nation’s economy have increased the need for credentials in the job market and have amplified the need for education beyond high school (Gladieux & Swail, 2000). Part of this amplification is the growing importance of graduate education in higher education as the number of individuals receiving a baccalaureate degree continually increases. As more individuals receive a baccalaureate, a phenomenon known as credential inflation is created as the value of the degree decreases (Collins, 2002; Davies & Hammack, 2005; Leef, 2005). High school diplomas were once sufficient to ensure a middle-class living; however, now high school is merely a stepping stone to a college degree, which in turn is a stepping stone to even higher education (Collins). The baccalaureate degree has become ubiquitous and does not provide much benefit to those
who attain it (Collins; Leef). In fact a baccalaureate degree has become merely a required credential as companies now make this degree a way of vetting applicants for jobs that used to be the realm of high school graduates (Leef). As a baccalaureate has become more prevalent students now are trying to distinguish themselves from others by obtaining a graduate education (Zhang, 2005). Therefore first-generation students, who achieve a baccalaureate that once would have been their pathway to the middle-class, now may need to look beyond the undergraduate to graduate education to gain socioeconomic mobility through higher education.

First-Generation Students

First-generation students are typically defined as those students with both parents having less than a baccalaureate degree (Choy, 2000; Ishitani, 2002; McConnell, 2000; Pascarella et al., 2004). In 1995-1996, 34% of all students entering a four-year postsecondary institution were first-generation. The number of first-generation students enrolling in two-year colleges was even greater at 53% (Choy, 2001). With the increased numbers of first-generation students entering higher education, they are becoming an important population for these institutions, and as a result have become the center of an increasing breadth of research (Filkins & Doyle, 2002; Pascarella et al.).

Most of this research deals with undergraduate students and focuses on three main areas: (a) comparisons of first-generation college students and continuing-generation college students on variables such as demographics, secondary school preparation, college choice process, college expectations, and financial aid; (b) the description and understanding of the transition from high school to postsecondary education; and (c) first-
generation college students’ persistence and degree attainment in college (Pascarella et al., 2004). While there is an abundance of research on first-generation undergraduate college students the research on these same students at the graduate level is scarce.

Although the research specifically on first-generation graduate students has been lagging behind, there has been more research in recent years dealing with this topic. Current research dealing with first-generation graduate students includes the following: dissertations by Hurley (2002), Strayhorn (2005), and Walpole (1998); research conducted by National Center for Education Statistics (Choy & Geis, 2002; Nevill et al., 2007; Seburn et al., 2005); and other research by Ishiyama & Hopkins (2003); and Mullen et al. (2003). Several of these studies were conducted through longitudinal data, specifically Strayhorn, Mullen et al., and Nevill et al., utilized the Baccalaureate and Beyond data set. Additionally, some studies utilized other National Center for Education Statistics longitudinal datasets, such as National Postsecondary Student Aid Study by Chois and Geis.

One reason for this is the smaller number of first-generation students who pursue education beyond the baccalaureate level (Hurley; Tinto, 1993). In fact research shows that at five years after undergraduate graduation, first-generation students are less likely to be enrolled in a graduate or first professional program, than continuing-generation college students (Pascarella et. al., 2004).

To gain a better understanding of first-generation graduate students it is appropriate to examine research both at the undergraduate and graduate level, as research has shown that parental education and various other variables can be mitigating factors at
each educational level (Mullen et al., 2003). It is also proper to review undergraduate research as it pertains to the transition to graduate education. Finally, the literature will be examined as it pertains to persistence and attainment through both the undergraduate and graduate education.

First-generation Student Barriers

First-generation students have inherent barriers that may prevent them from enrolling higher education. Various barriers have been identified throughout the research as contributing factors in preventing first-generation students from enrolling in higher education. For this research study parental education, financial debt, demographics, and educational background will be of primary importance.

Parental Education

Participation in education beyond high school has positive outcomes for individual students and society, such as higher incomes, less dependency on public assistance, and more volunteerism (Choy, 2001). Despite the benefits of postsecondary education participation, the desire to enter postsecondary education is influenced by many factors, one of which is students’ parental education level (Astin, 1975; Karabel & Astin, 1975). Early research suggested that parental education, while having an influence on student persistence, might be more associated with children of highly educated parents being more academically capable than children of less educated parents (Astin). Studies have shown that students whose parents have a college degree (continuing-generation) enter postsecondary education at rates 30% higher than students whose parents have a high school diploma (first-generation), and 56% higher than students whose parents have
less than a high school education (Choy). If parental education influences undergraduate enrollment, a logical question to ask is what influence, if any, does parental education have on graduate education enrollment? There continues to be conflicting research on what influence parental education does have on graduate school enrollment (Ethington & Smart, 1986; Mare, 1980; Mullen et al., 2003; Nevill et al., 2007; Stolzenberg, 1994).

Initial research on the influence of social background on enrollment in graduate education indicated that parental education had no effect in determining whether a first-generation student would enroll in graduate education (Mare, 1980). Other research found that such variables as family income and education do have some influence over graduate school attendance (Ethington & Smart, 1986). More recent research found that parental education level does have an effect on graduate school attendance (Mullen et al., 2003; Nevill et al., 2007). Moreover this effect, while significant across all degree areas, is greater for first professional and doctoral degree’s than it is for master’s degree enrollment (Mullen et al.).

In approximately a 40-year span the number of bachelor’s degrees awarded increased three-fold; however, in that same time frame the number of graduate degrees (master’s, first professional, and doctoral) increased four fold (Mullen et al., 2003). This increase in the number of graduate students can be correlated with graduate education becoming a mechanism to higher salary careers and individual and intellectual benefits (Bowen & Bok, 1998; Mullen et al.; Nevill et al., 2007). The result of these higher salary careers is, according to some research, a pathway for college graduates to move away from their socioeconomic backgrounds (Stolzenberg, 1994). However, research has also
shown that low socioeconomic students do not realize social mobility advantages gained from graduate work, and a majority of first-generation students fall into this category (Mullen et al.).

**Parental Income and Financial Debt**

Parental education level appears to be the primary barrier from which most of the other barriers first-generation students face stem. Many first-generation students’ families have lower incomes; the resulting lack of money becomes a barrier many of these students face. This barrier may be related to their parents either having not saved for their education, or their parents being unable to help them pay for their education. A closely related issue that accompanies lower family income is the resulting financial debt that is incurred by students. This debt itself may then become a barrier to matriculation into graduate education. Therefore, it is important to examine both of these barriers as they relate to each other.

The responsibility of paying for college has fallen more on the family now than in the past, and is another barrier that first-generation students from low-income households face (Choy & Berker, 2003; Pike & Kuh, 2005). In 1986 Pell grants covered 98% of the tuition at an average four-year institution. That percentage dropped to 57% in 1998, and was down to 40% in 2000-2001 (Burd, 2002; Sanoff & Powell, 2003). The drop in federal financial grant aid has been offset by increases in other types of non-need based aid, such as loans and merit awards National Center for Public Policy and Higher Education (NCPPHE, 2002). In 1981, the amount of financial aid obtained by students in the form of loans was only 45%, while grants accounted for 52% of all student financial
aid (Sanoff & Powell, 2003). This trend had reversed around by 2000, when loans accounted for 58% of student financial aid, while grants represented only 41% (NCPPHE, 2002; Sanoff & Powell).

The educational attainment of parents, which is a key predictor of income, can have enormous impact on student education (Stinebrickner and Stinebrickner, 2003). Students from low-income families are more likely to have parents who do not stress the importance of available educational opportunities, college education, and receive less home educational instruction (Stinebrickner & Stinebrickner).

Low-income families and students have less knowledge of college prices especially if the parents had little or no education beyond high school (Horn, Peter, & Carroll, 2003). The financial aid need for low-income students is greater for every institution type than for other income levels, and the financial need for low-income students is greater at higher-priced institutions than at lower-priced ones (Choy & Berker, 2003). Therefore, money becomes a large factor in students’ decision-making process as to (a) where they will attend college, (b) whether they will attend, and (c) if they will stay (Sanoff & Powell, 2003). The issue of price determines the types of institutions that first-generation, low-income students enroll in, and is also related to whether they enroll in graduate school (Walpole, 1998). Students who attend a less selective or non-selective higher education institution, which are typically less expensive, were less likely to apply to graduate or first professional schools as compared to peers who attended more selective, higher priced institutions (Millet, 2003; Mullen et al., 2003).
All of the aforementioned issues that first-generation, low-income students face concerning financial aid as undergraduates may not always pertain to those who decide to enroll in graduate education. However, federal grant aid is one important piece of the financial aid package that is missing at the graduate level (Redd, 2006). While institutions may offer grant aid to graduate students through the form of scholarships, fellowships, and tuition waivers, there is no federal grant aid program for graduate programs. Despite the many financial aid programs that are in place to assist undergraduate students, these programs have not necessarily been duplicated at the graduate level. This means that graduate students can receive assistantships and scholarships, or they can resort to student loans to help pay for their education (Redd). It is important then to examine what influence if any undergraduate debt has on enrollment in graduate education.

*Undergraduate debt.* Some research has shown that undergraduate financial aid debt is a large contributing factor when applying to graduate or first professional schools (Weiler, 1994; Millet, 2003). Students with debt greater than $5,000 were less likely to enroll in graduate or professional school than students with no undergraduate debt (Millet). Overall, 59% of students without undergraduate debt applied to graduate or first professional school, while only 46% of those with $15,000 in debt applied to graduate or first professional school (Millet). Additionally, students who do not anticipate having considerable educational debt are more likely to consider attending graduate school as opposed to those students who expect to borrow for their undergraduate education (Weiler, 1994). However, undergraduate debt may have little influence on applying to
graduate or first professional school, and in fact the undergraduate debt may shift graduate enrollment towards doctoral work and away from other post-baccalaureate work, such as first professional study (Fox, 1992; Murphy, 1994). Despite the contradictory results, more recent research has shown that undergraduate debt lowers persistence rates at the graduate education level (Strayhorn, 2005).

Graduate debt. Once an undergraduate student decides to enroll in graduate education they are subject to the possibility of incurring even more debt. In the last decade the cost of full-time enrollment in graduate or first-professional school has increased by 65% and averages almost $28,900 annually (Redd, 2006). The ability to pay for graduate education is limited to scholarships, fellowships, or assistantships, as the Pell Grant is only for undergraduate students (Redd). Even with the availability of alternative forms of financial aid only 20% of all graduate and first professional students receive a scholarship, fellowship or assistantship (Redd). With the average cost of $24,000 at public institutions and $35,800 at private institutions it is apparent why over 67% of all graduate and professional student aid packages contained student loans (Redd).

There are other factors that may influence first-generation students when considering graduate or first professional school enrollment. Research has shown that first-generation undergraduate students are typically older students, low income, married, and have dependents (McConnell, 2000). It is therefore appropriate to determine if these same demographics influence enrollment at the graduate level for first-generation students.
Age, Income, Marital Status, and Dependents

While considerable research has been conducted on the demographics of first-generation undergraduate students little has been conducted on first-generation graduate students. Therefore, it is difficult to obtain precise information concerning demographics specific to first-generation graduate students.

When examining age as it relates to graduate school enrollment, some research has shown that 48% of students age 22 and younger at baccalaureate receipt enrolled in graduate or first professional school (Nevill et al., 2007). This is compared to only 36% of those students over the age of 30 enrolling in graduate education (Nevill et al.). Additional research conducted on graduate science and engineering students determined that those students whose parents were less educated typically were older than their peers whose parents had more education (Kojaku, 2000). The age difference also carried over to other fields of study as well (Kojaku). The difference in age may have resulted in lowering graduate enrollment rates for first-generation students (Bradburn, Nevill, & Cataldi, 2006).

When examining income of first-generation graduate students it is difficult to get a clear picture of what they truly earn. Forty-three percent of first-generation undergraduate students completed a graduate degree at some level as compared to 57% of continuing-generation students (Bradburn et al., 2006). The income difference for individuals who completed a baccalaureate or a master’s is $2,300; however, the income difference between a baccalaureate or masters and a doctoral/first professional is $22,100 and $19,800, respectively (Bradburn et al.).
The primary research on the variables marriage status and number of dependents is based on the Baccalaureate and Beyond 1993/2003 (B&B:93/03) survey. The research shows that the higher the degree attained the less likely an individual will be married and results in an increase in the likelihood they are single and never been married (Bradburn et al., 2006). Accordingly, individuals who did not complete a degree beyond the baccalaureate were more likely (53%) to have children as compared to those who completed a doctoral or first professional degree (39%) (Bradburn et al.). Research also shows that individuals who were married at completion of a baccalaureate degree were less likely to enroll in graduate education (Nevill et al., 2007). This trend also held true for individuals with dependent children (Nevill et al.).

The effects of the demographics discussed in this research have a profound effect on undergraduate education. There are many educational issues that are influenced by parental education, parental income, educational debt, and students’ age, income, marital status, and dependents. The relationships of these factors on graduate education enrollment and completion are not well known and there has been limited research conducted on these variables.

*Continuation from Undergraduate to Graduate Education*

While demographics help to create an overview of what the first-generation graduate student population looks like, other variables help to clarify the transition from undergraduate to graduate level education. These variables involve the academic preparedness of students based on their pre-college and undergraduate education, the types of institutions they attend both at the undergraduate and graduate level, the choice
of majors at both the undergraduate and graduate level, and the enrollment rates at each level.

*Academic Preparedness*

When the issue of continuation from undergraduate education to graduate education is considered for first-generation students, it is important to examine their entire educational history. Being prepared academically in high school is imperative for any student with aspirations of college attendance. This preparation is important as it can determine what type of postsecondary institution a student will attend, and first-generation students are more likely to attend two-year, less selective, or non-selective institutions (Barahona, 1990; Hurley, 2002; Millet, 2003; Mullen et al., 2003; Tinto, 2004). Students who first attend a two-year institution are less likely to pursue a first professional or doctoral degree, mainly due to their abilities no standardized tests (Millet, 2003; Mullen et al., 2003). However, it must be considered that many of the individuals who attend two-year institutions may have lower or different educational aspirations that do not require enrollment in graduate or first-professional education. However, it is still important to consider the pre-college, undergraduate, and graduate education of first-generation college students as compared to continuing-generation college students.

*Pre-college.* Parental socioeconomic status, which was discussed previously, has been shown to be a predictor of parental involvement in students’ success more than the type of high school they attend (Choy, 2001; Malveaux, 2003). Multiple studies have shown that first-generation college students feel like they receive very little parental and family educational support (Brown & Burkhardt, 1999; McConnell, 2000). Additionally,
their parents do not understand the importance of higher education, and will not support the students when difficulties develop while attending college (Stinebrickner & Stinebrickner, 2003). Various studies have also shown that potential first-generation college students have less knowledge about the college environment and the information they do have is often erroneous (Carter & Robinson, 2002; McConnell, 2000).

Potential first-generation college students typically start out less prepared for postsecondary education than their peers, because they are less likely to complete preparatory classes in high school, like advanced mathematics (Warburton et al., 2001). This lack of rigorous curriculum directly correlates to their success in postsecondary education (Warburton et al.). Research has shown that academic performance in high school is a significant predictor of college success and attrition (Astin, 1975). This is relative to first-generation college students as research has shown they have lower high school GPAs, and have less involvement with high school teachers (Carter & Robinson, 2002; Ewers, 2005; Filkins & Doyle, 2002). Other researchers however, have found little correlation between parental educational levels and student success (Brown & Burkhardt, 1999).

Schools that serve high percentages of low-income students, which are associated with first-generation college students, have less access to computers than schools serving their more advantaged peers (Mitchem, 1997). This lack of access to computers could put potential first-generation students behind other students technologically. Potential first-generation college students take college entrance exams at a lower rate than continuing-generation students, and are likely to have lower scores (Warburton et al., 2001). Taking
college entrance exams is a prerequisite to getting into selective institutions and with fewer potential first-generation students taking these exams they face greater difficulty enrolling in these institutions.

The issue of parental involvement, lower grades, and attendance at lower quality secondary education institutions influences the undergraduate college choice for first-generation, low-income students. Research has shown that first-generation students are more likely to enroll in public two-year or nonselective higher education institutions (Barahona, 1990; Tinto, 2004). In addition research has shown that first-generation status may influence students’ grade point average, institutions they attend, and majors they choose (Mullen et al., 2003).

Undergraduate to Graduate Transition

There are multiple factors that are related to the transition from undergraduate institutions to graduate institutions for all students. Research has shown that majority of students enroll in graduate school to increase their knowledge in a field of study and have the opportunity to do research in this field (Anderson & Swazey, 1998). Interestingly, a larger percentage of students responded that they wanted to continue their education to help others rather than to increase their earning potential (Anderson & Swazey). Whatever the reason may be for enrolling in graduate education, being a first-generation student may influence matriculation into graduate education (Hurley, 2002; Mullen et al., 2003). Therefore, it is important to examine how being first-generation effects the movement from undergraduate to graduate education.
First-generation students make up 41% of all graduate students nationally, and 14.9% are from underrepresented groups in graduate education (NCES, 2000). However, first-generation students are less likely to enroll in graduate education than continuing-generation students (Choy, 2000; Mullen et al., 2003). While first-generation students are as likely as other students to enter into a master’s program, they are less likely to enroll in doctoral and first professional degree programs (Choy, 2001; Mullen et al.). This fact must be considered with the understanding that there are several potential departure points between a two-year institution and graduate education. However, for every one-year increase in parents’ education level there is over a 20% increase in the chance of enrolling in a doctoral program (Mullen et al.).

The type of undergraduate institution attended may also be correlated to the type of graduate institution students will attend. Students who attend a two-year institution are less likely to continue through undergraduate education and attempt a doctoral or first professional degree (Millet, 2003; Mullen et al., 2003). Students who attend a comprehensive institution are less likely to enroll in either doctoral or first professional programs, as compared to students who attend private research institutions, public research institutions, or liberal arts institutions (Millet, 2003; Mullen et al.). Additionally, the quality of the undergraduate institution appears to influence not only enrolling in graduate school but also the quality and type of graduate school a student attends (Zhang, 2005). This is important as the majority of first-generation students typically start out at two-year or non-selective institutions (Barahona, 1990; Tinto, 2004). Additionally, first-
generation students are less likely to apply and enroll in four-year institutions and are less likely to persist if they attend a public university (Hurley, 2002).

Student success at the postsecondary and undergraduate levels is a key predictor of matriculation into graduate level work (Astin, 1993; Mullen et al., 2003; Pascarella & Terenzini, 1991). Over half (55%) of all first-generation undergraduates had to take some form of remedial courses during college as compared to only 27% for continuing-generation students (Chen, 2005). This is important as students with higher GPAs are more likely to enroll in graduate education (Mullen et al.). In fact for every one decile increase in GPA chances of entering a master’s, MBA, first professional, or doctoral program increased 13%, 20%, 31%, and 37%, respectively (Mullen et al.).

The transition from undergraduate to graduate education is influenced by many factors for first-generation students. This transition is predicated on first-generation students completing an undergraduate degree and then continuing their education. Once students do this they must then persist through graduate education to realize many benefits of education including (a) higher lifetime earnings, (b) more fulfilling work environment, (c) better health, (d) longer life, (e) more informed purchases, and (f) lower probability of unemployment (National Center for Public Policy and Higher Education, 2004; Perna, 2003; Thomas, 2000).

 Persistence and Degree Attainment

Undergraduate

Low-income students, typically first-generation, who enter post-secondary education are less likely to graduate than their counterparts (Coles, 2003; Stinebrickner &
Stinebrickner, 2003; Tinto, 1993). Research on students who received the Pell grant, a federal grant primarily based on the parents and/or students income for the previous year, found they typically have a higher average of multiple risk factors that are related to college persistence than non-recipients (Wei & Horn, 2002). The risk factors Wei and Horn studied that influence college persistence included: (a) no high school diploma, (b) delayed enrollment into higher education, (c) financially independent, (d) have children, (e) single parent (f) enrolled part-time, and (g) worked 35 hours or more per week.

Research has shown that students who work full-time are less likely to persist (Tinto). Full-time work does not necessarily result in lower persistence rates due to less time available for academic work, but rather less time for student interaction with faculty and students (Astin, 1993; Tinto).

Once first-generation college students are enrolled they face another set of challenges that cause them to have higher dropout rates during their first semester or first year (Brown & Burkhardt, 1999; McConnell, 2000). First-generation college students are less likely to be enrolled continuously and attain a degree at their original institution, and are more like to stop attending or leave their first institution (Warburton et al., 2001). First-generation college students are also less likely to complete a degree program and attain a baccalaureate degree than those students whose parents have a four-year degree (Brown & Burkhardt; McConnell; Mitchem, 1997; Thayer, 2000; Warburton et al.). This lack of persistence can be traced back to students’ academic performance during their high school years (Astin, 1975). Additionally, studies conducted in the late 1990s determined that first-generation students completed fewer credit hours, took less
humanities and fine art courses, studied fewer hours, worked more during the week, were less likely to participate in an honors program, and made smaller educational gains during their first year (Pascarella et al., 2003).

Completion of a degree program is also a problem for first-generation college students. Studies have shown that these students are less likely to have completed a degree and still be enrolled in higher education three years after initial entry (Choy, 2001; Warburton et al., 2001). This trend continues as students reach five years after enrollment into postsecondary education (Choy; McConnell, 2000). First-generation students have also been shown to have lower level of planning for future education after their second and third years of college as compared to other students (Pascarella et al., 2004).

First-generation status also appears to be related to the types of majors students select. First-generation students are more likely to choose a major in vocational or technical fields as compared to their continuing-generation peers who typically choose a major in science, mathematics, engineering and architecture, humanities, arts, or social sciences (Chen, 2005). This is important in light of research that indicates students who major in biology, mathematics, science, and psychology enter doctoral programs at a higher rate than other majors (Mullen et al., 2003).

Graduate Student

“Given the importance of graduate education, it is surprising that so little research has been carried out on the process of graduate persistence” (pg. 230, Tinto, 1993). Tinto in *Leaving College: Rethinking the causes and cures of student attrition*, proposed several areas of research and an agenda to address the lack of research on graduate
student persistence. Tinto (1993) used the theory of educational communities as it relates to undergraduate students to address the issue of doctoral student persistence. By applying this theory it is probable that graduate student persistence is influenced by several local and external groups, to which graduate students relate (Tinto, 1993). Additionally, Tinto discussed the need for a longitudinal study of graduate student persistence, because currently little data concerning the different stages of graduate student persistence is available. The final research area Tinto discussed was the role of finances in graduate education, and their influence on persistence.

The research agenda Tinto (1993) described laid the foundation for possible future research into graduate student persistence. Tinto suggested four research areas of focus in particular that should be done; (a) a longitudinal study, (b) how institutional behavior, especially that of faculty, influence doctoral completion, (c) contrast experiences of students in different fields of study, within and across institutions, (d) what influence commitments and communities have on graduate persistence. To accomplish this Tinto suggest that both qualitative and quantitative research needs to be conducted, and this research must allow institutions to find ways to improve graduate student persistence and completion.

The most recent research on all graduate students is from the National Center for Education Statistics and is based on the Baccalaureate and Beyond 93:03 dataset. When examining persistence in graduate school those students who enter first-professional programs have the highest persistence and therefore completion rates. First-professional students were followed by master’s and doctoral students respectively in their persistence.
and completion rates (Nevill et al., 2007). Additionally, students whose parents had graduate degrees were 22% more likely to earn a graduate degree as compared to students whose parents have less than a high school diploma (Nevill et al.).

Much of the previous research concerning first-generation graduate students has been conducted through comparing students in the McNair Scholars TRIO program to other peer graduate students nationally. The main goal of the McNair Scholars program is to increase the number of doctoral degrees earned by underrepresented populations (Seburn et al., 2005). U.S. Department of Education regulations require two-thirds of the students in the McNair program must be first-generation and low-income; the other one third consists of members of groups underrepresented in graduate education (Seburn et al.). The data gathered in these reports can help paint a picture of first-generation graduate students.

The combination of low-income and first-generation graduate students represents 70.4% of McNair participants (Seburn et al., 2005). Thirty-nine percent of McNair participants in 2001–02 enrolled in graduate school immediately following graduation (Seburn et al.). Examining just those completing the first year of graduate school reveals differences in graduate school persistence. Out of 131 McNair students who completed the first year of graduate school, 76% persisted through the second year, compared with 95% of the national and 94% of the similar sample students (Seburn et al.). By the end of the third year, 60% persisted, compared with 85% and 84% of the national and similar samples, respectively (Seburn et al.). This indicates that although McNair participants gain acceptance into graduate school at higher rates than do non-McNair participants,
they persist at lower rates once enrolled (Seburn et al., 2005). This result is similar to that of first-generation undergraduate students who also persist at lower rates than their continuing-generation peers (Warburton et al.).

Approximately 25-30% of all undergraduates in the United States enroll in graduate school sometime after college graduation (McCormick, Nunez, Shah, & Choy, 1999; Nettles & Millett, 1999). Overall, of undergraduates who enroll in graduate school, 25-30% enroll immediately after college graduation and that another 17-29% enroll within two years. However, immediate enrollment is more common for those enrolled in doctoral programs than for those enrolled in masters or first professional degree programs (Choy & Geis; Golde & Dore; McCormick et al.; Nettles & Millett). This is important to note as 50% of all graduate students wait at least three years or more to enroll after completion of the baccalaureate (Choy & Geis).

On average, approximately half of all graduate students who begin doctoral or first professional programs will never actually succeed in completing their program (Golde, 2000; Kerlin, 1995; Tinto, 1993). Underrepresented and low-income students have less financial and social support in graduate school, and doctoral students from lower-income backgrounds tend to be less successful in graduate education (Seburn et al., 2005). Lack of financial resources is the most frequent reason for graduate school withdrawal, and students from low-income backgrounds are particularly vulnerable to financial difficulties (Kerlin; Lovitts, 2001; Nettles & Millett, 1999). The lack of social support is the next most often reason given for leaving doctoral programs, after lack of financial resources (National Academy of Sciences, 1997).
The persistence and completion rates for undergraduate and graduate students are influenced by many factors. Students’ grade point average, undergraduate and graduate institution attended, major chosen, and degree type all play a role in their success. It is therefore important to examine these factors further and determine if there are distinct differences between first-generation and continuing-generation students when considering graduate education.

**Summary**

There are a multitude of reasons individuals enroll in higher education. One is the desire to improve an individual’s standing above that of their parents before them. Another reason for many students is to gain social mobility and create better situations for them. Others attend college for altruistic reasons and want to help society as a whole. However, for some the mere act of enrolling, attending, and completing a college degree can be more difficult than for others. Many studies of first-generation students have shown they usually face more barriers than continuing-generation students, and they are less likely to persist and complete a higher education program due to these barriers.

Studies have illustrated that first-generation students are less prepared for college academically, economically, and socially as compared to continuing-generation college students. This lack of preparedness may be influenced by the parents’ lack of education and therefore knowledge about the whole college process. Once they have entered college they typically work more, take less class hours, are less socially integrated, are more likely to dropout, and are more likely to attend a two-year institution (Astin, 1993; Hurley, 2002; Tinto, 1993; Tinto, 2004; Warburton et al., 2001; Wei & Horn, 2002).
addition to all of these obstacles the mere act of enrolling and attending college is a risk for first-generation students as it is a journey into the unknown (Nunez & Cuccaro-Alamin, 1998).

Those first-generation students who persist through a baccalaureate program and enroll in a graduate program are very few (Hurley, 2002; Tinto, 1993). Additionally, they typically select undergraduate majors in which fewer students attempt master’s, doctoral, or first professional graduate work (Mullen et al., 2003). While programs such as McNair Scholars have helped to increase the numbers of first-generation and low-income students enrolling in graduate education, these students persist at lower rates then their continuing-generation peers (Seburn et al., 2005).

In this chapter the researcher attempted to show how being first-generation is correlated with a more difficult path through undergraduate and graduate education. Through comparisons of demographics of first and continuing-generation students the researcher hoped to illuminate the distinct differences between these two groups. Additionally, the demographics then correspond to issues of transition from pre-college education to undergraduate education. This educational history appears to have an influence on the likelihood of attempting a graduate education. Finally, the issue of persistence and attainment in education was discussed and how it pertained to first-generation students, particularly at the undergraduate and graduate level.

In the following chapter the researcher discusses the methodology of the study. The research questions, identification of the population and sample, the data collection questionnaire, and null hypotheses are also discussed. The statistical methods for data
analysis of the null hypotheses are discussed. Additionally, operational descriptions of the variables to be utilized are discussed.
CHAPTER THREE

Methodology

The methods used to complete this study of first-generation graduate students are presented in this chapter. Data from the National Center for Education Statistics (NCES) were utilized in this study. The Baccalaureate and Beyond 1993/2003 (B&B:93/03), which is derived from the National Postsecondary Student Aid Study 1992-93 (NPSAS:93), is the primary data source. Both Research Triangle Institute International (RTI) and MPR Associates (MPR) conducted the B&B research for NCES. Together they collected data for B&B:93/03 focusing on baccalaureate degree recipients over time, to help answer policy questions concerning the occupational and further educational outcomes of earning a baccalaureate degree (Wine, Cominole, Wheerless, Dudley, & Franklin, 2005).

The research questions directing the study, stated in Chapter One, are restated in this chapter. This chapter contains a summary of the methodology for the B&B:93/03, and the descriptions of (a) the population, (b) the sample process, (c) the survey questionnaire, (d) the data collection process, (e) the integrity of the data, and (f) and variable definitions. Lastly, this chapter also contains a description of the methodology including the data analysis procedures utilized to answer the research questions for this study specifically.

The research questions to be answered using the B&B:93/03 data are as follows:
1. How do the variables within the categories of educational background, socioeconomic status, and educational debt differ between first-generation graduate students and first-generation non-graduate attendees?

2. How do the variables within the categories of educational background, socioeconomic status, and educational debt differ between first-generation graduate students and continuing-generation graduate students?

3. Do the variables within the categories of educational background, socioeconomic status, and educational debt help predict graduate school enrollment for first-generation students?

4. Do the variables within the categories of educational background, socioeconomic status, and educational debt help predict the completion of graduate school for first-generation graduate students?

*Identification of Population and Sample*

The target population for this research was derived from a secondary data source, B&B:93/03. They were individuals who participated in the B&B:93/03 study which was derived from individuals who were eligible to participate in NPSAS:93 and were awarded the bachelor’s degree by a postsecondary institution in the United States or Puerto Rico. Individuals of the B&B:93 cohort were identified during the NPSAS:93 study, which was the beginning year for the longitudinal study. The B&B:93 cohort consisted of both students who completed the NPSAS:93 interview and were identified to be baccalaureate recipients, and those NPSAS:93 non-respondents who were potentially eligible for B&B who had at least some data. The NPSAS:93 sampling design consisted of a two-stage
design in which eligible institutions were selected first; then eligible students were
selected from eligible, participating institutions. The sampling procedures used to select
students in the base-year and follow-up studies are described below (Wine et al., 2005).

**B&B Institution Population**

Institutions that were eligible for the B&B study had to be eligible for the
NPSAS:93 study. To be eligible for the NPSAS:93 study institutions had to meet the
following criteria: (a) offer an education program designed for persons who have
completed secondary education; (b) offer an academically, occupationally, or
vocationally oriented program of study; (c) offer courses to students not employed by the
institution; (d) offer more than just correspondence courses; (e) offer at least one program
requiring at least 3 months or 300 clock hours of instruction; (f) located in one of the 50
states, the District of Columbia, or Puerto Rico; and (g) not be a U.S. service academy
(Wine et al., 2005).

**B&B Institution Sample**

To obtain the institution sample for B&B:93 the NPSAS:93 institution sampling
frame was utilized. It was constructed from the 1990-1991 Integrated Postsecondary
Education Data System (IPEDS). Institutions were excluded if they did not meet the
requirements listed previously and five institutions were deemed ineligible based on
IPEDS data discrepancies. The sample obtained consisted of 10,140 eligible institutions
(Wine et al., 2005). The sample was further narrowed into geographic areas utilizing
three-digit zip codes. Sample institutions were selected using measures of size that were
proportional to the expected sample allocation for the institution (Wine et al., 2005).
**B&B Student Population**

Students eligible for the B&B:93/03 study were those students who were eligible for the NPSAS:93. To be eligible for NPSAS students had to have been enrolled in a NPSAS-eligible institution between July 1, 1992, and June 30, 1993, and enrolled in either (a) course(s) for credit toward a degree or formal award; (b) a degree or formal award program of at least 3 months; (c) an academically, occupationally, or vocationally specific program requiring at least 3 months or 300 clock hours of instruction; (d) not currently enrolled in high school; and (e) not currently solely in a general equivalency diploma (GED) or other high school completion program.

**B&B Student Sample**

The student sample for B&B:93/03 was derived from the NPSAS student sample. The total number of students eligible for NPSAS:93 were approximately 53,000 undergraduates and 13,000 graduate students (Bradburn, Nevill, & Cataldi, 2006). Sample institutions indicated students who were eligible to receive a baccalaureate degree at some time between July 1, 1992, and June 30, 1993, regardless of their enrollment status during the academic year. Additionally, during the computer assisted telephone interviewing (CATI) any student who indicated they had received a baccalaureate degree in the same year was also included in the sample. Based on this the number of participants eligible for the B&B:93 cohort study was 16,320 baccalaureate recipients (Wine et al., 2005).

There have been three follow-ups on the B&B:93 cohort: one in 1994, again in 1997, and the latest one in 2003. The total number of participants was reduced over this
time period due to non-respondents and the cost of trying to track respondents from the original sample of 16,320. The total number of respondents in the latest follow up conducted in 2003 was 10,440 (Wine et al., 2005).

**Weighting**

Weights were utilized to compensate for unequal probability of selection into the B&B sample and to adjust for non-response (Bradburn, Nevill, & Cataldi, 2006). The weights for the respondents to B&B:93/03 were constructed by applying four adjustments for sub sampling and non-response to the B&B:93/94 base weight. The four adjustments were meant to account for: (a) sub sampling of the B&B:93/97 respondents, (b) those not located, (c) refusals among those who were located, and (d) types of non-response other than refusals among those who were located and did not refuse (Wine et al., 2005).

The National Center for Education Statistics also constructed cross-sectional weights to analyze the respondents to B&B:93/03. An adjustment for non-respondents was performed in three steps: (a) inability to locate the students, (b) refusal to be interviewed, and (c) other non-interview. Candidate predictor variables, those thought to be predictive of non-response and non-missing for most of the sample (non-respondents as well as respondents) for the B&B:93/03 weight adjustment were determined (Wine et al., 2005).

Additionally, a longitudinal weight was constructed for all individuals who responded to all four surveys B&B:93/03, B&B:93/97, B&B:93/94, and NPSAS:93. Variances were computed using the Taylor series and balanced repeated replications (BRR) techniques (Wine et al., 2005).
Data Collection Procedures

Data collected for B&B:93/03 was achieved through a web based data collection questionnaire administered to respondents in three modes: (a) self administered via the internet, (b) with a trained interviewer over the telephone using computer assisted telephone interview (CATI), and (c) with a trained interviewer in person using computer assisted personal interviewing (CAPI) (Wine et al., 2005).

Multiple types of data collection staff were utilized for the B&B:93/03 instrument, including tracing specialists, supervisors and monitors, Help Desk agents, telephone interviewers, and field interviewers. Each group participated in specialized training which covered an overview of the study, review of confidentiality requirements, a demonstration interview, question-by-question review of the instrument, as well as hands-on practice with the tracing module, instrument, and coding systems. Additionally, every training session contained specialized training for each job type mentioned previously (Wine et al., 2005).

The first method utilized to collect data was the self-administered web interview. This process was available for the initial three weeks of the data collection. To decrease the cost of the phone interview and increase response rate for the self-administered interview, respondents were given an incentive. The self-administered web interview had several benefits the telephone interview did not including: (a) respondents could complete the survey at a convenient time; (b) the interview could be completed at any location with computer access (home, work, library, school, etc.); (c) respondents were able to break off the interview and resume at another time; (d) security features included
password-protected login, encrypted data transmission, and automatic logout after idle periods; (e) the CATI case management system (CMS) controlled access to active cases so respondents in the process of completing the self-administered web interview would not be called by an interviewer; and (f) if they encountered any problems with the self-administered interview, sample members were offered the option of completing the survey with an interviewer by calling the Help Desk (Wine et al., 2005).

Telephone interviews utilizing CATI began at the end of the three-week web based self-administered interview. A CATI software package created and delivered a list of interviewees to each interviewer. This allowed for calls to be made according to priority and time of day. It allowed for maximizing the likelihood of contacting and interviewing sample members and the software also prevented CATI calls from being made to in-progress interviews on the web or to cases, which had been already completed (Wine et al., 2005).

If sample members could not be contacted using their current information little tracing was conducted by the interviewers. Various tracing methods were used based on previously collected data on each sample member, if they could not be found the interviewer gave the information to RTI’s Tracing Operations (TOPS). Sample members not located by TOPS were sent to the field for locating and interviewing or were returned to TOPS for more intensive tracing (Wine et al., 2005).

Field interviews or Computer Assisted Personal Interviews began four months after CATI began. Field interviewers (FI) were given a caseload based on the geographic areas with the highest density of non-respondents thus far. Field interviews were either
conducted in person or by telephone by local Field Interviewers. Software on the FI’s computer allowed for progress reports back to staff and prevented CATI from contacting the sample member; however, the sample member could still complete the self-administered web based interview (Wine et al., 2005).

Questionnaire

The B&B:93/03 dataset was created using a web based data collection questionnaire, which was administered to respondents in three modes; (a) self administered via the internet, (b) with a trained interviewer over the telephone using computer assisted telephone interview (CATI), and (c) with a trained interviewer in person using computer assisted personal interviewing (CAPI). The data elements used for the B&B:93 cohort, were the basis for the data elements in the B&B:93/03 study. They were developed with input from the study’s Technical Review Panel (TRP), National Center for Education Statistics (NCES) staff, and other Department of Education staff (Wine et al., 2005).

The interview for B&B:93/03 was first developed for implementation in the field test using a study website from which sample members could take the self-administered interview. It was then revised for full-scale administration with recommendations from NCES and the TRP. Questionnaire specifications determine the structure of sections, variable names and definitions, skip patterns, out-of-range limits, and, when necessary, item verifications (Wine et al., 2005).

The questionnaire was divided into five distinct areas for data collection. Section A collected data concerning participant education, specifically any postsecondary
education completed since the last interview (B&B:93/97) including formal degree programs (undergraduate and graduate), credit and noncredit coursework, and courses to obtain or maintain certification and licensure (Wine et al., 2005).

Section B collected data concerning employment including employment status, characteristics of respondents’ careers, and information concerning any time spent out of the workforce (Wine et al., 2005).

Section C collected data on those individuals who were teachers or who were considering the teaching profession. It contained questions about teaching (kindergarten through grade 12) to monitor movement into and out of the teacher pipeline and to gather information on teacher preparation, job characteristics, and job satisfaction (Wine et al., 2005).

Section D collected data concerning finances of respondents to better understand the cost and benefits of a completing a baccalaureate degree. This section contained questions focusing on income, assets, debts, and savings, as well as education loan burden (Wine et al., 2005).

Section E collected data on student demographics. This section contained questions focusing on marital status and family composition, volunteerism and political activism, as well as disability status (Wine et al., 2005).

Data Integrity

The data obtained for the B&B:93/03 study are extensively evaluated to ensure their integrity. To accomplish this NCES utilizes several methods including: (a) help text,
(b) coding, (c) indeterminate responses, (d) reliability of responses, (e) quality assurance CATI monitoring, and (f) quality circle meetings (Wine et al., 2005).

Help text was available for every web screen of the B&B:93/03. The help text screens displayed information on how to enter responses, type of information requested, and definitions of words or phrases within a question. Counters were used to track usage of help text throughout the interview. The majority of screens had a help text usage rate of less than 1%. Only one item showed a help text access rate exceeding 10% (Wine et al., 2005).

Coding of responses for occupation, industry, major/field of study, and area of licensure or certification was achieved through the web instrument tools for B&B:93/03. When self-administered by B&B sample members, help text and limited supporting text on screen were available to assist with online coding. When administered as a telephone or in-person interview, interviewers could take advantage of the availability of the respondent to clarify coding choices at the time the coding was performed, thereby improving data quality. In addition throughout the data collection phases of B&B:93/03, expert coders were present to determine if the selected codes were appropriate, whether a different code should be assigned, or whether a string was too vague to be evaluated for recode (Wine et al., 2005).

Indeterminate responses are those responses categorized as a response of “don’t know” or “refuse to answer.” Results of the field test showed that having the explicit responses available actually increased the non-response rate for these specific questions; therefore, these responses were removed from the screen entirely for the full
questionnaire. To replace these responses a “continue” button was placed on each screen. Secondly, if respondents went through three screens without responding they were reminded, with a pop up box, about the importance of their continued participation in the interview (Wine et al., 2005).

To ensure the reliability of responses to the questionnaire a sub-sample of 500 respondents was selected at random to complete a re-interview designed to assess the temporal stability of selected interview items. These 500 re-interview sample respondents were divided equally between those who self-administered and those who were interviewed. Re-interviews took place three weeks after the initial interview and were conducted in the same mode. The overall percent agreement rates for the interview and re-interview were between 71% and 97% (Wine et al., 2005).

To achieve better data from the telephone interviews regular monitoring was conducted. In effort to ensure monitoring occurred throughout the full-scale questionnaire, monitoring was conducted on day, night, and weekend shifts. Monitors listened to and viewed on-going interviews via remote telephones or computer screens, and monitored up to 20 questions. The monitors evaluated each question on two aspects of interviewer performance: (a) correct delivery of questions and (b) accurate keying of responses. This monitoring resulted in 10,640 items observed with only 115 delivery errors and 66 data entry errors (Wine et al., 2005).

The final method to ensure integrity of questionnaire data was the quality circle meeting. These meetings provided an opportunity to discuss data collection issues with project staff. Meetings were scheduled at all times on all shifts to ensure all telephone
interviewers had the opportunity to attend. Summaries of the topics discussed in these meetings were compiled and delivered to all interviewers in the form of a newsletter (Wine et al., 2005).

The data integrity for the current research study is directly based on the same data integrity of the B&B:93/03 dataset. Therefore, the results of the current study obtained from the B&B dataset should also have integrity. However, misinterpretation of the results may result in outcomes that are invalid.

Data Analysis Procedures

Data analysis for this dissertation was conducted utilizing Data Analysis System (DAS), the Statistical Analysis System (SAS), and Survey Data Analysis-Software for the Statistical Analysis of Correlated Data (SUDAAN). The DAS system was created by NCES to assist in the analyzing of NCES datasets, where the variables for this current research were obtained. The information from DAS was used to obtain descriptive statistics, and obtain t-tests for differences between proportions of variables for first-generation non-graduate attending, first-generation graduate attending, and continuing-generation graduate students. The use of logistic regression to answer research questions three and four was accomplished through SAS and SUDAAN. SAS was used to recode, dummy code, and dichotomize variables for use in SUDAAN. SUDAAN was utilized for logistic regression as it corrects for the complex sampling techniques, such as was used to collect data for the B&B:93/03 dataset (Thomas & Heck, 2001). For the logistic regression analysis a restricted B&B:93/03 data file was utilized. For all research
conducted in this research all differences stated were significant at the alpha level ($\alpha$)< .05.

The B&B:93/03 data were analyzed in several ways. Descriptive statistics including, percentages, means, and standard errors where appropriate, were calculated for the individual variables used in the study. The information gained from the descriptive statistics provided an overview of the population being studied. In addition $t$-tests were conducted to determine if there were statistically significant differences between proportions of the sample individuals in all independent variables. The $t$-tests were utilized, as this is the standard statistical test NCES uses to test for significance in much of their research.

Additionally, an inferential statistical procedure, logistic regression, was utilized to analyze the data. This procedure was used because the dependent variables for research questions three and four of the study are dichotomous (attending/non-attending and completing/non-completing) and therefore the use of logistic regression is appropriate. Logistic regression is used to accomplish multiple results including (a) predict a dependent variable based on the independent variables, (b) to determine the percent of variance in the dependent variable explained by the independent variables, (c) rank the relative importance of independent variables, (d) assess the interaction effects, and (e) understand the impact of covariate control variables (North Carolina State University, 2005).
Data analysis was conducted in five steps. In the first step a subset of the B&B:93/03 dataset was obtained from the electronic code book, including only the variables necessary for the analysis. The subset was then imported to SAS.

Next, using SAS, unweighted frequencies and tables for categorical variables were created. Univariate analysis was performed on all continuous variables.

The third step was to recode the variables and run weighted frequencies. Through recoding of variables the data was sorted into those individuals who attended graduate school (grad) and those who did not (non-grad). This was done to ensure there were sufficient numbers of cases to continue. Additionally, any missing or non-respondent cases were deleted in this step.

The fourth step was to run frequency tables once again; however the data was filtered so only those students who were considered first-generation (fgen) were reported. This was also done to ensure sufficient numbers in all variables to allow for continued analysis. The total number of first-generation students after both sorts resulted in approximately 4100 respondents.

The final step in the data analysis process was logistic regression. Prior to logistic regression being conducted any categorical variable that had more than two categories was recoded into separate variables. Each of the separate variables was coded into two categories. For research question three this resulted in 11 coded categorical variables, two interval ratio, one continuous variables, and one dependent variable with two possible outcomes (enrolled in graduate school; did not enroll in graduate school). For research question four this resulted in 21 coded categorical variables, two interval ratio, one
continuous variables, and one dependent variable with two possible outcomes (completed graduate education; did not complete graduate education). Once this was accomplished SUDAAN was utilized to complete logistic regression for research questions three and four.

Research question three asked if undergraduate GPA, total undergraduate debt, Carnegie 1994 classification of undergraduate institution, undergraduate major, marital status at receipt of baccalaureate, and total number of dependents at receipt of baccalaureate degree distinguished first-generation students who went to graduate school from those who did not. Research question four asked if undergraduate GPA, total undergraduate debt, Carnegie 1994 classification of graduate institution attended, graduate major, Carnegie 1994 classification of undergraduate institution, undergraduate major, marital status at receipt of baccalaureate degree, and total number of dependents at receipt of baccalaureate degree distinguished first-generation graduate students who attained a degree from those first-generation graduate students who did not attain a graduate degree. For research question four those first-generation students who are currently enrolled but who have not attained a degree are classified as having not attained a graduate degree.

Assumptions of Statistical Techniques

Independent t-tests. Independent t-tests are guided by four basic assumptions, which must be met to ensure the results are accurate. They are as follows; (a) the data are normally distributed, (b) homogeneity of variance, (c) data are measured with equal
intervals throughout the scale, and (d) independence of responses. For this research a $t$-test for proportions was utilized.

Logistic regression. Logistic regression is guided by five basic assumptions, which must be met to ensure results are accurate. The basic assumptions of logistic regression are; (a) the cases are independent, (b) the sample is large enough, (c) the dependent variable is dichotomous, (d) the model is correctly specified, and (e) there is no linearity between the variables.

Variable Definitions

The following are definitions for the operational variables used in this research.

Parental Education

Parental education (PEDUC) is a categorical variable. Respondents chose one of the following; (a) not high school graduate or equivalent, (b) high school graduate or equivalent, (c) some postsecondary education but less than two years, (d) two years or more postsecondary education, associates degree, but less than baccalaureate, (e) baccalaureate degree, and (f) advanced degree. Respondents who chose any of the first four options were considered first-generation. All other responses were considered to be continuing generation.

Marital Status

Marital status at receipt of first baccalaureate (MASTBA) is a categorical variable. Respondents chose one of the following responses; (a) married, (b) separated, (c) divorced, (d) widowed, (e) cohabitating, and (f) never married. Respondents were coded into either married or all other categories.
First Institution Type

First institution type (FSCTYPE) is a categorical variable. Respondents chose one of the following responses; (a) public four-year, (b) private not-for-profit four-year, (c) private for-profit four-year, (d) public two-year, (e) private not-for-profit two-year, (f) private for-profit two-year, (g) public less than two-year, and (h) private for-profit less than two-year. For research questions three and four the institution types were combined into three categories to ensure enough responses, with public four-year institutions being used as the comparison group for logistic regression, as this category had the highest response rate. The three combined categories included (a) private not-for-profit four-year, (b) public two-year, and (c) all other institution types. This grouping was done to ensure appropriate numbers in each category.

Graduate Enrollment and Attainment

Graduate enrollment and attainment status by 2003 (B3ENRAT) is a categorical variable. Respondents chose one of the following responses; (a) no graduate enrollment, (b) attained terminal master’s degree, (c) attained first-professional degree, (d) attained doctoral degree, (e) currently enrolled master’s, (f) currently enrolled first-professional, (g) currently enrolled doctorate, and (h) no attainment, previously enrolled. For research question three respondents were into either enrolled if they responded with attained terminal master’s degree, attained first-professional degree, attained doctoral degree, currently enrolled master’s, currently enrolled first-professional, or currently enrolled doctorate. Respondents were coded as not enrolled if they responded with either no graduate enrollment or no attainment, previously enrolled. For research question four
respondents were coded based on those who were considered to have enrolled, into either graduate degree attained if they responded with attained terminal master’s degree, attained first-professional degree, attained doctoral degree. Respondents were coded as graduate degree not attained if they responded with currently enrolled master’s, currently enrolled first-professional, or currently enrolled doctorate, no graduate enrollment, or no attainment, previously enrolled.

Undergraduate Major

Undergraduate major (BAMAJOR) is a categorical variable. Respondents chose one of the following; (a) business and management, (b) education, (c) engineering, (d) health professions, (e) public affairs/social services, (f) biological sciences, (g) mathematics and science, (h) social sciences, (i) history, (j) humanities, (k) psychology, and (l) other. To reduce the number of categories and to ensure a sufficient number of responses, similar major areas were combined. This combining was only done when answering research questions three and four. Engineering, biological sciences, and mathematics and science were combined into one category as these courses are typically considered STEM programs. Public affairs/social services, social science, and psychology were combined into a second category, because of the interconnectedness with social science. History and humanities were combined into a third category due to the areas close correlations. All other variables had a sufficient number of responses or did not fit well with other categories to require combining them. The omitted category which was used as the comparison group was education.
Undergraduate Institution

Undergraduate institution type was determined by the 1994 Carnegie code for the respondents NPSAS institution (CC94). Respondents chose one of the following categories: (a) research universities I, (b) research universities II, (c) doctoral universities I, (d) doctoral universities II, (e) master’s (comprehensive) college/universities I, (f) master’s (comprehensive) college/universities II, (g) baccalaureate (liberal arts) colleges I, (h) baccalaureate colleges II, (i) associate of arts colleges, (j) specialized institutions – theological, (k) specialized institutions – medical, (l) specialized institutions – other health, (m) specialized institutions – engineering, (n) specialized institutions – business and management, (o) specialized institutions – art/music/design, (p) specialized institutions – teachers, (q) specialized institutions – other specialized. To reduce the number of categories and to ensure a sufficient number of responses, similar institution categories were combined. This combining resulted in five categories; (a) research, (b) doctoral, (c) master’s, (d) baccalaureate (including associates), and (e) specialized. The omitted category which was used as the comparison group was research institutions.

Graduate Major

Graduate major (MAJORS4) is a categorical variable. Respondents chose one of the following categories; (a) humanities, (b) social behavioral science, (c) life and physical sciences, (d) engineering/computer/math, (e) education, (f) business/management, (g) health, (h) law, and (i) other. To ensure a sufficient number of responses, some similar major areas were combined. For this variable only the categories of business and management and law were combined to create a category. Similar to the
undergraduate major, the omitted category which was used as the comparison group was education.

Graduate Institution

The highest post baccalaureate institution enrolled in (B2HENCC) is a categorical variable. Respondents chose one of the following categories; (a) research I, (b) research II, (c) doctorate-granting I, (d) doctorate-granting II, (e) comprehensive I, (f) comprehensive II, (g) liberal arts I, (h) liberal arts II, (i) two-year, (j) religious, (k) medical, (l) other health, (m) engineering, (n) business, (o) fine arts, (p) law, (q) teachers, (r) other specialized, and (s) tribally controlled. To reduce the number of categories and to ensure a sufficient number of responses, similar institution categories were combined. This combining resulted in four categories; (a) research, (b) doctorate-granting, (c) comprehensive, and (d) liberal arts, two-year, and specialized. The omitted category which was used as the comparison group was research institutions.

Age

The age of the respondent at receipt of their baccalaureate (AGEATBA) is a interval/ratio variable.

Total Number of Dependents

The total number of dependents of the respondents at receipt of their baccalaureate (TUTNUMDP) is a interval ratio variable. The total number of dependents includes the respondent and anyone else for whom the respondent is responsible for more than half of their livelihood.
Undergraduate GPA (GPA) is a interval ratio variable. This is the cumulative GPA for all undergraduate work at receipt of baccalaureate.

Total undergraduate debt (B2TOTUDB) is a continuous variable. This is the total amount of money borrowed for undergraduate education from all sources that was to be repaid.

Null hypotheses

Four null hypotheses were proposed for this research study. The first two null hypotheses will be analyzed using $t$-tests, and the last two null hypotheses will be analyzed using logistic regression. To provide clearer understanding of the variables involved Tables 1 and 2 are provided. Table 1 provides the two dependent variables with a breakdown of the independent variables on which $t$-tests were utilized. Table 2 provides the two dependent variables with a breakdown of the independent variables, which were utilized in logistic regression.

$H_{01}$: There are no significant differences in the variables within the categories of educational background, socioeconomic status, and educational debt between first-generation graduate students and first-generation non-graduate attending students.

$H_{02}$: There are no significant differences in the classification of graduate higher education institutions attended for first-generation and continuing-generation college students attempting graduate education.
Ho₃: There is no significant relationship in the variables within the categories of educational background, socioeconomic status, and educational debt influence graduate school enrollment for first-generation students.

Ho₄: There is no significant relationship in the variables within the categories of educational background, socioeconomic status, and educational debt influence the completion of graduate school for first-generation graduate students.

Summary

This chapter presented the methods used to complete this current research study, of first-generation graduate students. The data utilized were obtained from the Baccalaureate and Beyond 1993 (B&B:93/03), which is derived from the National Postsecondary Student Aid Study 1992-93 (NPSAS:93). The questionnaire description, population and sample description, data collection techniques, weights, data integrity, and data analysis procedures were all discussed in this chapter.
Table 1

Variables analyzed by t-tests within Ho$_1$ and Ho$_2$

<table>
<thead>
<tr>
<th>Variables</th>
<th>Ho$_1$</th>
<th>Ho$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-gen non-grad</td>
<td>F-gen graduate</td>
</tr>
<tr>
<td>Educational Background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First undergraduate institution attended</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Undergraduate institution classification</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Undergraduate major</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Graduate institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at 1$^{st}$ BA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Marital status at 1$^{st}$ BA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td># of dependents in 1993</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2003 Income</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Educational Debt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total undergraduate debt</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 2

*Variables analyzed by logistic regression within Ho$_3$ and Ho$_4$*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Ho$_3$</th>
<th>Ho$_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First undergraduate institution attended</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Undergraduate institution classification</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Undergraduate major</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Graduate institution</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Graduate major</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at 1st BA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Marital status at 1st BA</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td># of dependents in 1993</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Educational Debt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total undergraduate debt</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
CHAPTER FOUR

Results

The purpose of this chapter is to present the results of the findings from data analysis conducted for the current research concerning the influence being first-generation has on enrolling in and completing graduate education. To determine this four research questions were created. This chapter will begin with a description of each group examined in the study, followed by a separate section for each of the research questions, and will conclude with a summary.

Descriptive

To better understand the results of Chapter Three, a brief description of characteristics that distinguish each of the three groups (first-generation non-graduate, first-generation graduate, and continuing-generation graduate) in the study will be given.

First-Generation Non-Graduate

First-generation non-graduate students most likely attended a public two or four-year institution, with 53.7% attending a public four-year and 21.5% attending a public two-year institution. Approximately 30% of first-generation non-graduate students major in business and management, which is almost double the rate for first-generation graduate students. Sixty-five percent of first-generation non-graduate students are ages 23 and older when they receive their baccalaureate degree, with approximately 25% receiving their baccalaureate after age 29. Over one-third are married and approximately 43% have at least one or more dependents when they receive their baccalaureate. Additionally, 69%
of first-generation non-graduate individuals earn less than $60,000 10 years after baccalaureate completion.

First-Generation Graduate

Approximately 75% of first-generation graduate students attended a public two or four-year institution as an undergraduate. They attended two-year institutions at almost double the rate of continuing-generation students. When private four-year institutions are added to the previously mentioned institutions it accounts for approximately 99% of all institution types attended by first-generation graduate students. Approximately 84% attended a doctoral or master’s institution as an undergraduate. When examining graduate institution type, approximately 44% attend a comprehensive institution, with 48% attending either a research or doctoral granting institution (28.3% and 19.9%, respectively).

Over one-third of first-generation graduate students major in business and management or education (16% and 18.7%, respectively). Another interesting observation is they are more likely than continuing-generation students to major in psychology as undergraduates. Similar to the trend in undergraduate majors, 39% of first-generation graduate students major in business and management or education (19.2% and 19.5%, respectively).

Approximately 71% of first-generation graduate students were ages 25 and younger at receipt of their baccalaureate degree, with the majority being ages 22-23. Twenty-two percent are ages 30 or older when the complete their baccalaureate degree. Over one-quarter are married upon receipt of baccalaureate degree, with 63% of all first-
generation graduate students reporting not having any dependents. Approximately 60% earned less than $60,000 10 years after baccalaureate receipt. The salary distribution is similar for continuing-generation students except at the greater than $100,000 range where continuing-generation students had a statistically higher proportion.

Continuing-Generation Graduate

Approximately 90% of the continuing-generation graduate students first attended a four-year public or not for profit private institution as undergraduates. The remaining 10% were divided among the other institution types with the overwhelming majority first attending public two-year institutions (9.4%). Almost 60% attended a doctoral granting institution as an undergraduate with 25% attending a master’s institution. Sixty-seven percent attended a research or doctoral granting institution for their graduate work (48.5% and 18.5%, respectively).

Over 50% of continuing-generation students majored in four areas as undergraduates (a) business and management (12.8%), (b) education (14.2%), (c) social science (14.5%), and (d) humanities (10.5%). Almost 90% of continuing-generation students major in one of six main areas as graduate students with 64% majoring in social/behavioral sciences (18.8%), education (15.5%), business and management (14.8%), and life/physical sciences (14.5%).

Approximately 82% of continuing-generation graduate students were ages 23 and younger at receipt of the baccalaureate degree, and unlike the first-generation graduate students’ one 7.7% of continuing-generation students were ages 30 and older at baccalaureate receipt. Eighty-three percent had never been married and almost 80% had
no dependents upon receipt of baccalaureate. The salary distribution is similar to first-generation graduate students except at the greater than $100,000 range, where the proportion of continuing-generation graduate students is almost double that of first-generation graduate students.

*First-Generation Graduate and Non-Graduate Students*

The first research question sought to determine if variables within the categories of educational background, socioeconomic status, and undergraduate educational debt resulted in significant differences between first-generation students who attend graduate school as compared to those who do not attend. To accomplish this, the National Center for Education Statistics (NCES) Data Analysis System (DAS) was utilized to generate estimates and their related standard errors for each variable within the afore mentioned categories from the Baccalaureate and Beyond 1993/2003 dataset (B&B:93/03). The results for this analysis are divided based on their respective variable category.

*Educational Background*

For the category of educational background there were three variables analyzed; (a) institution type, (b) undergraduate major, and (c) undergraduate institution type based on Carnegie classification. The following sections describe results for each variable, including tables.

*Institution type.* The results of the first undergraduate institution type attended can be seen in Table 3. The first undergraduate institution attended was divided into eight categories. Within these categories the percentage of first-generation graduate and non-graduate students were distributed fairly equally. The percentage of first-generation non-
graduate students compared to first-generation graduate students based on their initial attendance at a public two-year institution was statistically significant ($t=2.60$, $p<.05$). Additionally, the comparison between the groups who attended a public less-than two-year institution was significant ($t=2.00$, $p<.05$).

*Carnegie classification.* The results for the distribution of Carnegie classification for institution type attended can be seen in Table 4. The only statistically significant comparison was in the specialized institution category where first-generation non-graduate students attended these institutions at over twice the rate (5.1%) of first-generation graduate students (2.3%) ($t=2.22$, $p<.05$).

*Undergraduate major.* The results for the distribution of undergraduate major can be seen in Table 5. The undergraduate major variable was divided into 12 main categories. There were five statistically significant comparisons. First-generation non-graduate students majored in business and management at a statistically significant higher rate (29.4%) than first-generation graduate students (16%) ($t=6.22$, $p<.05$). Additionally, first-generation non-graduate students majored in engineering at a statistically significant higher rate (6.4%) than first-generation graduate students (4.2%) ($t=2.12$, $p<.05$). The other three significant comparisons were related to higher rates of first-generation graduate students in majors.
Table 3

*Undergraduate institution type for first-generation graduate and non-graduate students by %*

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>First-Generation Status</th>
<th>Graduate</th>
<th>S.E.</th>
<th>Non-Graduate</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public 2-year</td>
<td></td>
<td>17.7</td>
<td>1.54</td>
<td>22.5</td>
<td>1.02</td>
<td>2.60*</td>
</tr>
<tr>
<td>Public less than 2-year</td>
<td></td>
<td>0.0</td>
<td>0.00</td>
<td>0.1</td>
<td>0.05</td>
<td>2.00*</td>
</tr>
<tr>
<td>Private not for profit 4-year</td>
<td></td>
<td>24.4</td>
<td>1.49</td>
<td>21.5</td>
<td>1.15</td>
<td>1.54</td>
</tr>
<tr>
<td>Public 4-Year</td>
<td></td>
<td>56.4</td>
<td>2.01</td>
<td>53.7</td>
<td>1.61</td>
<td>1.05</td>
</tr>
<tr>
<td>Private for profit 4-year</td>
<td></td>
<td>0.4</td>
<td>0.31</td>
<td>0.9</td>
<td>0.39</td>
<td>1.00</td>
</tr>
<tr>
<td>Private not for profit 2-year</td>
<td></td>
<td>0.5</td>
<td>0.17</td>
<td>0.8</td>
<td>0.24</td>
<td>1.02</td>
</tr>
<tr>
<td>Private for profit 2-year</td>
<td></td>
<td>0.4</td>
<td>0.30</td>
<td>0.5</td>
<td>0.26</td>
<td>0.25</td>
</tr>
<tr>
<td>Private not for profit less than 2-year</td>
<td></td>
<td>0.1</td>
<td>0.10</td>
<td>0.1</td>
<td>0.08</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p*.05
Table 4

Undergraduate institution Carnegie classification for first-generation graduate and non-graduate students by %

<table>
<thead>
<tr>
<th>Carnegie Classification</th>
<th>First-Generation Status</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graduate %</td>
<td>S.E.</td>
<td>Non-Graduate %</td>
<td>S.E.</td>
<td>t</td>
</tr>
<tr>
<td>Doctoral</td>
<td>42.3</td>
<td>2.50</td>
<td>40.3</td>
<td>1.84</td>
<td>0.93</td>
</tr>
<tr>
<td>Master’s</td>
<td>41.3</td>
<td>2.78</td>
<td>41.3</td>
<td>2.00</td>
<td>0</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>11.4</td>
<td>1.66</td>
<td>12.7</td>
<td>1.37</td>
<td>0.60</td>
</tr>
<tr>
<td>Associates</td>
<td>1.8</td>
<td>1.03</td>
<td>0.6</td>
<td>0.47</td>
<td>1.06</td>
</tr>
<tr>
<td>Specialized</td>
<td>2.3</td>
<td>0.65</td>
<td>5.1</td>
<td>1.08</td>
<td>2.22*</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p<.05
Table 5

Undergraduate major for first-generation graduate and non-graduate students by %

<table>
<thead>
<tr>
<th>Major</th>
<th>Graduate</th>
<th>S.E.</th>
<th>Non-Graduate</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business and management</td>
<td>16.0</td>
<td>1.61</td>
<td>29.4</td>
<td>1.43</td>
<td>6.22*</td>
</tr>
<tr>
<td>Biological sciences</td>
<td>6.8</td>
<td>0.97</td>
<td>2.7</td>
<td>0.41</td>
<td>3.89*</td>
</tr>
<tr>
<td>Education</td>
<td>18.7</td>
<td>1.79</td>
<td>12.0</td>
<td>0.57</td>
<td>3.57*</td>
</tr>
<tr>
<td>Psychology</td>
<td>6.2</td>
<td>1.07</td>
<td>2.7</td>
<td>0.38</td>
<td>2.84*</td>
</tr>
<tr>
<td>Engineering</td>
<td>4.2</td>
<td>0.67</td>
<td>6.4</td>
<td>0.79</td>
<td>2.12*</td>
</tr>
<tr>
<td>Mathematics &amp; science</td>
<td>6.2</td>
<td>0.82</td>
<td>4.6</td>
<td>0.40</td>
<td>1.75</td>
</tr>
<tr>
<td>Public affairs/social services</td>
<td>3.7</td>
<td>0.64</td>
<td>4.7</td>
<td>0.54</td>
<td>1.19</td>
</tr>
<tr>
<td>Humanities</td>
<td>8.3</td>
<td>1.2</td>
<td>6.9</td>
<td>0.61</td>
<td>1.04</td>
</tr>
<tr>
<td>Other</td>
<td>12.3</td>
<td>0.8</td>
<td>13.1</td>
<td>0.71</td>
<td>0.75</td>
</tr>
<tr>
<td>Social science</td>
<td>8.2</td>
<td>0.99</td>
<td>7.5</td>
<td>0.64</td>
<td>0.59</td>
</tr>
<tr>
<td>Health professions</td>
<td>7.8</td>
<td>1.01</td>
<td>8.4</td>
<td>0.74</td>
<td>0.48</td>
</tr>
<tr>
<td>History</td>
<td>1.7</td>
<td>0.46</td>
<td>1.7</td>
<td>0.37</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
First-generation graduate students majored in education, biological sciences, and psychology at statistically higher rates (18.7%, 6.8%, and 6.2%, respectively) than first-generation non-graduate students (12%, 2.7%, and 2.7%, respectively) ($t=3.57$, $p<.05$; $t=3.89$, $p<.05$; and $t=2.84$, $p<.05$, respectively).

**Socioeconomic Status**

For the category of socioeconomic status there were four variables analyzed; (a) age upon receiving first baccalaureate, (b) marital status upon receiving first baccalaureate, (c) number of dependents in 1993, and (d) 2003 salary. The following sections describe results for each significant variable.

**Age.** The results for the distribution of the age variable can be seen in Table 6. Three estimates were considered to be statistically significant. An expected outcome is the statistically significant percentage (45.4%) of first-generation students who received their first baccalaureate at a younger age where more likely to continue on to graduate school as compared to non-graduate students (34.9%) ($t=4.14$, $p<.05$). Additionally, first-generation students attended graduate school at statistically significant lower rates as their age at first baccalaureate increased. For those individuals aged 23-24 first-generation students were significantly less likely to attend graduate school ($t=2.55$, $p<.05$). First-generation students who were ages 25-26 were approximately 33% less likely to attend graduate school ($t=2.51$, $p<.05$). The trend continues into the 27-28 age range as first-generation students are also significantly less likely to attend graduate school ($t=3.01$, $p<.05$). However, an unexpected result is the similar percentages of
Table 6

*Age upon receiving first BA for first-generation graduate and non-graduate students by %*

<table>
<thead>
<tr>
<th>Age</th>
<th>First-Generation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graduate</td>
</tr>
<tr>
<td>20 and younger</td>
<td>0.8</td>
</tr>
<tr>
<td>21-22</td>
<td>45.4</td>
</tr>
<tr>
<td>23-24</td>
<td>21.2</td>
</tr>
<tr>
<td>25-26</td>
<td>5.3</td>
</tr>
<tr>
<td>27-28</td>
<td>3.1</td>
</tr>
<tr>
<td>29 and older</td>
<td>24.3</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
first-generation graduate and non-graduate students who were over the age of 29 when they received their first baccalaureate.

*Marital status.* The results for the distribution of the marital status variable can be seen in Table 7. There were two statistically significant comparisons as first-generation non-graduate students are more likely to be married upon completion of their first baccalaureate ($t=3.44$, $p<.05$). Similarly, first-generation graduate students were more likely to have never been married upon receipt of their first baccalaureate degree ($t=3.00$, $p<.05$).

*Number of dependents.* The results for the distribution of the number of dependents variable can be seen in Table 8. The variable was coded to create five categories ranging from one (including the respondent) to five or more dependents (including the respondent, spouse, and anyone who received more than half their support from the respondent). Not surprisingly the percentage of first-generation graduate students was statistically significant as compared to non-graduate students who responded only one dependent ($t=2.46$, $p<.05$). First-generation non-graduate students were statistically more likely to have two dependents as compared to graduate students ($t=2.54$, $p<.05$). The graduate school enrollment rates for three and more dependents are not significantly different for either group.
Table 7

Marital status upon receiving first BA for first-generation graduate and non-graduate students by %

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>First-Generation Status</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graduate</td>
<td>S.E.</td>
<td>Non-Graduate</td>
<td>S.E.</td>
<td>t</td>
</tr>
<tr>
<td>Married</td>
<td>26.8</td>
<td>1.80</td>
<td>34.5</td>
<td>1.33</td>
<td>3.44*</td>
</tr>
<tr>
<td>Never married</td>
<td>66.4</td>
<td>1.96</td>
<td>59.4</td>
<td>1.26</td>
<td>3.00*</td>
</tr>
<tr>
<td>Separated</td>
<td>0.7</td>
<td>0.32</td>
<td>0.5</td>
<td>0.12</td>
<td>0.59</td>
</tr>
<tr>
<td>Cohabitating</td>
<td>1.4</td>
<td>0.49</td>
<td>1.1</td>
<td>0.18</td>
<td>0.57</td>
</tr>
<tr>
<td>Divorced</td>
<td>4.3</td>
<td>0.83</td>
<td>4.1</td>
<td>0.48</td>
<td>0.21</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.5</td>
<td>0.28</td>
<td>0.5</td>
<td>0.17</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Table 8

*Number of dependents in 1993 for first-generation graduate and non-graduate students by %*

<table>
<thead>
<tr>
<th># of Dependents</th>
<th>Graduate</th>
<th>S.E.</th>
<th>Non-Graduate</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>63.2</td>
<td>1.9</td>
<td>57.4</td>
<td>1.39</td>
<td>2.46*</td>
</tr>
<tr>
<td>2</td>
<td>19.2</td>
<td>1.36</td>
<td>23.9</td>
<td>1.25</td>
<td>2.54*</td>
</tr>
<tr>
<td>3</td>
<td>7.7</td>
<td>0.76</td>
<td>8.4</td>
<td>0.73</td>
<td>0.66</td>
</tr>
<tr>
<td>4</td>
<td>6.4</td>
<td>1.3</td>
<td>7.2</td>
<td>0.64</td>
<td>0.55</td>
</tr>
<tr>
<td>5 or more</td>
<td>3.5</td>
<td>0.79</td>
<td>3.2</td>
<td>0.53</td>
<td>0.32</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
2003 Salary

The results for the distribution of the 2003 salary for first-generation graduate and non-graduate students can be seen in Table 9. The variable was coded to create six categories ranging from less than $20,000 to greater than $100,000. The only statistically significant comparison was for those first-generation non-graduate as compared to first-generation graduate students who make less than $20,000 ($t=3.51, p<.05$). Based on the data the distribution of salaries for both graduate and non-graduate first-generation students is not statistically significant.

First-Generation and Continuing-Generation Graduate Students

The second research question sought to determine if variables within the categories of educational background, socioeconomic status, and undergraduate educational debt resulted in significant differences between first-generation and continuing generation students who attend graduate school. To accomplish this, the National Center for Education Statistics (NCES) Data Analysis System (DAS) was utilized to generate estimates and their related standard errors for each variable within the aforementioned categories from the Baccalaureate and Beyond 1993/2003 dataset (B&B:93/03). The estimates were then analyzed with a $t$-test. The results for this analysis are divided up based on their respective category.
Table 9

2003 salary for first-generation graduate and non-graduate students by %

<table>
<thead>
<tr>
<th>Salary</th>
<th>First-Generation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graduate</td>
</tr>
<tr>
<td>&lt;$20,000</td>
<td>15.1</td>
</tr>
<tr>
<td>$20,000-$39,999</td>
<td>16.0</td>
</tr>
<tr>
<td>$40,000-$59,999</td>
<td>28.5</td>
</tr>
<tr>
<td>$60,000-$79,999</td>
<td>22.5</td>
</tr>
<tr>
<td>$80,000-$99,999</td>
<td>10.8</td>
</tr>
<tr>
<td>&gt;$100,000</td>
<td>7.0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Educational Background

For the category of educational background there were five variable analyzed: (a) institution type, (b) undergraduate major, (c) undergraduate institution type based on Carnegie classification, (d) graduate major, and (e) graduate institution type based on Carnegie classification. The following sections describe results for each variable, only statistically significant comparisons will be discussed.

Undergraduate institution type. The results of the breakdown of first undergraduate institution type attended for first-generation and continuing-generation graduate students can be seen in Table 10. The first undergraduate institution attended was divided into eight categories. Institution categories with no responses were deleted from the table.

Within these categories the percentage of first-generation and continuing-generation graduate were distributed fairly equally across all but two categories. The percentage of first-generation graduate students compared to continuing-generation graduate students based on their initial attendance at a public two-year institution was statistically significant ($t=4.43$, $p<.05$). In fact, first-generation students who attended graduate school were nearly twice as likely to have attended a public two-year institution as compared to continuing-generation graduate students.

The second significant comparison was the higher proportion of first-generation students attending private four-year institutions as compared to first-generation graduate students ($t=4.71$, $p<.05$). Continuing-generation students attended a private four-year institution at over a 50% higher rate than did first-generation graduate students.
Table 10

*Undergraduate institution type for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Institution type</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private not for profit 4-year</td>
<td>24.4</td>
<td>1.49</td>
<td>38.3</td>
<td>2.55</td>
<td>4.71*</td>
</tr>
<tr>
<td>Public 2-year</td>
<td>17.7</td>
<td>1.54</td>
<td>9.4</td>
<td>1.07</td>
<td>4.43*</td>
</tr>
<tr>
<td>Public 4-Year</td>
<td>56.4</td>
<td>2.01</td>
<td>51.5</td>
<td>2.67</td>
<td>1.47</td>
</tr>
<tr>
<td>Private for profit 2-year</td>
<td>0.4</td>
<td>0.0</td>
<td>0.3</td>
<td>0.0</td>
<td>1.33</td>
</tr>
<tr>
<td>Private for profit less than 2-year</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
<td>0.4</td>
<td>0.93</td>
</tr>
<tr>
<td>Private for profit 4-year</td>
<td>0.4</td>
<td>0.31</td>
<td>0.1</td>
<td>0.15</td>
<td>0.87</td>
</tr>
<tr>
<td>Private not for profit 2-year</td>
<td>0.5</td>
<td>0.17</td>
<td>0.7</td>
<td>0.33</td>
<td>0.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
**Undergraduate major.** The results for the distribution of undergraduate major for first-generation and continuing-generation graduate students can be seen in Table 11. The undergraduate major variable was divided into 12 main categories. There were only four statistically significant comparisons.

First-generation graduate students majored in psychology at a statistically significant higher rate (6.2%) than continuing-generation graduate students (3.2%) \((t=2.59, p<.05)\). Additionally, first-generation students majored in education at a statistically significant higher rate (18.7%) than continuing-generation graduate students (14.2%) \((t=2.15, p<.05)\). The other two significant comparisons were related to higher rates of continuing-generation graduate students in majors.

Continuing-generation graduate students majored in engineering and social sciences at statistically higher rates (8.3% and 14.5%, respectively) than first-generation graduate students (4.2% and 8.2%, respectively) \((t=3.63, p<.05\) and \(t=4.19, p<.05\), respectively).

**Undergraduate institution Carnegie classification.** The results for the proportions of undergraduate institution 1994 Carnegie classification for first-generation and continuing-generation graduate students can be seen in Table 12. The institutions were combined into five categories to ensure enough responses in each category. Continuing-generation students were statistically more likely to attend a Carnegie classified doctoral institution for their undergraduate education \((t=4.21, p<.05)\). First-generation graduate students were statistically more likely to attend a Carnegie classified master’s institution for their undergraduate education \((t=4.53, p<.05)\).
Table 11

*Undergraduate major for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Major</th>
<th>First-Generation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-Gen</td>
</tr>
<tr>
<td>Social science</td>
<td>8.2</td>
</tr>
<tr>
<td>Engineering</td>
<td>4.2</td>
</tr>
<tr>
<td>Psychology</td>
<td>6.2</td>
</tr>
<tr>
<td>Education</td>
<td>18.7</td>
</tr>
<tr>
<td>Public affairs/social services</td>
<td>3.7</td>
</tr>
<tr>
<td>Business and management</td>
<td>16.0</td>
</tr>
<tr>
<td>Health professions</td>
<td>7.8</td>
</tr>
<tr>
<td>Mathematics &amp; science</td>
<td>6.2</td>
</tr>
<tr>
<td>Humanities</td>
<td>8.3</td>
</tr>
<tr>
<td>Other</td>
<td>12.3</td>
</tr>
<tr>
<td>History</td>
<td>1.7</td>
</tr>
<tr>
<td>Biological sciences</td>
<td>6.8</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Table 12

*Undergraduate institution Carnegie classification for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Carnegie Classification</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>( t )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral</td>
<td>42.3</td>
<td>2.5</td>
<td>58.2</td>
<td>2.54</td>
<td>4.21*</td>
</tr>
<tr>
<td>Master’s</td>
<td>41.3</td>
<td>2.78</td>
<td>25.2</td>
<td>2.22</td>
<td>4.53*</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>11.4</td>
<td>1.66</td>
<td>14.9</td>
<td>2.10</td>
<td>1.31</td>
</tr>
<tr>
<td>Associates</td>
<td>1.8</td>
<td>1.03</td>
<td>0.6</td>
<td>0.57</td>
<td>1.02</td>
</tr>
<tr>
<td>Specialized</td>
<td>2.3</td>
<td>0.65</td>
<td>1.2</td>
<td>0.39</td>
<td>1.45</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *\( p < .05 \)
Graduate major. The results for the proportions of graduate majors for first-generation and continuing-generation graduate students can be seen in Table 13. When comparing the graduate major of first-generation and continuing-generation graduate students’ two categories were found to have statistical significance. Continuing-generation graduate students major in the areas of engineering, computer, science, and math at significantly higher rates than first-generation students ($t=2.65$, $p<.05$). Additionally, continuing-generation graduate students major in the life and physical sciences at statistically significant higher rates (14.5%) than first-generation graduate students (10.8%) ($t=2.27$, $p<.05$).

Graduate institution Carnegie classification. The results for the proportions for Carnegie classifications of graduate institutions for first-generation and continuing-generation graduate students can be seen in Table 14. The institutions were combined into five categories to ensure enough responses in each category. Continuing-generation students were statistically more likely to attend a Carnegie classified research institution for their graduate education ($t=5.41$, $p<.05$). First-generation graduate students were statistically more likely to attend a Carnegie classified comprehensive institution for their graduate education ($t=6.40$, $p<.05$).
Table 13

Graduate major for first-generation and continuing-generation graduate students by %

<table>
<thead>
<tr>
<th>Major</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering/computer/science/math</td>
<td>8.2</td>
<td>0.95</td>
<td>11.8</td>
<td>0.97</td>
<td>2.65*</td>
</tr>
<tr>
<td>Life/physical sciences</td>
<td>10.8</td>
<td>1.15</td>
<td>14.5</td>
<td>1.16</td>
<td>2.27*</td>
</tr>
<tr>
<td>Business/management</td>
<td>19.2</td>
<td>1.80</td>
<td>14.8</td>
<td>1.48</td>
<td>1.89</td>
</tr>
<tr>
<td>Education</td>
<td>19.5</td>
<td>1.92</td>
<td>15.5</td>
<td>1.12</td>
<td>1.80</td>
</tr>
<tr>
<td>Health</td>
<td>7.6</td>
<td>0.91</td>
<td>5.5</td>
<td>0.81</td>
<td>1.72</td>
</tr>
<tr>
<td>Social/behavioral sciences</td>
<td>16.3</td>
<td>1.33</td>
<td>18.8</td>
<td>1.32</td>
<td>1.33</td>
</tr>
<tr>
<td>Law</td>
<td>0.4</td>
<td>0.22</td>
<td>0.7</td>
<td>0.17</td>
<td>1.08</td>
</tr>
<tr>
<td>Humanities</td>
<td>10.5</td>
<td>1.04</td>
<td>11.7</td>
<td>1.34</td>
<td>0.71</td>
</tr>
<tr>
<td>Other</td>
<td>7.5</td>
<td>0.90</td>
<td>6.7</td>
<td>0.78</td>
<td>0.67</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Table 14

*Graduate institution Carnegie classification for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Carnegie Classification</th>
<th>First-Generation Status</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-Gen</td>
<td>S.E.</td>
<td>C-Gen</td>
<td>S.E.</td>
</tr>
<tr>
<td>Research</td>
<td>28.3</td>
<td>2.69</td>
<td>48.5</td>
<td>2.59</td>
</tr>
<tr>
<td>Doctoral</td>
<td>19.9</td>
<td>2.19</td>
<td>18.5</td>
<td>1.71</td>
</tr>
<tr>
<td>Comprehensive</td>
<td>44.3</td>
<td>2.92</td>
<td>22.1</td>
<td>1.87</td>
</tr>
<tr>
<td>Liberal arts</td>
<td>1.8</td>
<td>0.50</td>
<td>3.6</td>
<td>0.80</td>
</tr>
<tr>
<td>Specialized</td>
<td>5.7</td>
<td>1.70</td>
<td>7.3</td>
<td>1.85</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Socioeconomic Status

For the category of socioeconomic status there were four variables analyzed: (a) age upon receiving first baccalaureate, (b) marital status upon receiving first baccalaureate, (c) number of dependents in 1993, and (d) 2003 salary. The following sections describe results for each variable.

Age. The results for the proportions of the age variable can be seen in Table 15. Five comparisons were considered to be statistically significant. At both the 20-21 and 22-23 age levels continuing-generation graduate students were more likely to attend graduate school than first-generation students \( t=4.65, p<.05 \) and \( t=4.67, p<.05 \), respectively). First-generation graduate students were significantly more likely to be in the age levels of 24-25, 28-29, and 30 and older \( t=2.56, p<.05; t=2.44, p<.05; \) and \( t=5.40, p<.05 \), respectively). An interesting note is neither group attends graduate school at very high rates from the age of 26 through the age of 29.

Marital status. The results for the proportions of the marital status variable can be seen in Table 16. There were three statistically significant comparisons within the variable. First-generation graduate students are more likely to be married or divorced upon completion of their first baccalaureate \( t=4.94, p<.05 \) and \( t=3.77, p<.05 \), respectively). Continuing-generation graduate students were more likely to have never been married upon receipt of their first baccalaureate degree \( t=6.09, p<.05 \).
Table 15

*Age at receipt of first BA for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Age</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-21</td>
<td>15.7</td>
<td>1.51</td>
<td>25.8</td>
<td>1.56</td>
<td>4.65*</td>
</tr>
<tr>
<td>22-23</td>
<td>44.3</td>
<td>1.72</td>
<td>56.2</td>
<td>1.88</td>
<td>4.67*</td>
</tr>
<tr>
<td>24-25</td>
<td>11.1</td>
<td>1.48</td>
<td>6.7</td>
<td>0.87</td>
<td>2.56*</td>
</tr>
<tr>
<td>26-27</td>
<td>3.1</td>
<td>0.54</td>
<td>2.2</td>
<td>0.36</td>
<td>1.39</td>
</tr>
<tr>
<td>28-29</td>
<td>3.7</td>
<td>0.72</td>
<td>1.4</td>
<td>0.61</td>
<td>2.44*</td>
</tr>
<tr>
<td>30 and older</td>
<td>22.1</td>
<td>1.99</td>
<td>7.7</td>
<td>1.73</td>
<td>5.40*</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05*
Table 16

*Marital status upon receiving first BA for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never married</td>
<td>66.4</td>
<td>1.96</td>
<td>82.9</td>
<td>1.87</td>
<td>6.09*</td>
</tr>
<tr>
<td>Married</td>
<td>26.8</td>
<td>1.80</td>
<td>14.5</td>
<td>1.72</td>
<td>4.94*</td>
</tr>
<tr>
<td>Divorced</td>
<td>4.3</td>
<td>0.83</td>
<td>1.0</td>
<td>0.28</td>
<td>3.77*</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.5</td>
<td>0.28</td>
<td>0.0</td>
<td>0.02</td>
<td>1.78</td>
</tr>
<tr>
<td>Separated</td>
<td>0.7</td>
<td>0.32</td>
<td>0.3</td>
<td>0.28</td>
<td>0.94</td>
</tr>
<tr>
<td>Cohabitating</td>
<td>1.4</td>
<td>0.49</td>
<td>1.3</td>
<td>0.42</td>
<td>0.15</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Number of dependents. The proportion results for the number of dependents variable can be seen in Table 17. The variable was coded to create five categories ranging from one (including the respondent) to five or more dependents (including the respondent, spouse, and children). Continuing-generation students were statistically more likely to have no other dependent besides themselves upon receipt of the baccalaureate degree ($t=5.47, p<.05$). First-generation students were more likely to have three, four, or five or more dependents ($t=4.46, p<.05$; $t=3.15, p<.05$; and $t=2.43, p<.05$, respectively).

2003 salary. The results for the proportions of the 2003 salary of first-generation and continuing-generation graduate students can be seen in Table 18. The variable was coded to create six categories ranging from less than $20,000 to greater than $100,000. There were two statistically significant comparisons. First-generation graduates were statistically more likely to have a salary in 2003 between $60,000 and $79,999 as compared to continuing-generation graduate students ($t=2.55, p<.05$). Continuing-generation graduate students were statistically more likely to have a salary greater than $100,000 as compared to first-generation graduate students ($t=3.31, p<.05$).

Total Undergraduate Debt

The results for the proportions of total undergraduate debt can be seen in Table 19. The variable was divided into seven ranges from less than $5,000 to $19,000 and
Table 17

Number of dependents in 1993 for first-generation and continuing-generation graduate students by %

<table>
<thead>
<tr>
<th># of dependents</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>63.2</td>
<td>1.90</td>
<td>78.8</td>
<td>2.13</td>
<td>5.47*</td>
</tr>
<tr>
<td>2</td>
<td>19.2</td>
<td>1.36</td>
<td>15.0</td>
<td>1.31</td>
<td>2.22*</td>
</tr>
<tr>
<td>3</td>
<td>7.7</td>
<td>0.76</td>
<td>3.0</td>
<td>0.73</td>
<td>4.46*</td>
</tr>
<tr>
<td>4</td>
<td>6.4</td>
<td>1.30</td>
<td>1.9</td>
<td>0.59</td>
<td>3.15*</td>
</tr>
<tr>
<td>5 or more</td>
<td>3.5</td>
<td>0.79</td>
<td>1.3</td>
<td>0.44</td>
<td>2.43*</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Table 18

2003 salary for first-generation and continuing-generation graduate students by %

<table>
<thead>
<tr>
<th>Salary</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$20,000</td>
<td>15.1</td>
<td>1.52</td>
<td>19.3</td>
<td>1.70</td>
<td>1.84</td>
</tr>
<tr>
<td>$20,000-$39,999</td>
<td>16</td>
<td>1.36</td>
<td>16.5</td>
<td>1.44</td>
<td>0.25</td>
</tr>
<tr>
<td>$40,000-$59,999</td>
<td>28.5</td>
<td>2.11</td>
<td>25.4</td>
<td>1.57</td>
<td>1.18</td>
</tr>
<tr>
<td>$60,000-$79,999</td>
<td>22.5</td>
<td>2.38</td>
<td>15.3</td>
<td>1.52</td>
<td>2.55*</td>
</tr>
<tr>
<td>$80,000-$99,999</td>
<td>10.8</td>
<td>1.48</td>
<td>10.8</td>
<td>1.01</td>
<td>0</td>
</tr>
<tr>
<td>&gt;$100,000</td>
<td>7.0</td>
<td>1.16</td>
<td>12.9</td>
<td>1.35</td>
<td>3.31*</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
higher. There were four comparisons resulting in statistically significant differences. Continuing-generation graduate students were more likely to have less than $5,000 total undergraduate debt as compared to first-generation graduate students \((t=6.40, p<.05)\). First-generation graduate students were statistically more likely to have undergraduate debt in the ranges of $5,000 to $7,999, $8,000 to $10,999, and $11,000 to $13,999 \((t=3.27, p<.05; t=4.10, p<.05; \text{ and } t=3.30, p<.05, \text{ respectively})\) as compared to continuing-generation graduate students. Interestingly, undergraduate debt amounts greater than $14,000 does not create any statistical significant difference between the groups.
Table 19

*Total undergraduate debt for first-generation and continuing-generation graduate students by %*

<table>
<thead>
<tr>
<th>Undergraduate debt</th>
<th>F-Gen</th>
<th>S.E.</th>
<th>C-Gen</th>
<th>S.E.</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$5,000</td>
<td>58.7</td>
<td>1.92</td>
<td>73.4</td>
<td>1.26</td>
<td>6.40*</td>
</tr>
<tr>
<td>$5,000-$7,999</td>
<td>9.9</td>
<td>1.11</td>
<td>5.8</td>
<td>0.58</td>
<td>3.27*</td>
</tr>
<tr>
<td>$8,000-$10,999</td>
<td>12.1</td>
<td>1.06</td>
<td>6.7</td>
<td>0.78</td>
<td>4.10*</td>
</tr>
<tr>
<td>$11,000-$13,999</td>
<td>6.8</td>
<td>.79</td>
<td>3.7</td>
<td>0.51</td>
<td>3.30*</td>
</tr>
<tr>
<td>$14,000-$16,999</td>
<td>4.3</td>
<td>.94</td>
<td>4.1</td>
<td>0.63</td>
<td>0.18</td>
</tr>
<tr>
<td>$17,000-$18,999</td>
<td>1.9</td>
<td>0.46</td>
<td>1.2</td>
<td>0.36</td>
<td>1.20</td>
</tr>
<tr>
<td>$19,000 and higher</td>
<td>6.3</td>
<td>0.80</td>
<td>5.0</td>
<td>0.65</td>
<td>1.26</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). *p < .05
Logistic Regression Analysis

In order to answer research questions three and four a logistic regression model was tested. Logistic regression has become beneficial in recent years to institutional researchers when the outcomes of a model are dichotomous (DesJardins, 2001).

In logistic regression the dependent variable is the logarithm of the odds of the occurrence of a particular outcome (DesJardins, 2001). Written mathematically:

\[
\log \frac{P_i}{1-P_i} = a + BX_i
\]  

(1)

Therefore, \(P_i\) is the probability of the event happening and \(1-P_i\) is the probability of the event not happening. Additionally, \(X_i\) is the set of independent variables, and \(a\) and \(B\) are the intercept and the coefficients of each of the independent variables included in the model. The left side of the equation is in log-form, which means the outcome is the log-odds of an event occurring (DesJardins, 2001).

The odds-ratios are more intuitive when interpreting one-unit changes in the independent variables. Statistical software packages, such as SAS and SUDAAN, produce the odd-ratios and beta coefficients for independent variables in the model.

In the current research there were several negative beta coefficients. If this occurs the odds-ratios for negatively related coefficients can be put on the same metric as the positive estimated coefficients (DesJardins, 2001). This is done to “make the results of these models more understandable and therefore more useful” (DesJardins, p. 5).
Research Question Three

Research question three was to determine if the variables undergraduate GPA, total undergraduate debt, first undergraduate institution type, undergraduate institution type based on Carnegie classifications, undergraduate major, marital status, and total number of dependents distinguished first-generation graduate students from first-generation non-graduate students. The results of the logistic regression for research question three can be seen in Table 20. There were approximately 3,800 cases of first-generation students retained in the model. As an indication of the strength of the relationship between the outcome variable and the independent variable the Cox and Snell Pseudo R² for research question three was R²=0.048. The goodness of fit is represented by the change in -2 log likelihood \((212.44, 17)\). Within the model only the independent variables found to be statistically significant will be discussed.

**GPA.** The coefficient estimate for the variable GPA is 0.00. This coefficient estimate indicates a change in GPA for first-generation students does not increase the likelihood of attending graduate school.

**Public two-year.** The coefficient estimate for public two-year first institution type is -0.33. This coefficient estimate indicates if first-generation students’ first institution attended type is a public two year, there is a decrease in the likelihood they will attend graduate school. The odds-ratio with the variable is 0.72. With the beta coefficient being negative the inverse odds-ratio was calculated. Students who attend public four-year institutions first are 1.39 times more likely to attend graduate school than students whose first institution type is a public two-year.
**Business and management.** The coefficient estimate for the undergraduate major business and management is -1.23. This coefficient estimate indicates if a first-generation student majors in business and management, as opposed to a major in education, there is a decrease in the likelihood for enrollment in graduate school. The odds-ratio with the variable is 0.29. With the beta coefficient being negative the inverse odds ratio was calculated. Students who majored in education have odds of enrolling in graduate school that are about 3.44 times greater than students who majored in business and management.

**Health sciences.** The coefficient estimate for the undergraduate major in health sciences is -0.63. This coefficient estimate indicates if a first-generation student majored in health sciences, as opposed to a major in education, it reduced the likelihood for enrollment in graduate school. The odds-ratio with the variable is 0.53. With the beta coefficient being negative the inverse odds ratio was calculated. Students who majored in education have odds of enrolling in graduate school that are about 1.89 times greater than students who majored in health sciences.
*Humanities or history.* The coefficient estimate for the combined undergraduate majors’ humanities or history is -0.44. This coefficient estimate indicates if first-generation students majored in humanities or history there is a decrease in the likelihood for enrollment in graduate school. The odds-ratio with the variable is 0.65. With the beta coefficient being negative the inverse odds ratio was calculated. Students who majored in education have odds of enrolling in graduate school that are about 1.54 times greater than students who majored in humanities or history.

*Other.* The coefficient estimate for the all other undergraduate majors is -0.70. This coefficient estimate indicates if first-generation students major in other majors besides the ones listed in Table 20, there is a decrease in the likelihood for enrollment in graduate school. The odds ratio with the variable is 0.50. With the beta coefficient being negative the inverse odds ratio was calculated. Students who majored in education have odds of enrolling in graduate school that are about 2.00 times greater than students who majored in any other area besides the ones listed in Table 20.

*Married.* The coefficient estimate for the variable married is -0.24. This coefficient estimate indicates if first-generation students are married there is a decrease in the likelihood for their enrollment in graduate school. The odds ratio with the variable is 0.79. With the beta coefficient being negative the inverse odds ratio was calculated. Students who were not married have odds of enrolling in graduate school 1.27 times greater than students who are married.
<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Beta coefficient</th>
<th>S.E.</th>
<th>t-test</th>
<th>p-value</th>
<th>OR</th>
<th>IOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.16</td>
<td>0.21</td>
<td>-0.77</td>
<td>0.0000***</td>
<td>0.85</td>
<td>1.18</td>
</tr>
<tr>
<td>GPA</td>
<td>0.00</td>
<td>0.00</td>
<td>2.64</td>
<td>0.0113**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Total undergrad debt</td>
<td>0.00</td>
<td>0.00</td>
<td>0.22</td>
<td>0.8232</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Private not-for-profit four-year</td>
<td>0.11</td>
<td>0.14</td>
<td>0.81</td>
<td>0.4233</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>Public two-year</td>
<td>-0.33</td>
<td>0.10</td>
<td>-3.18</td>
<td>0.0027**</td>
<td>0.72</td>
<td>1.39</td>
</tr>
<tr>
<td>All other institutions</td>
<td>-0.49</td>
<td>0.44</td>
<td>-1.11</td>
<td>0.2750</td>
<td>0.61</td>
<td>1.64</td>
</tr>
<tr>
<td>Undergrad doctoral institution</td>
<td>0.15</td>
<td>0.13</td>
<td>1.12</td>
<td>0.2668</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>Undergrad comprehensive institution</td>
<td>-0.02</td>
<td>0.12</td>
<td>-0.17</td>
<td>0.8681</td>
<td>0.98</td>
<td>1.02</td>
</tr>
<tr>
<td>Undergrad baccalaureate</td>
<td>-0.16</td>
<td>0.15</td>
<td>-1.07</td>
<td>0.2913</td>
<td>0.85</td>
<td>1.18</td>
</tr>
<tr>
<td>Undergrad specialized</td>
<td>-0.39</td>
<td>0.27</td>
<td>-1.47</td>
<td>0.1494</td>
<td>0.67</td>
<td>1.49</td>
</tr>
<tr>
<td>Business and management</td>
<td>-1.23</td>
<td>0.17</td>
<td>-7.21</td>
<td>0.0000***</td>
<td>0.29</td>
<td>3.44</td>
</tr>
<tr>
<td>Engineering/biological sciences/</td>
<td>-0.27</td>
<td>0.16</td>
<td>-1.72</td>
<td>0.0920</td>
<td>0.76</td>
<td>1.32</td>
</tr>
<tr>
<td>mathematics and science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>-0.63</td>
<td>0.20</td>
<td>-3.17</td>
<td>0.0028**</td>
<td>0.53</td>
<td>1.89</td>
</tr>
<tr>
<td>Public affairs/ social services/</td>
<td>-0.30</td>
<td>0.16</td>
<td>-1.83</td>
<td>0.0744</td>
<td>0.74</td>
<td>1.35</td>
</tr>
<tr>
<td>social science/ psychology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities/ history</td>
<td>-0.44</td>
<td>0.21</td>
<td>-2.06</td>
<td>0.0455*</td>
<td>0.65</td>
<td>1.54</td>
</tr>
<tr>
<td>Other</td>
<td>-0.70</td>
<td>0.15</td>
<td>-4.74</td>
<td>0.0000***</td>
<td>0.50</td>
<td>2.00</td>
</tr>
</tbody>
</table>
Table 20 Continued

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-value</th>
<th>p-value</th>
<th>OR</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>-0.24</td>
<td>0.10</td>
<td>-2.52</td>
<td>0.0154*</td>
<td>0.79</td>
<td>1.27</td>
</tr>
<tr>
<td>Total dependents</td>
<td>0.01</td>
<td>0.03</td>
<td>0.20</td>
<td>0.8398</td>
<td>1.01</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). ***p < 0.001  **p < 0.01  *p < .05
Research Question Four

Research question four was to determine if the variables undergraduate GPA, total undergraduate debt, undergraduate institution type based on Carnegie classifications, undergraduate major, graduate institution type based on Carnegie classification, graduate major, marital status, and total number of dependents distinguished first-generation graduate students who attain a graduate degree from first-generation graduate students who did not attain a graduate degree. The results of the logistic regression for research question three can be seen in Table 21. There were approximately 1,500 cases of first-generation students retained in the model. As an indication of the strength of the relationship between the outcome variable and the independent variable the Cox and Snell Pseudo $R^2$ for research question three was $R^2=0.038$. The goodness of fit is represented by the change in $-2 \log$ likelihood (64.84, 27). Within the model only one independent variable was found to be statistically significant.

Graduate comprehensive institutions. The coefficient estimate for the variable graduate comprehensive institution is 0.51. This coefficient estimate indicates if first-generation students attend a graduate comprehensive institution there is an increase in the likelihood for attainment of a graduate degree. The odds ratio with the variable is 1.67. This means first-generation graduate students who attend a comprehensive graduate institution are 1.67 times more likely to attain a graduate degree than first-generation students who attend either Research I or Research II graduate institution types.
Table 21

*Logistic regression results for first-generation graduate student attainment*

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Beta coefficient</th>
<th>S.E.</th>
<th>t-test β=0</th>
<th>p-value</th>
<th>OR</th>
<th>IOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.10</td>
<td>0.31</td>
<td>0.33</td>
<td>0.0000***</td>
<td>1.11</td>
<td></td>
</tr>
<tr>
<td>GPA</td>
<td>0.00</td>
<td>0.00</td>
<td>0.16</td>
<td>0.8748</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Total undergrad debt</td>
<td>-0.00</td>
<td>0.00</td>
<td>0.07</td>
<td>0.8961</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Graduate doctoral institutions</td>
<td>0.05</td>
<td>0.21</td>
<td>0.22</td>
<td>0.8279</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>Graduate comprehensive institutions</td>
<td>0.51</td>
<td>0.13</td>
<td>3.89</td>
<td>0.0003***</td>
<td>1.67</td>
<td></td>
</tr>
<tr>
<td>Graduate liberal and specialized institutions</td>
<td>-0.23</td>
<td>0.19</td>
<td>-1.19</td>
<td>0.2423</td>
<td>0.79</td>
<td>1.27</td>
</tr>
<tr>
<td>Humanities</td>
<td>-0.21</td>
<td>0.74</td>
<td>-0.28</td>
<td>0.7779</td>
<td>0.81</td>
<td>1.23</td>
</tr>
<tr>
<td>Sociology/ behavioral sciences</td>
<td>0.18</td>
<td>0.76</td>
<td>0.23</td>
<td>0.8180</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences</td>
<td>0.02</td>
<td>0.79</td>
<td>0.02</td>
<td>0.9811</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Engineering/ computer science/ mathematics</td>
<td>-0.39</td>
<td>0.76</td>
<td>-0.51</td>
<td>0.6132</td>
<td>0.68</td>
<td>1.47</td>
</tr>
<tr>
<td>Business management/ law</td>
<td>0.80</td>
<td>0.64</td>
<td>1.25</td>
<td>0.2178</td>
<td>2.22</td>
<td></td>
</tr>
<tr>
<td>Graduate health sciences</td>
<td>0.12</td>
<td>2.01</td>
<td>0.06</td>
<td>0.9511</td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>Graduate other</td>
<td>0.12</td>
<td>0.70</td>
<td>0.17</td>
<td>0.8683</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>Private not-for-profit public four-year</td>
<td>0.29</td>
<td>0.22</td>
<td>1.27</td>
<td>0.2098</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>Public two-year</td>
<td>0.12</td>
<td>0.17</td>
<td>0.70</td>
<td>0.4858</td>
<td>1.13</td>
<td></td>
</tr>
</tbody>
</table>
Table 21 Continued

<table>
<thead>
<tr>
<th>Category</th>
<th>0.28</th>
<th>0.64</th>
<th>0.45</th>
<th>0.6851</th>
<th>1.33</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other institutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergrad doctoral institution</td>
<td>-0.08</td>
<td>0.27</td>
<td>-0.29</td>
<td>0.7715</td>
<td>0.92</td>
</tr>
<tr>
<td>Undergrad comprehensive institution</td>
<td>-0.26</td>
<td>0.21</td>
<td>-1.25</td>
<td>0.2172</td>
<td>0.77</td>
</tr>
<tr>
<td>Undergrad baccalaureate</td>
<td>-0.20</td>
<td>0.27</td>
<td>-0.73</td>
<td>0.4688</td>
<td>0.82</td>
</tr>
<tr>
<td>Undergrad specialized</td>
<td>-0.29</td>
<td>0.48</td>
<td>-0.61</td>
<td>0.5464</td>
<td>0.75</td>
</tr>
<tr>
<td>Business and management</td>
<td>-0.25</td>
<td>0.73</td>
<td>-0.34</td>
<td>0.7348</td>
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*Note.* From U.S. Department of Education, National Center for Education Statistics, 1993-2003 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). ***p < 0.001
CHAPTER FIVE

Discussion

The present research was designed to study first-generation students and the factors that may influence their enrollment in graduate school. In order to accomplish the research three groups were created for comparison (a) first-generation non-graduate students, (b) first-generation graduate students, and (c) continuing-generation graduate students. Three main categories of variables were created for the study (a) educational background, (b) socioeconomic status, and (c) educational debt. Both $t$-tests and logistic regression were utilized to answer the four research questions that guided this study.

The primary findings of the study are as follows:

1. Being a first-generation student, when combined with the variables in the model, does have a significant but weak correlation on matriculation into graduate school.

2. Being a first-generation student, when combined with the variables in the model, does have a significant but weak correlation on attaining a graduate degree.

3. According to B&B:93/03, approximately half of all the respondents who attended graduate school were first-generation. This is higher than previous research that reports approximately 40% for graduate education.

4. There are similar barriers for first-generation students that may influence both their entrance into undergraduate and graduate education.
5. The factors influencing undergraduate completion for first-generation students do not appear to be related to graduate education completion for these students. Therefore there may be other intrinsic or extrinsic factors influencing first-generation student graduate completion or non-completion.

6. The first undergraduate institution type attended may influence the matriculation into graduate education.

7. The graduate institution type attended may have an influence on the completion and attainment rate for first-generation students.

8. The undergraduate major selected by first-generation students may have influence on enrollment in graduate education for these students.

This chapter will summarize and discuss the results presented in Chapter Four for each research question in order. Additionally, this chapter will also discuss how the results relate to the current literature, any implications they have on policy, and conclude with recommendations for future research.

Research Question One

Research question one centered on the differences between first-generation graduate and non-graduate students. To accomplish this $t$-tests were conducted to determine significant differences between first-generation graduate and non-graduate students in three variable categories (a) educational background, (b) socioeconomic status, and (c) total undergraduate debt. A total of eight variables were examined in research question one.
When considering first institution type attended for first-generation students only one institution type was statistically significant. First-generation students whose first undergraduate institution is a public two-year institution are approximately 22% less likely to enroll in graduate education. This is a similar result found by other researchers concerning first-generation students (Barahona, 1990; Hurley, 2002; Mullen et al., 2003; Tinto, 2004; Warburton et al., 2001). However, it is important to understand that many students who begin their postsecondary education at a two-year institution may not plan on pursuing a higher degree beyond the associates; therefore this number needs to be interpreted cautiously.

The undergraduate major for first-generation students appears in some instances to possibly have influence on graduate school attendance. Majoring in business or management as undergraduates results in a lower percentage of first-generation students attending graduate school. This supports the findings of Nevill et al. (2007) on all students who major in business are less likely to enroll in graduate school. Interestingly, if a first-generation student majors in engineering it also decreases their likelihood of attending graduate school. This may be related to some research that suggest first-generation students will major in technical and vocational fields, and therefore some of these students may be focusing in areas of engineering, which do not require education beyond the baccalaureate (Chen, 2005).

Conversely, based on the results from research question one, if first-generation students major in biology, education, or psychology they are statistically more likely to enroll in graduate education as compared to other majors. The results concerning biology
majors are also similar to the findings on all students by Nevill et al. (2007), who found students who majored in biology as undergraduates were more likely to enroll in graduate school than any other major.

These outcomes can be viewed in terms of the ultimate objective for students in their respective majors. Overall, students who major in business may be less likely to require an advanced degree for employment purposes. However, all students in biology, most science, technology, engineering, and mathematics (STEM) areas, and psychology may find it necessary to continue their education to find employment and much of the work in these areas requires graduate work. The one anomaly here would be the decrease in attending graduate school for first-generation students whose undergraduate major is engineering. Similarly for education, most states now require educators to continue their education to at least the master’s level; therefore, graduate education becomes a necessity for these individuals. This thought is supported by the NCES report *The Condition of Education 2006*, which found students who major in education typically earned masters degrees. Additionally, first-generation students may be more likely to major in education as opposed to other degrees, such as engineering, medicine, law, and others, which would require graduate or first-professional level study.

The age at which individuals receive their baccalaureate may also influence the matriculation into graduate school. An expected outcome was, the younger the first-generation student was the greater the likelihood of enrolling in graduate education. The percentage of students enrolling in graduate education steadily dropped from 21.2% to 3.1% for individuals ages 23 to 28. These results are similar to the findings of Nevill et
al. (2007) on all students, who found overall, the younger a student the more likely they were to enroll in graduate education. Interestingly, the percentage of first-generation graduate and non-graduate students aged 29 and older was very similar (24.3% and 24.6%, respectively). This suggests perhaps other factors need to be examined for older students to determine why there is such an increase in graduate school attendance at a later age.

Marital status and number of dependents upon receipt of the baccalaureate can be examined together as marital status of a student may also influence the number of dependents. Marital status was divided between married and never married. While there were significant differences between graduate and non-graduate first-generation students there were overall higher percentages of students in both groups that were not married when they received their baccalaureate. The findings of this study, for those who were married being less likely to attend graduate education, are similar for all students in the B&B:93/03 study (Nevill et al., 2007).

The results for number of dependents are similar to the results for marital status, as those students who stated there were two dependents in their household in 1993 were less likely to attend graduate school. Interestingly, as the number of dependents increased for each group the percentage of graduate and non-graduate students remained relatively constant. This result is different from the findings of other research, that being a parent has a negative influence on enrolling in graduate school (Nevill et al., 2007). Therefore, there may be factors within the first-generation demographic, which reduce the overall influence of having multiple dependents.
Graduate education is seen as a pathway to higher earnings over the lifetime of the individuals who are able to attain this educational level (Bowen & Bok, 1998; Mullen et al., 2003; Zhang, 2005). The results of this current study are interesting as the only difference between graduate and non-graduate first-generation students came at the salary range of less than $20,000. All other salary ranges showed no statistical difference, even when examining the highest salary range. This finding is important as students who attend less selective or public institutions earn less than those students who attend large graduate degree granting institutions and private institutions (Monks, 1999). Relating this to first-generation students’ institution types, both graduate and undergraduate, it would appear, despite the increase in their education level a disparity may exist among the economic returns these students receive.

Research Question Two

Research question two centered on the differences between first-generation and continuing-generation graduate students. To accomplish this a t-test was conducted to determine significant differences between first-generation and continuing generation graduate students in three variable categories (a) educational background, (b) socioeconomic status, and (c) total undergraduate debt. A total of ten variables were examined in research question two.

When considering first institution type attended for first-generation and continuing-generation graduate students two institution types were statistically significant. First-generation graduate students were nearly twice as likely to have attended a public two-year institution as compared to their continuing-generation peers.
Alternatively, continuing-generation graduate students had a 36% greater chance of attending a private four-year institution as compared to their first-generation peers. These results support research, which found first-generation students’ first institution type are typically two-year institutions, but continuing-generation students are more likely to attend a private four year institution (Barahona, 1990; Hurley, 2002; Mullen et al., 2003; Tinto, 2004; Warburton et al., 2001). Interestingly, all other comparisons between the groups across institution types did not yield any significant results. This is interesting as it might be expected first-generation students would attend public four-year institutions at significantly higher rates than continuing-generation students, or there would be some significant differences between the groups when looking at attendance at private for profit institutions.

When examining the undergraduate major for first-generation and continuing-generation graduate students there are distinct differences. First-generation graduate students were 24% more likely to major in education as compared to continuing-generation graduate students. This seems to support the results found in research question one that found first-generation students who went to graduate school majored in education more often then first-generation students who did not enroll in graduate school. The choice of education as a major plays a role in graduate school attendance for first-generation students as it is increasingly necessary for educators to obtain graduate education. Additionally, first-generation graduate students majored in psychology as undergraduates at almost twice the rate of continuing-generation graduate students (6.2% and 3.2%, respectively). This researcher was unable to find any literature that would help
explain this difference between the groups. One possible explanation is first-generation students major in psychology in an attempt to obtain a degree they perceive as valuable in helping them understand their upbringing and with the possibility of assisting others with which they associated.

Continuing-generation students, as research has indicated, majored in engineering as undergraduates at double the rate of first-generation students (Chen, 2005). Additionally, continuing-generation graduate students major in social science as undergraduates 43% more than first-generation graduate students who major in social science. Both of these results follow research, which found continuing-generation students typically major in science, mathematics, engineering and architecture, humanities, arts, or social sciences (Chen, 2005).

The 1994 Carnegie classification for the undergraduate institution type where students received their baccalaureate yielded results similar to other research. First-generation graduate students were 39% more likely to attend a Master’s (Comprehensive) institution for their undergraduate education. Conversely, continuing-generation graduate students were 27% more likely to attend a Doctoral granting institution for their undergraduate education. These results seem to agree with previously published research that found first-generation students are more likely to attend a comprehensive institution (Warburton et al., 2001).

The graduate major students select may be related to parental education level and by undergraduate majors. In this analysis continuing-generation students were more likely to have graduate majors in the science, technology, engineering, and medicine
(STEM) areas as compared to first-generation students. This result is an extension of the differences in the primary undergraduate majors of continuing-generation and first-generation graduate students. As stated previously, first-generation students are more likely to choose a major in vocational or technical fields as compared to their continuing-generation peers who typically choose a major in science, mathematics, engineering and architecture, humanities, arts, or social sciences (Chen, 2005). Additionally, these results are important as individuals who earn advanced degrees, especially in the areas those continuing-generation students major have a greater opportunity to earn more over their lifetime (College Board, 2006).

When examining the Carnegie classification for the graduate institution attended there are distinct differences between first-generation and continuing-generation graduate students. Continuing-generation students are more over 40% more likely to attend a research institution. This finding, when combined with the results from the undergraduate institution type and graduate major, illuminate that those students whose parents have at least a baccalaureate degree are more likely to attend a doctoral institution for their undergraduate education, are more likely to major in STEM areas, and are more likely to enroll in the Research I and II institutions as compared to first-generation students.

Conversely, first-generation students are more likely to attend a comprehensive institution. In fact the rate at which first-generation students attend a comprehensive institution is almost equal to the rate at which continuing-generation students attend research institutions (44.3% and 48.5%, respectively). One outcome of this is first-generation students are more likely to attempt a master’s degree as opposed to a doctoral
or first-professional degree, which is similar to the findings of Muellen et al. (2005). A second outcome is that when viewed in combination with the types of undergraduate institutions most first-generation students attend; it may be that first-generation students are choosing to stay in an environment in which they may have become comfortable. This may be related to the same type of social barriers many of these students face with the transition from high school to college, when first-generation students are required to trade the identity with which they were raised, and acquire another (Hurley, 2002). An extension of this is these students may be concerned about trying to make this transition once again, and are fearful of not being able to find another identity at a different institution and culture.

First-generation graduate students are typically older than continuing-generation students when they receive their baccalaureate degree. Eighty-two percent of continuing-generation graduate students received their baccalaureate degree by age 23. This is compared to the 60% of first-generation graduate students who received their baccalaureate degree by age 23. Additionally, approximately one-quarter of all first-generation graduate students did not receive their baccalaureate degree until age 28 or older. This difference in age is consistent with research that found, typically, first-generation undergraduate students are older students, low income, married, and have dependents (McConnell, 2000). A possible explanation for this may be first-generation students may be married and may have to consider working for several years prior to deciding to continue their education.
In conjunction with age, the marital status and number of dependents at receipt of the baccalaureate distinguish first-generation and continuing-generation graduate students from each other. First-generation graduate students were more likely to be married or divorced when they received their baccalaureate; while continuing-generation graduate students were more likely to have never been married upon receipt of their baccalaureate degree. This finding can be linked to the findings of McConnell (2000) on undergraduate first-generation students. Following the same pattern first-generation students were more likely to have responded there were two or more dependents in their household when they received their baccalaureate than continuing-generation graduate students.

An examination of the 2003 salary for first-generation and continuing-generation individuals who attended graduate school reveals that for both groups the distribution with the salary ranges is fairly equal. Approximately half of first-generation students have a salary between $40,000 and $80,000, with approximately 31% below and 18% above that amount. For continuing-generation students, approximately 41% fell in the salary range of $40,000 to $80,000. However, approximately one-quarter of continuing-generation students earned greater than $80,000. This would be expected as more continuing-generation students attended research institutions and are more likely to enroll in first-professional or doctoral programs, which are associated with higher incomes (Mullen et al., 2005). Interestingly, a higher but not significant percentage of continuing generation students earned less than $20,000 as compared to first-generation students. This result may be linked to continuing-generation graduate students who are currently enrolled in graduate education at the doctoral or post-doctoral level.
The influence of undergraduate debt on enrollment in graduate education is still fully unknown. Some research states there is an influence based on the amount of undergraduate debt, while other research states undergraduate debt has no influence on enrollment in graduate school (Fox, 1992; Millet, 2003; Murphy, 1994; Strayhorn, 2005; Weiler, 1994).

The current research study finds a majority of both first-generation (58%) and continuing-generation graduate (73%) students had less than $5,000 in undergraduate debt. Additionally, first-generation students are more likely to have undergraduate debt in the range between $5,000 and $14,000. However, above $14,000 in undergraduate debt there are no significant differences between the groups.

Research Question Three

The third research question examined the factors, which distinguished a first-generation graduate school attending student from a first-generation non-graduate school attending student. Logistic regression was utilized to analyze this research question. The discussion will be based upon the three variable categories of (a) educational background, (b) socioeconomic status, and (c) total undergraduate debt. The overall model for research question three was significant; however, this significance was weak.

First-generation graduate attending students were distinguished by the variables GPA, public two-year, business and management, health, humanities and history, and other in the educational background category. All of these variables may have a negative influence on first-generation enrollment in graduate education, except GPA, which was significant, but had no apparent correlation to graduate enrollment.
Attending a public two-year institution again had a negative influence on enrolling in graduate school. This result supports the findings of this current research and other researchers (Hurley, 2003, Millett, 2003, & Mullen et al., 2003). However, as mentioned previously many students who attend a two-year institution may ultimately have no plans to continue their education. Therefore, these results need to be examined cautiously.

The results of the logistic regression are similar to the findings of research question one, which found first-generation students who majored in business were less likely to enroll graduate education. The lower probability of a first-generation undergraduate student enrolling graduate school if they major in health or other areas may be a result of the decreased requirement for graduate education in these particular fields. However, the negative relationship of majoring in history and humanities is perplexing and this researcher has not been able to find resources that can properly explain this result.

In addition to the majors mentioned previously, it appears majoring in a STEM area as an undergraduate has a negative influence on first-generation enrollment in graduate education. This influence is not significant at the alpha level set for this research study but it is below \( p < .10 \). This is an interesting phenomenon when taken in context of other findings in this study that show continuing-generation students who major in STEM areas typically continue their education at the graduate level. Once again this lends evidence that first-generation students who major in STEM areas focus on those areas,
which are more technical and vocational and do not necessarily require graduate education.

When examining socioeconomic status only the variable marital status distinguished first-generation graduate from first-generation non-graduate students. In fact if a first-generation student was married it decreased their likelihood of attending graduate school by 33%.

Total undergraduate debt did not appear to be related to whether first-generation students enrolled in graduate school. This is similar to research that found undergraduate debt does not influence whether students enroll in graduate school (Fox, 1992; Murphy, 1994). Therefore, when considering this variable it appears first-generation students are similar to the population. However, it must be noted this current study did not look at what influence undergraduate debt has on graduate persistence as Strayhorn (2005) did.

_Research Question Four_

The fourth research question examined the factors, which distinguished a first-generation graduate student who completed graduate school from a first-generation graduate student who did not complete graduate education. Logistic regression was utilized to analyze this research question. The discussion will be based upon the three variable categories of (a) educational background, (b) socioeconomic status, and (c) total undergraduate debt. The overall model for research question three was significant; however, this significance was weak.

The only variable within all three categories that was significant was if a first-generation student attended a comprehensive institution for their graduate work. First-
generation students who attended a comprehensive institution increased their likelihood of graduating by 64%. This result may be attributed to several factors. First, if first-generation students major in education at the undergraduate level they will most likely find it necessary to return to higher education to obtain their master’s degree, especially if they teach in public schools. Secondly, those first-generation students who are not in education may choose the comprehensive institution as an environment in which they may have become comfortable, especially if they are attending the same institution in which they received their baccalaureate. Another speculation may be that while master’s work is not easy, it requires less time to completion and does not always require an extensive individualized research project like doctoral work (i.e., dissertation); therefore, first-generation students may choose to stop at the master’s level. It may also be important to examine the affordability and accessibility of the doctoral and research institutions as this may be influencing first-generation student graduate school choice.

**Policy Implications**

There are multiple areas to examine when considering the policy implications of this current research. Not only do the results have implications for institutional, college, and programmatic policy, they also have implications for state and federal government policy.

At the state level, one implication, which can be made, based on this current study is that state legislatures need to have a better understanding graduate school and the barriers associated with matriculation, especially as it pertains to first-generation students. An example of how important it is to have an understanding of first-generation
and continuing-generation students is the recently passed legislation in Ohio. The new Ohio CORE program will require students wishing to attend an Ohio public university to have completed a set of required courses in high school. If students do not complete these courses they will be required to attend a two-year institution to gain the requisite coursework to gain entrance into the public universities. This should raise some concern as it has been shown that students who begin their education at a two-year institution are less likely to attempt a graduate degree (Hurley, 2003; Mullen et al., 2004).

Another implication, which is not necessarily a direct result of this current research, is the funding of graduate education at the federal level. Currently, graduate students cannot receive federal grant aid as part of their financial aid package (Redd, 2006). Despite the many financial aid programs that have been put in place to assist undergraduate students, these programs have not been duplicated at the graduate level. This means graduate students can receive assistantships and scholarships, or they can resort to student loans to help pay for their education (Redd).

While this current study did not examine the role of graduate financial aid in the decision to enroll in graduate school this may have an influence for first-generation students. Other researchers have discussed the need for financial aid to be addressed at the graduate level (Bowen & Rudenstine, 1992; Baird, 1996). One possible means to address the financial aid need would be that the federal government focus on creating programs similar to PELL or extending the reach of these programs, to cover the graduate level of education for need based students.
At the institutional, college and programmatic level implications from this research are varied. There are academic, social, and economic barriers, first-generation students face as they decide whether or not to enroll in graduate education, in addition to other factors once they begin graduate education. To help mitigate these factors first-generation students need to have accurate and appropriate information at both the undergraduate and graduate level to assist them in making a more informed decision about enrolling in and completing graduate education.

Once students are enrolled in graduate education approximately half of them will not complete (Golde, 2000; Kerlin, 1995; Tinto, 1993). This current research found that for first-generation students the variables studied are not influencing this decision to leave. Therefore, the reason for departure must be something outside of these variables. Lovitts (2001) suggested this departure is due to lack of social integration. With this in mind it is important programs be put in place to help students with this aspect of graduate education and it should not be left to only the academic departments (Guentzel & Neshiem, 2006). However, Boyle and Boice (1998) suggest academic departments can assist with the social integration through a multi-step process. Boyle and Boice posit academic departments conduct an orientation separate from the institution wide orientation held for graduate students. In addition to this they suggest to find ways to increase the interactions graduate students have with each other, and to find ways for students to interact with faculty in both professional and social contexts (Boyle & Boice). Building upon the interactions with faculty is to increase the mentoring and advising
ability of faculty to better inform and assist graduate students throughout the process (Boyle & Boice; Lipschutz, 1998).

The role of student affairs in graduate student retention and completion of degree is also important. After examining the research available on student engagement Pontius and Harper (2006) devised several ideas for good practice as it relates to graduate student engagement. Pontius and Harper state “a student affairs division is most effective when it addresses these efforts” (p. 52). The seven practices they describe are as follows: (a) eradicate marginalization among underrepresented groups, (b) provide a meaningful institutional orientation, (c) communicate with graduate and professional students, (d) opportunities for community building and multicultural interaction between academic units, (e) create engagement plans for students by working with schools and departments, (f) increased career and professional development, and (g) continually assess satisfaction, needs, and outcomes. If institutions, specifically the student affairs division, would implement some if not all of these strategies they may see increases in graduate student retention and completion rates.

One possible solution to the problem of retention and completion is the concept of cohorts. This researcher is a first-generation student and participated in a cohort during the doctoral process. While the cohort may not have been the sole reason for continuation in this researcher’s case, it certainly helped with the social integration aspect of doctoral education. Additionally, as mentioned above, there were ample opportunities for interaction with both other students and with faculty both professionally and socially. The mentoring and advising through the cohort allowed for a better understanding of the
expectations of graduate work. Many of these positive attributes, as well as some areas of concern, regarding cohorts were also shared by individuals who participated in a teacher education cohort study (Radencich, et al., 1998).

While first-generation students enroll in graduate education at fairly high rates they are more likely to enroll in comprehensive institutions as opposed to doctoral and research institutions. Attendance at the latter institutions may be associated with careers resulting in higher pay and higher social standing, and these careers may be in the STEM or first-professional areas. If first-generation students are to increase their numbers in these more prestigious institutions it might be necessary to provide opportunities for them to interact with faculty from these types of institutions at an early stage in their graduate career. Part of this could be the creation of mentoring programs for first-generation students, as the current research has shown; first-generation students appear to be more comfortable in an institution with which they are familiar.

Future Research

Based on this current research there are several potential areas for future research. The current research study utilized quantitative research methods to analyze factors, which may influence first-generation student enrollment in and completion of graduate education. However, based on the findings of research question four, there are obviously other factors influencing completion of graduate education for first-generation students. As Tinto suggested, one possible way of getting to this information would be through qualitative methodology. An example of a study could be to discuss with first-generation students who completed and did not complete graduate school what factors may have
influenced their progress. Additionally, this researcher believes examination into what, if any, influence self-efficacy may have on the graduate school completion for first-generation students would be a valuable area of study.

A possible alternative analysis to the question of first-generation students’ who complete versus not complete would be the social alienation first-generation students feel as they progress through higher levels of education. These students have moved or been removed from a culture they were born and raised in and now are considered part of another culture by their family and friends. Simultaneously, first-generation students may not feel like they truly belong to the academic culture in which they currently reside. They are then forced to choose to continue their education and potentially completely remove themselves from their culture of origin, or stop their education, face the consequences of failure and try to assimilate back into a culture that may have disowned them when they began their education beyond high school. The answer may be more ambiguous than either example given here; nonetheless finding the answer is an important step in helping first-generation students attain graduate education.

One additional area for future research would be to conduct a qualitative study of first-generation students who are attending graduate school, those who have dropped out or chose to quit, and those who have succeeded. The results of this study could be used to provide “word of mouth” assistance to any future first-generation students who may choose to attend graduate school. Additionally, it would allow them to understand personal barriers, which may inhibit their success rates, which were not part of the current study. Finally, colleges, departments, and faculty to gain a better understanding of
the factors that either influence departure or completion of graduate education for first-generation students could utilize results from this type of study.

An additional research area would be to examine the effects of gender and ethnicity on first-generation student enrollment in and completion of graduate school. This research might illuminate specific issues above and beyond those of merely being first-generation on the influence graduate enrollment. Based on previous research there appears to be no difference between gender when individuals are married; however when individuals are single and female they are more likely to enroll in graduate school when compared to males (Nevill et al., 2007). Adding the first-generation variable to the previous research might yield valuable results to increase enrollment for both male and female first-generation students.

The definition of first-generation student used in this research is very broad in the sense that it classifies students first-generation even if parents have an associate degree or some college, and even if another family member has some level of higher education. Therefore, further possible research should be conducted to determine possible relationships between the multiple levels of parental education and how these levels may influence graduate school enrollment and completion for first-generation students. An example of this research would be to categorize first-generation students based on whether their parents have less than a high school education, are high school graduates, have some college, or have an associates degree. Then determine what similarities or differences each of the parental education levels have on the students’ matriculation and
completion of graduate education. This would allow for a clearer picture of the barriers, or lack of barriers, faced by all of these “first-generation” students.

An extension of the previous study would be to examine what influence students whose grandparents or siblings have achieved higher education on their enrollment and matriculation. Individuals whose grandparents have earned a degree, but whose parents did not, could be considered “skip-generation students.” It may be reasonable to expect there to be some educational influence passed on to grandchildren from grandparents. In the same line of thought it would may also be reasonable to believe siblings who have attended higher education may also have some influence on younger siblings decision processes concerning higher education.

Yet another area of research that may be an extension of the current study is to compare first-generation students with continuing-generation students while controlling for socioeconomic factors. By doing this a more accurate picture of what is influencing both groups of students may be achieved. An additional factor that may influence graduate school attendance in conjunction with socioeconomic factors would be geographic location. First-generation students may be more likely to not venture far from what they know and therefore, perhaps have limited choices for graduate education.
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