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The Effect of Socioeconomic Status on Year-to-Year Persistence of First-Generation and Continuing Generation Students at Two-Year and Four-Year Institutions: Developing a Conceptual Model

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ABSTRACT

Estimating the persistence of first-time students from the first year to the second year of college is a growing social and financial concern for postsecondary education. Studying how socioeconomic status affects year-to-year persistence may help to identify and assist those students who had socioeconomic profiles most likely to indicate challenges to year-to-year persistence.

This study used data from the Beginning Postsecondary Students Longitudinal Study (BPS:96/98). BPS is a nationally representative survey designed to provide additional information about the patterns of educational attainment and persistence for a subset of the more than 51,000 students included in the NPSAS:96 survey. This study used all students enrolled as first-time beginning students at two-year and four-year institutions.

The purpose of this study was to develop and test a theoretical framework to describe the year-to-year persistence of beginning postsecondary education students at both two-year and four-year institutions. The preliminary model included 39 literature-based variables coded and grouped into seven factors: background, high school, college-entry, financial, social integration, academic integration, and college performance. The data were tested using descriptive statistics and logistic regression to determine the correct predictive percentage of the models for first-generation and continuing-generation students, only first-generation students, and only continuing-generation students at both two-year and four-year institutions.

The tested models can be used as a method to identify students who may struggle with persistence decisions. Identification of students in need may help postsecondary

educators to provide services and interventions that will facilitate the year-to-year persistence of these students. This model could be easily adapted to a specific institution, and the validity of the model assessed longitudinally with year-to-year persistence of the students.

Social capital variables, particularly student integration to the collegiate environment, are strongly associated with persistence of first-generation students at both types of institutions. Contact between the student and faculty member outside of the classroom environment is critical to the persistence of students. The student must match with the social and academic environment of the campus.

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CHAPTER 1

Introduction to the Study

Introduction

At the start of each academic year, a new group of men and women enroll in postsecondary education. These students enroll in either a two-year or four-year institutions, and bring their own unique characteristics, backgrounds, and aspirations to their institutions. According to the Beginning Postsecondary Student Longitudinal Study, Second Follow-up (BPS:90/96), 47% of beginning first-year students can be considered first-generation college students; a student from a family background where no parent attended a postsecondary institution or earned a bachelor's degree. These students, when compared with their peers whose background included a parent who had some college or who earned a bachelor's degree, are less likely to "persist," or remain enrolled through their first year and to enroll in postsecondary education for a second year (Warburton, Bugarin, & Nuñez, 2001).

Estimating the persistence of first-time students from the first year to the second year of college is a growing social and financial concern for postsecondary education. Funding levels are tied to persistence for some state institutions, placing greater emphasis upon the economic aspects of year-to-year persistence. The revenue from the students' tuition, fees, auxiliary services, and other sources are critical for all institutions. The importance of stable financial resources for higher education is very important during times when states have cut more than $5.5 billion from higher education budgets (U.S. Congress, 2002). In 2002, two-year and four-year higher education institutions in 38 states implemented mid-year budget cuts (U.S. Congress, 2002). Retaining new students to

attainment of a degree is important for state-aided funding and for the student's financial contribution toward educational costs.

First-generation students tend to be from lower socioeconomic backgrounds (Nuñez & Cuccaro-Alamin, 1998). Studying how socioeconomic status affects year-to-year persistence may help to identify and assist those students who had socioeconomic profiles most likely to indicate challenges to year-to-year persistence.

There is an obvious need for further research to compare persistence of first-generation students between two-year and four-year institutions, in order to develop specific, targeted measures to improve persistence. Additional research may yield a model that can explain year-to-year persistence at both two-year and four-year institutions. The proposed model could be used to provide supportive programs, services, and initiatives designed to increase persistence. The model may also serve as a proxy for race, an important factor in the current era of concern regarding race-based admissions and student support services.

This study, the model, and resulting analysis may be used in the future as a basis to form the framework for establishing admission and support service program criteria for first-generation students that includes race as one, but not the only variable. This is an important outcome for persistence studies (Somers, Woodhouse, & Cofer, 2000). The model may yield an admission model that meets the challenges and uncertainties of current concerns about race-based admissions processes. While the future of race-based admissions decisions has not been determined with specific certainty through the United States Supreme Court, the United States Education Department's Office of Civil Rights continues to receive complaints from advocacy organizations protesting college

admissions and other programs that use race-based criteria, particularly programs with race-exclusive criteria (Schmidt, 2003). Recent Supreme Court rulings clarify race-based admissions theory, but are still unclear on the specifics of "how" to integrate race and other factors into the admissions process. The results of this study should provide a framework to establish criteria to include race as a variable in a factor for admission.

Background of the Study

Each year, a new class of beginning college students enrolls in postsecondary education at a two-year or four-year institution. Many of these students are considered first-generation college students, a student whose parent never attended college or did not achieve a four-year degree (Horn & Nuñez, 2000). The first year of college is a time of significant change (Pascarella & Terenzini, 1991). Students who successfully choose a compatible postsecondary institution, adjust to the changes and pressures of education, and achieve academic and personal goals are likely to continue to the second year. Students who enroll in postsecondary education for their first time in the fall of a semester and return to postsecondary education the following fall, or who complete the programs at a two-year institution are identified as students who persisted from the first to second year.

The persistence and retention of college students has been studied over the past three decades based primarily on models from Spady (1970) and Tinto (1975). Both of these postsecondary persistence models use the sociological study of suicide by Emile Durkheim (1897/1951). Durkheim found people were more likely to commit suicide if they were not well-integrated into society. Spady built upon this finding, applying the model to college student departure. Tinto extended Spady's model, proposing college

students would be less likely to leave a postsecondary institution if they had high levels of integration into the social and academic environments of the campus. Much of the research since 1975 has focused on Tinto's amalgamation of Durkheim's and Spady's theories (Nora, Attinasi, & Matonak, 1990)

First-generation student status has a negative influence on persistence in postsecondary education and on attainment of a degree (see Table 1). First-generation status is important because, "Both high school graduation and college enrollment for those who graduate from high school are strongly related to parental educational attainment" (Mortenson, 1995, p. 1).

Table 1

Five-Year Persistence & Graduation Rates of First-Generation And Continuing-Generation Students at Four-Year and Two-Year Institutions Included in 1989/90 BPS

	Degree attained or still enrolled	No degree or not enrolled
Four-year public institutions		
First-generation	68.4%	31.7%
Continuing-generation	78.9%	21.1%
Two-year public institutions		
First-generation	55.4%	44.7%
Continuing-generation	65.3%	34.7%

Note: From "First-generation Students: Undergraduates Whose Parents Never Enrolled In Postsecondary Education," by Nuñez, A.M., and Cuccaro-Alamin, S. 1998, Washington, DC: U.S. Department of Education, National Center for Education Statistics.

One of the reasons these students are important for many institutions of higher education is because of the number of first-generation college students enrolling each year. The National Center for Education Statistics (NCES) reported 43% of the new students in all sectors of postsecondary education were first-generation students in the

1989-1990 academic year (Nuñez & Cuccaro-Alamin, 1998). Only six year later, the percentage increased to 47% (Kojaku & Nuñez, 1998). The concerns of first-generation college students are of special significance for public two-year institutions, where nearly 52% of new students were first-generation status (Kojaku & Nuñez, 1998).

Statement of the Problem

First-generation college students persist at lower rates than continuing-generation college students (Nuñez & Cuccaro-Alamin, 1998). As shown in Table 1, first-generation students were 10% less likely to have attained a degree or to still be enrolled at a four-year public institution, when compared to continuing-generation students. Persistence and graduate rates for two-year institutions show similar results (see Table 1).

Year-to-year persistence is an important foundation for the future success of students. A college degree is a strong predictor of annual income. According to the U.S. Census Bureau (2000), college graduates older than 17 years of age earn nearly 92% more average annual income when compared to workers who attained only a high school diploma (see Table 2). A college degree is required for graduate and professional schools. As shown in Table 2, graduates with a Master's degree earn nearly one-and-a-half times more average annual income when compared to high school graduates (U.S. Census Bureau, 2000).

Table 2

1998 Income by Educational Level for All Workers 18 Years and Over

	High school graduate	Some college, no degree	Associate degree	Bachelor's degree	Master's degree
Income	$17,960	$20,268	$26,174	$34,446	$44,492
Percentage variance from high school graduate		+12.85	+45.73	+91.79	+147.73

Note: From "Table 8. Income in 1998 by Educational Attainment for People 18 Years Old and Over," Retrieved March 29, 2003, from http://www.census.gov/population/socdemo/education/p20-528/tab08.txt

The long-term socioeconomic effect of persistence and attainment of a college degree upon a family unit is significant. First-generation students who persist and attain a degree set the foundation for their children to experience a less-difficult transition from secondary education to post-secondary education. First-generation students who attain a degree will, on average, earn nearly 92% more (see Table 2) than if they had not attained a degree; this economic boost can have a positive effect on the graduate and the family.

The combination of increasing numbers of first-generation students attending postsecondary education, the lower persistence and degree attainment rates for first-generation students, the widespread cuts in funding for higher education, and the substantial differences in income based on education forms a strong need for continued study of the factors that effect persistence of first-generation students.

Research questions

This dissertation used data collected through the Beginning Postsecondary Survey 1996/1998 (BPS:96/98) subset of the National Postsecondary Student Aid Study (NPSAS) 1996 to compare the effect of socioeconomic status and other factors on year-

to-year persistence of first-generation and continuing-generation college students at two-year and four-year institutions.

This dissertation focuses on the development of a model for first-generation student persistence at both two-year and four-year institutions, using socioeconomic status and social capital as primary factors. The following four questions guide this dissertation.

1. How does socioeconomic status, including social capital variables, positively or negatively influence the year-to-year persistence of first-generation college students as compared to continuing-generation students?
2. What effects do socioeconomic status have for persistence of students at two-year institutions compared to four-year institutions?
3. How do background, high school, college-entry, financial, social integration, academic integration, and college performance factors affect year-to-year persistence at two-year and four-year institutions for first-generation and continuing-generation students, and are there differences between first-generation and continuing-generation student persistence at two-year and four-year institutions based on the factors?
4. What implications do these findings have for future federal and institutional policy decisions for first-generation and continuing-generation students at two-year and four-year institutions?

Significance of the Study

Discussion of audience to whom the study will be important

Administrators, enrollment management staff, and institutional researchers at both two-year and four-year schools need a broad understanding of the variables that influence the retention of first-generation and continuing-generation college students. Enrollment management staff, including admissions representatives, needs a complete understanding of the barriers to persistence as they recruit new students. A thorough understanding of the social capital variables that influence persistence will help admissions staff to recruit, prepare, and matriculate students who will persist from year to year. State and local legislators need information about the effects of socioeconomic status on college student persistence, particularly as legislators must make difficult financial decisions for both two- and four-year colleges.

Description of Study Relevance

This study adds to the limited literature available on the persistence of first-generation students, based upon socioeconomic status and social capital theory. The dissertation should result in a model useful for evaluating persistence of first-generation college students at both two-year and four-year institutions. The model can be used to modify current financial aid, student support, and admissions policies at two-year and four-year institutions. Many institutions provide support for first-year students through financial aid and discrete programs for minority students; very few, if any, institutions provided integrated support for students based upon a persistence model that includes socioeconomic status.

This study provides a model for decision-makers to use when determining resource-allocation for first-time students at both two-year and four-year institutions. As Somers, Woodhouse, and Cofer (2000) suggest, the information in this study may be used to develop new admission and retention strategies that "*Hopwood*-proof" institutions from legal concerns focused on race-based admission and retention programs.

Limitations and Assumptions

The data collected by the National Center for Education Statistics were assumed to be accurate, correctly recorded, and correctly reproduced by NCES and through the restricted license data used to produce this dissertation. Data for the BPS subsets of NPSAS were also assumed to be valid.

Data may have included sampling errors created by weighting variables using the NCES longitudinal analysis weight table B01LWT2 (Berkner, He, & Cataldi, 2002). It is assumed the weight table accurately estimates and weights data.

Definition of Terms

First-generation student

The term *first-generation* applies to a student enrolled in postsecondary education at a two-year or four-year institution, who is the child of a parent or parents who did not earn an Associate's or Bachelor's degree. The parent or parents may have some postsecondary education, defined as no more than 1 year.

Continuing-generation student

The term *continuing-generation* applies to a student enrolled in postsecondary education at a two-year or four-year institution, who is the child of a parent or parents who earned at least an Associate's or Bachelor's degree.

Social capital

The term *social capital* refers to a series of variables measured in the data set that conform to the concepts of social capital as outlined by Pierre Bourdieu (1983/1986).

Socioeconomic status

The term *socioeconomic status* refers to the family income of the student, the material possessions in the student's home environment, and the occupation of the student's parents.

Within-year persistence

The term *within-year persistence* specifies the continued enrollment in a two-year or four-year postsecondary institution for the fall of the first year of attendance and also in the spring of the first year of attendance.

Year-to-year persistence

The term *year-to-year persistence* specifies the continued enrollment in a two-year or four-year postsecondary institution in the fall of the first year of attendance and also in the fall of the second year of attendance.

Organization of the study

This study is presented in six chapters, with a reference list at the end. The first chapter is an introduction to the study, and contains background information, the research questions for the study, the significance of the study, limitations of the study, and definition of terms used in the study.

The second chapter in the study consists of a literature review. This chapter includes a comprehensive review of relevant literature, background, and previous study. The literature review includes reviews of social capital theory, relevant student

persistence literature, first-generation and continuing-generation student literature, and two-year and four-year institutional persistence information.

Chapter three focuses on the methods used in the dissertation. The purpose of the study, research questions, procedures, limitations of the study, and populations used in the study were included in this section.

Chapter four contains descriptive statistics and logistic regression analysis for two-year institutions. Statistics include persistence data for all students, first-generation students, and continuing-generation students. Additional statistics for social capital factors, demographic factors, and other factors were also included.

Chapter five contains descriptive statistics and logistic regression analysis for four-year institutions. Statistics include persistence data for all students, first-generation students, and continuing-generation students. Additional statistics for factors such as social capital, demographics, and other factors were also included.

The sixth, and final, chapter contains a summary of the results with discussion and recommendations for practice and future study.

CHAPTER 2

Review of Literature

Introduction

This chapter reviews major theory concepts and associated literature that form the foundation for this research. The review includes discussion of literature on college choice, social capital theory, student persistence, first-generation and continuing-generation students, and two-year and four-year institutional persistence.

College Choice

Making the decision to attend college and choosing a college is one of the most significant decisions in a student's life. The financial implications for short-term expenditures for tuition, books, housing, and other expenses can change a student's life and the life of those around the student. The long-term value of a college education can influence a student for decades and can also change future generations of the student's family. To graduate, a student must stay enrolled in a postsecondary education program. Persistence is, in the most basic sense, a student staying in college.

In addition to the end product of persistence, college choice is important for several reasons during the collegiate experience (Jackson, 1978). First, selecting a compatible postsecondary educational institution may help the student to remain in college. Second, the choice of a college may be influenced by many background characteristics (Pascarella, Terenzini, & Wolfe, 1986). According to Tinto (1975), college choice may be explained in part by the background factors, such as family influences, previous educational experiences, and student characteristics. Much of the model is based upon the "fit" between the student and the institution. The college choice

process, including the marketing of the institution, financial aid and cost variables, and academic variables contribute to the initial satisfaction with the institution, according to Tinto.

Literature on college choice may be grouped into three primary theories (St. John, Paulsen, & Starkey, 1996). The first perspective is based on economics. In this view, students and family members approach choice from an investment view. Students analyze costs and benefits, and make a final decision based upon a net benefit model that maximizes potential for a satisfactory academic career and college experience.

The second perspective is rooted in sociology. In this frame, decisions on college choice are made on the basis of social status and decisions about college choice are a means to increase social status (Jackson, 1978). This perspective views family and background characteristics as a foundation to form aspirations and goals for college attendance (Sewell & Shah, 1967; Stage & Hossler, 1989).

The final perspective, developed by Hossler and Gallagher (1987), outlines a three-part model to explain the process of a student selecting a college or university (see Figure 1). This model integrates economic factors, background characteristics, and attainment variables into the model. The model includes variables related to the effect of the recruitment and search processes of a postsecondary institution. The proposed model also contains a process to explain how colleges and universities search for student applicants.

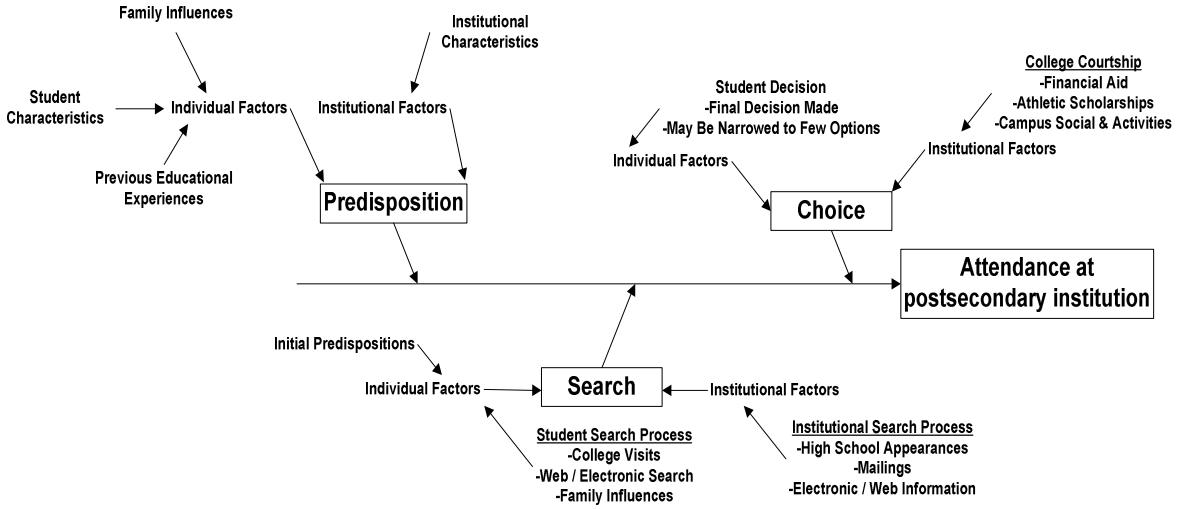
A review of college choice is important for any research focused on persistence of college students. The importance of college choice was summarized by Hossler and Gallagher (1987), writing, “A clearer understanding of student college choice and its

implications for policymakers could result in a more effective use of resources and enhance the goals of both access and choice for traditional-age students" (p. 220).

Choy, 2001

Figure 1

College choice cause & effect



Note: Adapted from: Choy, 2001

Social Capital Theory

Introduction to the Types of Capital

Pierre Bourdieu (1986) proposed a theory to explain the relationships between an individual and the world in which he/she interacts. Capital, as proposed by Bourdieu (1986) refers to a resource for use by individuals. The resource can be monetary or non-monetary, as well as tangible or intangible (Anheier, Gerhards, & Romo, 1995). Bourdieu proposes three types of capital: social capital, economic capital, and cultural capital. This paper studies the effects of social capital on the persistence of students.

Bourdieu's (1986) theory is designed to explain the social world, and is based upon capital, which he defines as follows:

> Capital, which, in its objectified or embodied forms, takes time to accumulate and which, as a potential capacity to produce profits and to reproduce itself in identical or expanded form, contains a tendency to persist in its being, is a force inscribed in the objectivity of things so that everything is not equally possible or impossible." (p. 241)

Cultural capital. Cultural capital is defined by Bourdieu (1956/1986 as "convertible, on certain conditions, into economic capital and may be institutionalized in the form of educational qualifications" (p. 243). According to Bourdieu, cultural capital is segmented into three types; embodied, objectified, and institutionalized. These three states of cultural capital explain the forms of cultural capital. The three types of cultural capital also explain the origin and foundation of cultural capital.

Embodied cultural capital is inherent in the individual. In this form, the individual possesses cultural capital as an integral part of their persona. The individual is part of the cultural capital process.

Objectified cultural capital is a tangible object that is a cultural object or cultural product. In this form of cultural capital, a person or other entity may possess a piece of art or other tangible object. The item is a piece of objectified cultural capital, which "refers to the ability to use and enjoy that which one owns" (Tierney, 1999, p. 83).

Finally, institutionalized capital is a form of capital related to educational capital and the certification or graduation as a result of education (Bourdieu, 1956/1986). In this type of cultural capital, a degree from a prestigious institution of postsecondary education is institutionalized capital. Similarly, graduation from an institution with special acclaim for a specific academic program can bring institutionalized capital to the individual.

Economic capital. Economic capital matches the common understanding of economic theory. Economic capital is a tangible or intangible asset that can be immediately converted into currency (Bourdieu, 1986). Economic capital may be institutionalized in the form of property rights or other rights convertible to currency.

Economic capital may be the most straightforward of the three types of capital proposed by Bourdieu. This type of capital is most closely associated with the common definitions of capital, including currency and other negotiable forms of money, property, or possessions. Economic capital may be accrued through a variety of means, including payment for services, such as work.

Social capital. Social capital theory, "refers to features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit" (Putnam, 1993). Social capital, "is the sum of the actual and potential resources that can be mobilized through membership in social networks of actors and organizations" (Anheier, Gerhards, & Romo, 1995, p. 862). When examining social capital, the primary distinction between those with social capital and those without social capital is status as member or nonmember (Anheier et al., 1995). The definition of social capital was summarized by Woolcock and Narayan (2000) as, "It's not what you know, it's who you know" (p. 226). Social capital can also be summarized as the membership in a group or social structure.

Social capital is based upon human interaction and relationships. Increases or decreases in social capital are directly tied to relationships, management of social structures and interactions between people (Coleman, 1988). Social capital is built upon the normative rules and responsibilities in a society. Social capital is, at the very basic

level, the benefit or asset of having family, friends, and peers who will respond to you, be there in a crisis, or serve as a springboard for meeting others (Woolcock & Narayan, 2000).

Hanifan (1916) defined social capital as:

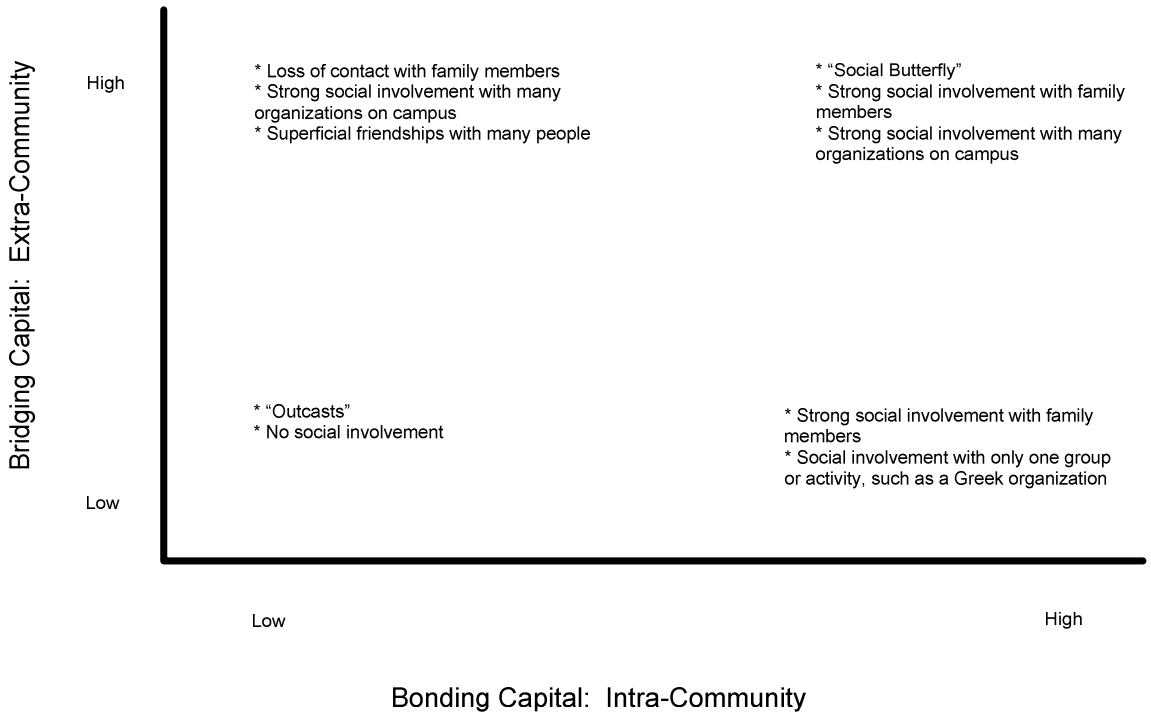
> …those tangible substances [that] count for most in the daily lives of people: namely good will, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit. If [a member of the social unit] is into contact with his neighbor, and they with other neighbors, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community. (p. 130)

Social capital can be categorized into two types, bridging social capital and bonding social capital (Putnam, 2000). Bridging social capital is the aspect of social organizations used to find and disseminate information and to form bridges to other organizations or resources. Bonding social capital is the aspect that forms the foundations of close relationships, including friendships (Figure 2).

Bridging capital in the postsecondary education environment is often exemplified by involvement in student organizations, including Greek-lettered fraternity and sorority groups. Participation in clubs and other organizations, including student leadership and governance, is an indicator of bridging social capital.

Figure 2

Bridging and Bonding Social Capital



Note: Duggan (2000), Putnam (2000)

This study theorizes there are differences between the social capital characteristics of first-generation and continuing-generation students, and differences between social capital characteristics of students at two-year institutions and four-year institutions.

In his study using BPS, Duggan (2002) noted that quantifying social capital, "can be difficult" (p. 44). Duggan used seven variables to quantify social capital, as noted in Table 3. He specifically reviews the use of electronic mail as a marker of social capital, as both bridging and bonding capital. According to Duggan, electronic mail can be used to establish new social groups (bridging social capital) as well as continuing, supporting, and enforcing existing social connections (bonding social capital).

Duggan (2002) also included several BPS variables in a model to determine social capital as a quantifiable concept. In particular, the use of electronic mail (e-mail) as social capital was included in Duggan's research. As noted by Duggan, e-mail has, "both bridging and bonding social capital" (p. 147). Duggan found e-mail to have a positive and statistically significant effect in persistence. The social capital variables studied by Duggan are noted in Table 3.

Table 3

Social Capital Variables (Duggan, 2002)

Factors / Variable	Measurement	Comparison Criteria
Background factors		
First generation	0=2nd gen. 1=1st gen.	Father's graduation, postsecondary education
Distance from home to college	0=1-15 miles 1=16-50 2=51-150 3=150+	compares to 150+
College housing	0=non-resident 1=in campus housing	compares to living on campus
Friends attend same	0=no 1=yes	compares to yes
Has e-mail account	0=no 1=yes	Compares to yes
Satisfied with campus climate	0=no 1=yes	Compares to satisfied
Go places with friends	0=never 1=sometimes 2=often	Compares to often

Source: Stanton-Salazar & Dornbusch (1995)

Persistence

Introduction

There is a substantial body of research, literature, and comment about students remaining in postsecondary education. Much of the persistence research started in the last half of the twentieth century, including persistence research from such well-known authors as Astin (1971, 1975, 1977), Spady (1970, 1971), Tinto (1975, 1986, 1993), Pascarella and Chapman (1983), Pascarella, Terenzini, and Wolfe (1986), Terenzini, Springer, Yeager, Pascarella, and Nora (1996), Tierney (1992, 1999), and others. Prior to the current research, there was little concern about persistence.

History of Higher Education and Persistence Studies

This history of postsecondary education in the United States is critical to a complete understanding of the growth in higher education and the persistence of students in higher education.

Overview of early history. The original postsecondary education institutions in colonial American were private institutions. These small institutions were based upon "the liberally educated Englishmen who came to America… (who) were graduates of either Cambridge or Oxford" (Thwing, 1906, p. 1). The nine colleges educated only men, and were based on English Puritanism and the monastic model of British education (Rudolph, 1990). Involvement from the government was minimal, although most institutions received small subsidies or assistance from the state or colony through land grants, lottery proceeds, or directed taxations.

Institutions quickly realized the need for funding to establish the college and to provide for salaries, buildings, and educational endeavors. The institutions soon fostered

strong ties with their respective states (Rudolph, 1990). In New Jersey, the Governor and members of the board for the College of New Jersey struggled to find a solution to enable shared governance between the college, founded by the Presbyterian Church, and the state (Herbst, 1989). Higher education was still a firmly independent endeavor during this time period, based very closely on the British model of *in loco parentis*.

During the period from 1800 to 1860, there was modest growth in both the number of colleges and in the number of students (Potts, 1989). Colleges began to include science in the curriculum (Thwing, 1906), a step toward the German model of education. The inclusion of science and mathematics moved these small institutions from the classical course of study that emphasized religion, philosophy, and languages (Cohen, 1998; Thwing). The institutions remained mostly independent of federal or state control. The schools also continued to admit only the male members of aristocratic society.

Federal involvement begins. The Civil War started the period of involvement of the federal government in higher education. Most of the institutions in existence in 1860 continued the British model of education, providing the most elite of American men with the understanding of religion and philosophy necessary for aristocracy.

The Civil War also set the stage for passage of the Morrill Land-Grant Act. The Morrill Act is the first major involvement of the federal government in postsecondary education in the United States. The Act granted each state "a quantity equal to thirty thousand acres for each Senator and Representative in Congress" and specified each state use the land for "at least one college where the leading object shall be, without excluding other scientific or classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, … in order to promote the

liberal and practical education of the industrial classes in the several pursuits and professions of life" (Morrill Land Grant Act, 1862). With passage of this legislation, some states created new institutions while others used the money to rescue flailing institutions (Lucas, 1994).

The original Morrill Land Grant Act was amended in 1890. With full implementation of the 1890 Act, the federal government "provided for regular annual appropriations, state support for land-grant colleges…" (Lucas, 1994, p. 149). The second Act required institutions receiving federal money must admit students of any race or establish separate land-grant colleges for black students. Many states established new schools that became the traditional Black colleges and universities. The second Act marks the first involvement of the federal government in setting admissions criteria for institutions receiving federal support. This precedent set the stage for very increasing involvement in accreditation, federal financial support, and federal involvement in admission.

With the establishment of the Department of Education in 1867, the federal government created an official interest in primary, secondary, and postsecondary education. Gruber (1989) notes, "Beginning in 1862 with the passage of the first Morrill Act and continuing with the Hatch Act of 1887 and the second Morrill Act of 1890, the federal government pledged its support to the promotion of education in the useful – agricultural and mechanical – arts for the common man" (p. 211). Although many of the schools created by the Morrill Land Grant Acts were (and still are) referred to as "state schools," these institutions were created through provision of federal dollars. Many are

still funded through federal and state sources, including funding for federal student aid, research grants and scholarships, and direct support of specific programs.

This development is interesting, given the U.S. Constitution does not note federal duty or involvement in any level of education. With the creation of the Department of Education, federal Acts, and funding processes, the federal government started a path of substantial involvement in primary, secondary, and postsecondary education.

Post Civil War through World War I. Twenty-four years after the second Morrill Act, the Smith-Lever Act of 1914 funded cooperative extension services through the United States Department of Agriculture. This Act was designed to fund partnerships with land-grant institutions and various levels of the state governments. Through the cooperative agreements, more "information on subjects relating to agriculture, home economics, and rural energy" (Smith-Lever Act, 1914) would reach American citizens, regardless of their enrollment status. Through federal funding and support of this Act, the value of postsecondary education was demonstrated to Americans living in rural areas.

The Smith-Hughes Act of 1917 provided federal funding to institutions willing to train vocational education teachers. With this Act, colleges and universities expanded programmatic offerings to include agriculture trade-specific training, and technical fields. This federally-funded expansion of curricular offerings firmly moved higher education from the British model of philosophy and theology to include vocational, agricultural, and job training education that was critically important to many Americans.

During this time period, hundreds of buildings, residence halls, and other campus structures were built with the support of the federal government, through the Public

Works Administration. This set the precedent for future federal involvement in building efforts on college campuses. Subsequent building efforts, notably led by the G.I. Bill, populated many college campuses with the academic, research, and residential buildings still in use this day.

During the time from the Civil War to World War I, American universities began to more closely match the German model of postsecondary education. The German system supported faculty members conducting research, primarily in the sciences, through teaching and financial support. The American academic system was still largely based on the British model, where faculty taught and, "American professors who incurred extraordinary expenses in their research customarily met them out of their own pocketbooks…" (Geiger, 1989, p. 276). In a shift toward the German model, institutions became less willing to assume the role of parent (*in loco parentis*), and more institutions examined academic freedom issues, including tenure (Lucas, 1994). The German tradition of *Lehrfreiheit*, the "freedom to teach and research without outside interference" (Lucas, p. 195) was implemented at Stanford University and subsequently at other institutions.

The Influence of Wars. The start of World War I moved the American higher education system closer to the Germanic research model. Research into new technologies for war was critical, as was finding the funds to pay for the research (Peerless, n.d.). In 1918, the Vocational Rehabilitation Act was passed. This Act provided federal grants to colleges and universities for the rehabilitation of World War I veterans through training. The training, primarily vocational, increased the scope of educational offerings at many postsecondary institutions.

The Servicemen's Readjustment Act of 1944 (G.I. Bill) and Public Law 550 (1952), "released literally billions of dollars to help underwrite the cost of a college education for millions of returning war veterans" (Lucas, 1994, p. 232). Higher education institutions struggled with a surge in enrollments and with the demand for more research from the federal government (Williams, 1989). The G.I. Bill funded, in most cases, at least a bachelor's degree for veterans, with the provision that any veteran "…be entitled to education or training at an approved educational or training institution for a period of one year plus the time such person was in the active service" (Servicemen's Readjustment Act, 1944). The G.I. Bill and subsequent legislation also provided low-interest loans that resulted in massive construction projects on campuses.

The G.I. Bill was the first time the federal government directly funded and encouraged attendance of students at a postsecondary institution. The Bill also helped minority students attend higher education; the Bill provided funding for any serviceman, regardless of race or religion. After Truman integrated the military in 1948, many higher education institutions followed. With the decision of *Brown v. Board of Education* (1954) and the subsequent ruling of *Florida ex re. Hawkins v. Board of Control* (1956), the Supreme Court initiated the crisis in elementary, secondary, and postsecondary education that led to the Civil Rights Act of 1964.

Through the G.I. Bill, the federal government also affected admission to postsecondary education. The G.I. Bill contained language encouraging colleges to consider veterans for admission, even though the veteran may not have completed high school. With this incentive, many higher education institutions began large-scale acceptance of the General Educational Development test as an option for admission.

The G.I. Bill also encouraged the development of transfer credit and standardized testing in higher education. With federal money from the G.I. Bill at stake, colleges began to award academic credit for military training and experience. Academic administrators also began to use the standardized tests from military service for academic credit decisions, admission, counseling services, and in other areas. With federal support for military standardized testing, the G.I. Bill, military training, and other initiatives, the federal government helped to solidify student services, particularly guidance, testing, counseling, registration, and records, as important components of colleges and universities.

At the start of World War II, the federal government increased investment in scientific research. Scientific research at postsecondary education institutions was critical to the creation of atomic energy, advanced aircraft, and other war technologies. More than 300 colleges and universities also became training sites for Army or Navy operations (Fincher, 2001). The on-campus training programs led to refinements of postsecondary and secondary teaching techniques and support for guidance counseling in secondary education.

Post World War II to 1965. Immediately after World War II, the U.S. Congress passed several pieces of legislation to support the growth and stability of higher education. Much of the legislation and discussion was the result of President Truman's 1946 Commission on Higher Education (Fincher, 2001). The Commission's report called for more students in postsecondary education, and for support from the federal government to resolve the crisis of social problems, human understanding, religious and racial barriers, and equal opportunity. The Housing Act of 1950 facilitated hundreds of

residence halls across the United States. More than fifty years later, many of the residence halls still stand on college and university campuses, housing residence hall students.

In 1958, Congress passed the National Defense Education Act (NDEA). The National Defense Education Act provided more federal funds for institutions, provided the institution was accredited by a private accreditation body. This act, along with the G.I. Bill, made receipt of federal funds dependent upon accreditation.

The NDEA was passed by Congress as a result of the Soviet launch of the Sputnik satellite in 1957. Because of Congressional concern over the ability of the United States to compete in mathematics, foreign languages, and science, the NDEA targeted research grants and loans in science and mathematics, funded doctoral and post-doctoral fellowships, created fellowships for language study, and established the National Defense Student Loan (NDSL) Program. The NDSL Program is still in existence today, after two revisions and name changes from defense student loans, to direct loans, to the current name of Perkins loans.

Although the federal government had supported construction on college and university campuses through previous legislation, the government became a major source of funding for classroom and other building construction with the Higher Education Facility Act of 1963. The Act supported construction funds for new undergraduate and graduate classrooms, libraries, and laboratories through low-interest loans and grants.

In 1964, the federal government authorized the Economic Opportunity Act of 1964. While the focus of the Act was to dispel poverty, the Act funded federal support for work-study financial assistance to needy students, the volunteer in service to America

(VISTA) program, the Job Corps programs, Head Start, and Upward Bound. This federal initiative and subsequent changes over the past nearly-thirty years, added financial incentive to colleges and universities willing to recruit and admit low income students.

The Civil Rights Act of 1964 banned discrimination by employers and also provided some funding for training to instructional staff. The Civil Rights Act of 1964 was a precursor to the government's involvement in higher education in the following years to come.

The Higher Education Act of 1965 and Subsequent Reauthorizations. The Higher Education Act (HEA) of 1965 was a significant step from the federal government into the funding, financing, and student admission of higher education. The HEA and subsequent reauthorizations have authorized federal spending to support higher education, through facility spending, programmatic and research spending, and financial aid to students. The trend in the reauthorizations seems to be to support access to higher education and choice for the student; students receive federal financial aid (grants, loans, scholarships, fellowships, interest subsidies) to attend the institution of the student's choosing. Financial aid is now determined at almost all public and private institutions through federally-controlled formulas, in a federally-sponsored and controlled process.

Middle Income Students, Recent Developments. In the past thirty years, the federal government has moved from supporting student attendance in higher education through grants and scholarships to loans (Hartle & Galloway, 1997). This change was accompanied by an increased emphasis on access and choice for middle-income students.

Recent legislation, including Family Educational Rights and Privacy (1974) and Crime Awareness and Campus Security Act (1990), impose mandatory reporting and

compliance requirements on higher education institutions. The federal government is also involved in affirmative action decisions, including the Bush administration's recent *amicus curiae* briefing in the University of Michigan Law School affirmative action case (Gratz v. Bollinger, 2003).

Subsequent efforts, including clarifications and extensions of the original Morrill Act, several Higher Education Acts, and other federal legislative action, formed a solid foundation upon which the federal and state governments encouraged the growth and development of public postsecondary education in the United States.

Theory

Introduction

There are several theoretical models used in the study of persistence in postsecondary education. The development of theory and the conduct of research regarding persistence have blossomed since 1970. As Tinto (1986) notes:

> The past decade has witnessed a marked increase in studies of student retention in higher education. Fueled in large measure by the onset of declining numbers of college entrants, there has been renewed interest in the forces that shape student departure from institutions of higher education (p. 359).

The decline in college entrants noted by Tinto is the result of many factors, including economic pressures, fluctuation in birth rates, and changes in the postsecondary education system to support two-year institutions. The frequency with which students leave an institution of higher education are a concern for many in postsecondary

education. Faculty and staff in various disciplines and administrators of the institution are concerned with persistence for a variety of reasons.

Durkheim

Much of the research on student persistence is based upon Durkheim's (1897/1951) research on suicide. Durkheim studied the reasons for individual commitment to leave a community through suicide. Durkheim identified four main reasons for suicide: altruistic, anomic, egoistic, and fatalistic. Durkheim maintained suicide is the result of individual actions, grouped into the four causal types.

Altruistic suicide is the result of an individual who lacks the strength of individuality to see the necessary moral justification for suicide. Anomic suicide results when an individual does not understand how to regulate his or her own individual behavior within the social framework of social norms. Egoistic suicide is based upon an overly-strong individual personality that occurs when the individual is no longer a part of the social community or social structure that acts to integrate the person and the environment. Finally, fatalistic suicide is the result of over-regulated individual behaviors that suppress individuality.

Durkheim found persons with strong interpersonal relationships were less likely to commit suicide. The interpersonal relationships formed a bond between an individual and the community. Those bonds could persuade a suicidal individual to remain a part of the community.

Durkheim proposes, "…suicide is a social phenomenon…" (1897/1951, p. 326). As a social phenomenon, sharing common beliefs between the community and the individual indicates a person would be less likely to commit suicide. Similarly, those

persons integrated into their community through participation, involvement, and commitment to the social structure would be less likely to commit suicide.

Van Gennep

In 1960, Van Gennep published a book based on social theory and anthropological study. Van Gennep studied tribal societies, focusing on the rituals and ceremonies that marked the passage of time from one stage of life to the next and the intricacies of membership in society.

Van Gennep's (1960) observations of tribal cultures related to membership, integration, and departure are most parallel to student retention models. Van Gennep's observations led him to conclude that group members in a society moved from one stage of societal development to another through a specific, defined process.

The passage from one stage to the next was a three-step process (Van Gennep, 1960). The first stage, separation, occurred when the member was separated from previous acquaintances and places. Van Gennep found ceremonies common at this stage, where the individual came to realize the differences between old beliefs and values versus the beliefs and values of the new group.

Transition is the second stage in the rite of passage (Van Gennep, 1960). During this stage, the individual begins to form bonds with the new group and to interact in different ways with the new group. In some cultures, Van Gennep found individuals in this stage were given ordeals and difficult tasks to accomplish with members of the new group as a way to ease transition. Ordeals and tasks also serve to teach or train the new member for their specific role in the new group. Isolation of the new member from the previous group was noted as quite common by Van Gennep.

Finally, the new member reaches the third stage, incorporation. In this stage, the member is accepted by the members of the new group as an equal and as a fully-integrated member of the new community or group. Van Gennep found this stage is most often marked by elaborate ceremonies or rituals (1960).

Ritual and ceremony are noted often for both the public and the private value to the new member and the current members of the group. For the new member, the ritual or ceremony can serve as a social function. The new member can meet other members of the group, can become acquainted with the social norms and expectations of the members, and can better determine their new role in the group. For existing members of the group, the activity serves as an opportunity to meet the new member and to become reacquainted with current members. The new member may also view ritual and ceremony as a therapeutic function. The activities may be used to smooth the emotional and cognitive processes of leaving one group or stage of life for another. Existing members of the group may use ritual and ceremony as reminders of the purpose and function of the group.

Spady

Spady (1970, 1971) and Tinto (1975) use Durkheim's work as a foundation to explain student persistence in postsecondary education. Students who are connected to the community and to the social structures of postsecondary education are less likely to withdraw from the institution. This is an analogy to Durkheim's work, where individuals who are connected to the social structures are less likely to withdraw from the community through suicide.

Spady's theory is based in sociological research. It is one of the first models of postsecondary education persistence, and is based upon the work of Durkheim (1897/1951). Spady developed a longitudinal model that includes background characteristics as important in the persistence process. Spady (1970, 1971) connected Durkheim's theories of withdrawal to dropout from postsecondary education. Spady proposed a model using seven assumptions to evaluate and predict the withdrawal of a student from postsecondary education. The results of the study formed three major conclusions. The first conclusion focused on the involvement of students with each other outside of the classroom and the involvement of the student with faculty members. Second, the student should have a strong commitment to obtaining a degree and to earning the degree from the institution. Finally, intellectual growth and success cannot be accurately predicted by secondary education performance.

The background characteristics used by Spady (1970) are the foundation for the student's persistence decisions. Variables such as the student's motivation, values, and beliefs form the foundation of persistence decisions. The family background variables form the foundation for a student's aspirations that lead to persistence and degree completion. Students who enter postsecondary education with clear, realistic goals are more likely to achieve those goals (Spady, 1970).

A key concept of Spady's research is "normative congruence," the parallel compatibility between the student's personality, interests, goals, and attitudes and the postsecondary education environment. Essentially, if the student matches the college's environment and the college has attracted the right student, both are in congruence.

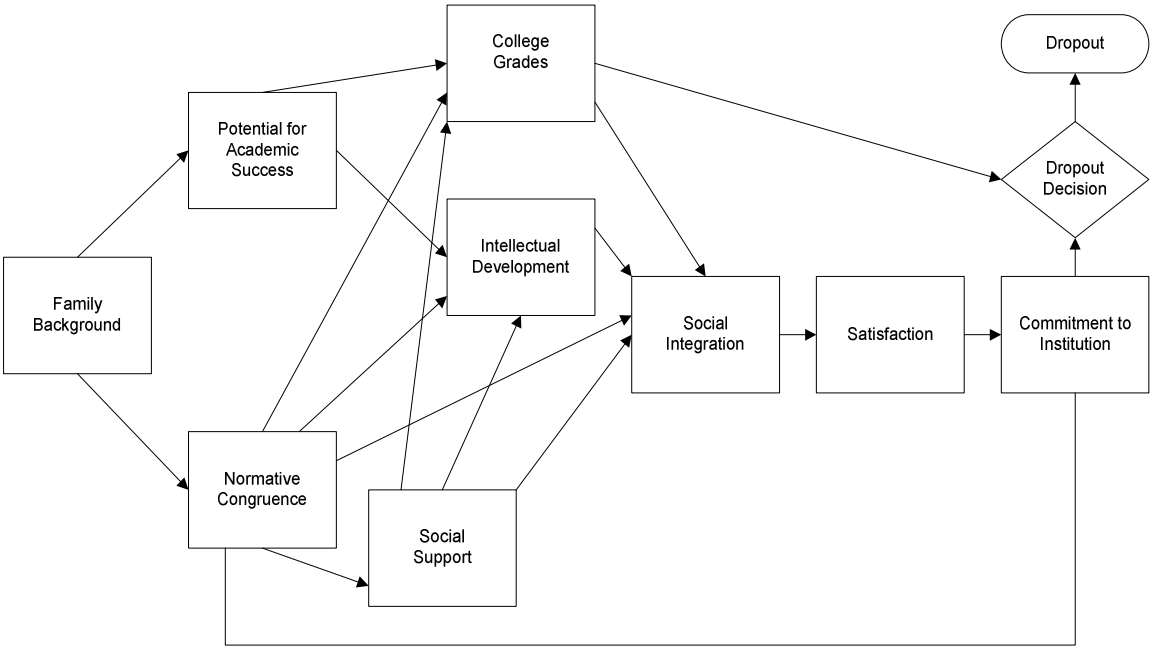
Social support is another key concept in Spady's (1970) work. Social support is indicated by the formation of close community and individual ties in postsecondary education. It is in this area that Durkheim's (1897/1951) influence is most evident. Social support is very similar to the social integration theory proposed by Durkheim.

Spady's (1970) model, as graphically outlined in Figure 3, contains several variables that can influence persistence for students in postsecondary education. The concept of normative congruence is a key decision-making point, and influences many of the other variables in Spady's model, including social integration, academic success, and intellectual development. Similarly, a student's commitment to the institution is the core of normative congruence.

Spady's (1970) model is based upon research conducted with a small number of beginning first-year students at a small, highly selective, private postsecondary institution. There is some question if Spady's model is founded upon research with an appropriately broad sample upon which to generalize to other student populations (Duggan, 2002). Of particular concern is Spady's use of only male Caucasian students in the research model. With the narrow sample at such a narrowly-defined postsecondary institution, the model may not provide a valid reference for other ethnic groups or for students attending other types of institutions.

Figure 3

Spady's Model of Undergraduate Persistence



Tinto

Vincent Tinto is a prolific writer on issues of postsecondary persistence. Tinto's initial works between 1970 and 1980 formed a foundation for much of the subsequent persistence literature. Aspects of Tinto's model are based upon Durkheim (1897/1951), Spady (1970), and Van Gennep (1960). Tinto sought to explain persistence decisions through sociological study of group membership, separation, association, ritual, and ceremony. Tinto's theories include Van Gennep's rites of passage for college students who must disassociate from their secondary education relationships and environment, and re-associate with the community in the postsecondary environment. Tinto (1975) labels the re-association as integration, and discusses the concepts of integration at length, from both social and intellectual integration in the postsecondary environment.

Tinto (1988) reviewed the three stages of college student transition to college, based upon the work of Van Gennep (1960). Tinto theorized that membership in the new collegiate community and persistence in that community was similar to Van Gennep's anthropological findings of cultural and tribal passages. Separation, transition, and incorporation, similar to the stages identified by Van Gennep, were theorized by Tinto as the same processes for college students. Tinto believed failure to adequately negotiate these stages could result in a student leaving postsecondary education, as noted below,

"By extension, it can be argued that the process of institutional departure may be seen as being differentially shaped over time by the varying problems new students encounter in attempting to navigate successfully the stages of separation and transition and to become incorporated into the life of the college" (p. 442).

The first stage, separation, happens when students distance themselves from the relationships that were most important to them during their secondary education years. Students who leave their home communities to "go away" to college see the most significant separation, where they experience emotional and physical separation from their previous group membership. For students who live at home or in their home community, they may not have to experience separation from family, friends, and previous community members in the same ways. Although students in the later category may seem to be in a position of ease, Tinto (1988) notes they may actually have a more difficult time in the long run, as they, "may not be able to reap the full social and intellectual rewards that social membership in college communities brings." (p. 443).

Transition to college is the second stage of the process for students. In this stage, students move from the old community and former associations to new friends and new

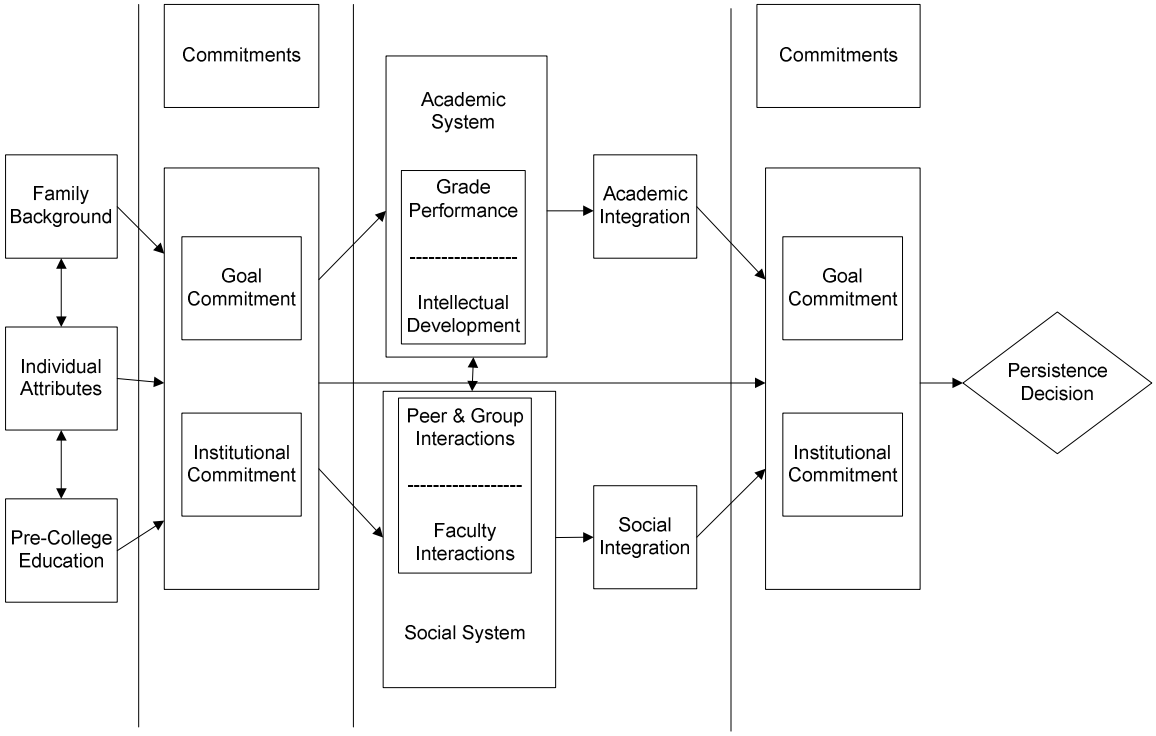
communities. Tinto (1975, 1988, 1993) argues that this may be the most precipitous time for college students. During this stage, the student has no strong ties to form an anchor to the college. Students, "are neither bound strongly to the past, nor firmly tied to the future" (1988, p. 444).

It is during the transition stage that college students may need the most assistance. Integration during the transition stage is the critical task for the college student, and students who are unable to integrate into the social and academic structure of the college are likely to leave the institution. Much of Tinto's theory of student departure is based on prediction and prevention of departure at the transition stage, where he believes students are most vulnerable and most likely to leave an institution.

Finally, the last of the three stages proposed by Tinto is integration. In this stage, the student is fully incorporated or integrated into the collegiate community. Tinto argues that many colleges and universities, "are often not provided with formal rituals and ceremonies" (Tinto, 1988, p. 446) necessary to help insure successful integration. As a result, the new members may not make the affiliations and associations with social and intellectual members of the community, and may not become an active member of their new community. Tinto notes those students who reach the third stage are still in real danger of departure.

Figure 4

Tinto's Model of Persistence



Tinto's 1975 model and refinement in the 1993 book notes a lack of integration can result from two primary sources. The first, incongruence, occurs when, "individuals perceive themselves as being substantially at odds with the institution" (1993, p. 53). The second concept, isolation, indicates an individual who experiences no social interaction or insufficient social interaction. Either, or both of these problems can cause a lack of social integration, which negatively affects persistence.

The same concept of integration was applied by Tinto to the intellectual life of higher education and the persistence decisions of students. Through a student's assessment of their congruence with the institution's academic requirements, the political and academic orientation and feeling of their peers and the faculty, students perceive academic integration with the institution.

Tinto created a model to predict student departures, based upon the individual traits of the student, the commitment of the student to the institution and to academic goals, the academic system in place at the institution, the social system in place at the institution, and the integration of classroom and out-of-classroom environments.

More recently, Tinto's work from 1985 through 1995 focused on revision of his earlier theories and critiques of the authors proposing newer, integrated models of student persistence. His 1986 article on student departure is designed to resolve the, ". . . disagreement, if not confusion, about the appropriate explanation of student departure in higher education" (p. 359). This work categorizes the student departure literature into five primary categories; psychological, societal, economic, organizational, and interact ional (Tinto, 1986). The 1986 article includes a review of major theorists and key concepts of the five categories (see table 4).

Table 4

Tinto's current theory of student departure

Theory Title	Major Theorists	Key Concepts
Psychological	Summerskill (1962) Waterman & Waterman (1972) Rose & Elton (1966)	"…retention and departure are primarily the reflection of individual actions and are therefore largely due to the ability of willingness of the individual to successfully complete the tasks associated with college attendance" (Tinto, 1986, p. 361). Decisions to persist or depart are made by the individual. External input may be important, but the decision is made by the student.
Societal	Pincus (1980) Featherman & Hauser (1978) Sewell & Hauser (1973)	"…attributes of individuals, institutions, and society, such as social status, race, institutional prestige, and

		opportunity structures" (Tinto, 1986, p. 362). Decisions to persist or depart are largely the result of external factors related to society and culture.
Economic	Manski & Wise (1984) Voorhees (1984) St. John (1994)	Decisions to persist or depart are primarily caused by the individual financial status of the student and the financial aid available.
Organizational	Bean (1983) Kamens (1971)	The "…central tenet has been that departure is as much, if not more, a reflection of the institutional behavior as it is of the individuals within it" (Tinto, 1986, p. 364). Decisions to persist or depart are centered on the organizational qualities of the postsecondary institution.
Interactional	Tinto (1975) Spady (1970)	"…interactional theories see student leaving as reflecting the dynamic reciprocal interaction between environments and individuals" (Tinto, 1986, p. 366). Decisions to persist or depart are based on the interaction of variables related to the student, the organization, and other external factors.

Tinto's model has been studied by many researchers. Boyle concluded, "the model has withstood careful scrutiny from the profession and has become accepted as the most useful for explaining the causes of student departure from higher education" (1989, p. 290).

Pascarella and Terenzini

Pascarella and Terenzini (1980) indicate Tinto, building on Spady's earlier work, developed a theory of student attrition primarily as a result of too many studies at the

time based upon descriptive research without theoretical foundations. The model, reviewed earlier in this paper, is combination of background characteristics, institutional characteristics, prior experiences, and integration into the institution that influence the persistence of the student. Many subsequent higher education practitioners and researchers have used Tinto's 1975 publication and subsequent work on student persistence and dropout in postsecondary education in many applications.

Pascarella and Terenzini use Tinto's 1975 publication, *Dropout from higher education: A theoretical synthesis of recent research* as the foundation to test validity of the theory developed in the publication and subsequent publications. The study is longitudinal and used the variables identified in Tinto's original and follow-up studies. As in Tinto's original work, the Pascarella and Terenzini study was conducted at a single institution (1980, p. 61).

A 1979 publication of results supports much of Tinto's theoretical framework, but Pascarella and Terenzini note strong cautions against drawing conclusions with the initial publication, "It is particularly important to stress the tentativeness of these findings…" (1979, p. 208). The study lists concerns with a single-institution, non-longitudinal study, as well as concerns with validity related to replication.

With more data available, including longitudinal analysis, the results of the 1980 Pascarella and Terenzini study, "generally support the predictive validity of the major dimensions of the Tinto model" (1980, p. 72). Study results indicated student and faculty contact were extremely important predictors of persistence, particularly informal contact between students and faculty. Pascarella and Terenzini note in the results, "…the quality and impact of student-faculty relationships made greater estimated contributions to the

prediction of subsequent decisions to persist or withdraw than did scores on the scale concerns with students' peer relationships" (p. 72).

Three years later, Pascarella and Terenzini followed up on the same study with a path analysis validation of Tinto's model. The analysis indicates, "..the constructs outlined in Tinto's model have reasonable predictive power in explaining variance in freshman year persistence/voluntary withdrawal decisions." (1983, p. 224). The analysis indicates Tinto's model also was particularly good, at 80% efficiency, in identifying those students who would persist. There were differences in the predictive validity of the model between gender as well as academic integration of the students.

The studies conducted by Pascarella and Terenzini generally support Tinto's person-environment fit theory for persistence and withdrawal (1983). Much of the foundational review work done by Pascarella, Terenzini, and colleagues helped to validate and refine Tinto's persistence and attrition model.

Bean

Bean (1981) proposes a student attrition model based on similarities between student attrition and departure from employment. Bean's model, "provided useful in analyzing the process of student attrition" (1980, p. 183). Bean's theory includes variables tied to student background characteristics, as well as organizational, environmental, attitudinal, and outcome variables. Bean's model also includes the student's intent to leave the institution. The model includes clear specifications for using the variables and their relationship to the overall prediction of persistence. The model was expanded to include nontraditional students (Bean & Metzner, 1985), noting the social integration of nontraditional students is not a significant predictor of persistence.

This highlights a major limitation of Tinto's theoretical model, which is based upon traditional students at four-year institutions.

Much of Bean's (1981) work is based upon validation of theories focused on the causes for students to leave postsecondary education, as mirrored by decisions made outside of postsecondary education. Students who do not express a strong affiliation with the institution, noted as institutional fit (Bean), are more likely to leave to find an institution where the student will feel more comfortable.

Bean (1981) proposed several different variables, in three different categories, as a model to predict student attrition. The results indicate men and women depart higher education for different reasons, but that the commitment to the institution was the most important single variable for both sexes (Bean).

Bean's (1981) research included eight specific recommendations for higher education institutions as methods to reduce student attrition. These recommendations included admitting students who had high grade point averages, increasing perceived quality of higher education, and the awareness of the differences between genders leading to departure decisions.

Tierney

Tierney proposes the common acceptance of Tinto's theory of student persistence, "misses the mark for minority students" (Tierney, 1999, p. 80). Tierney also criticizes Tinto's theory as misrepresenting anthropological theories of ritual and ceremony.

Tierney (1992) also criticizes the foundations from Durkheim used as the basis for much of student persistence theory. Tierney (1999) indicates a basic disagreement with the suicide-based foundation as it applies to minority students. Using the Tinto model,

minority students must adapt and assimilate to the predominately white culture, abandoning their minority culture. According to Tierney:

> Tinto's notion is that college initiates must undergo a form of cultural suicide, whereby they make a clean break from the communities and cultures in which they were raised and integrate and assimilate into the dominant culture of the colleges they attend. (p. 82)

In Tinto's model, minority college students must undergo a Durkheim-like form of cultural suicide when they attend a predominantly white institution. In fact, all students must give up a portion of their own culture to separate from their previous culture, ideals, values, and beliefs to explore the culture, ideals, values, and beliefs of the new institution. Tierney notes his concern with this process, and "that it is the individual's task to adapt to the system" (p. 607).

Tierney studied the effects of Bourdieu's proposed social and cultural capital theories for minority students in a postsecondary environment. Tierney summarizes the research by noting his concern that, "one might implicitly assume that those who lack cultural capital are in some way deficient in a manner akin to those who proffer the 'culture-of-poverty' viewpoint (Tierney, 1999, p. 89).

From an anthropological point of view, Tierney (1992) asserts Tinto misinterpreted Van Gennep's 1960 research on ritual, ceremony, and rites of passage. Tierney's first concern is that Tinto improperly used Van Gennep's term "ritual" in the theory of cultural initiation in higher education. According to Tierney, Van Gennep intended ritual to be used only for a within-culture reference, and not for cross-cultural references. Tierney argues that Tinto's theory of student departure, including ritual and

ceremony would apply only to upper middle-class or upper class white male students of traditional age attending a traditional four-year college or university.

Tierney (1992) has objections to Tinto's use of ritual in the academic setting as an optional activity. Tierney's interpretation of anthropological study of ritual and ceremony is that the events studied by researchers such as Van Gennep are not optional events. Tierney notes, "Choice does not exist about whether to undergo the ritual; one simply partakes of it" (p. 609).

Tinto's theory is also criticized by Tierney (1992, 1999) because of Tinto's focus on individuality and individual choices. Tierney (1992) argues anthropological theory requires Tinto to focus on the group as the primary unit, and not upon the individual. Tierney notes, "what is particularly odd with regard to Tinto's analysis is that he utilizes anthropological terms in an individualist manner" (p. 610).

Integrated Theories and Theorists

Cabrera, Nora, & Castaneda

Cabrera, Castaneda, Nora, and Hengstler (1992) proposed an integrated model of student persistence, combining features of the Tinto and Bean theories. Cabrera, et al. propose a model based on Tinto's work, but includes greater attention to external factors in the persistence process. The integrated model demonstrates environmental factors have a significant influence on persistence, as does the encouragement of family and friends.

Perna, Somers, Woodhouse, and Cofer

Perna (2000) and Somers, Woodhouse, and Cofer (2000) suggest future persistence studies should integrate social capital theory to develop more accurate

persistence models. The integrated model is used as a key component of this study; it is a good fit with social capital theory, and forms the theoretical framework for this study.

Social Capital and Persistence

Duggan (2002) studied the effect of social capital on the within-year persistence of first-generation students using an integrated persistence model. The study found first-generation student persistence was not significantly influenced by the type or location of secondary education, but was influenced by variables such as access to e-mail in the home, interaction with faculty members, and the primary spoken language in the home.

Minority College Students

There is a small but growing body of research on minority students in postsecondary education. Most of the research is recent, conducted and published starting in 1990.

African-American Students

Much of the research on persistence and differences between different racial groups have been conducted in the past ten to 20 years. These studies, combined with analysis of gender, examine the interactions of race, gender, and many of the background variables included in this study.

In 1988, Stoecker, Pascarella, and Wolfe published results of a nine-year longitudinal study that examined the application of Tinto's persistence model to sex and ethnicity. The study examined the effect of background characteristics, institutional characteristics, social integration, and academic integration on persistence and withdrawal decisions. Study results indicate social integration at the institution had significant effects on persistence for African-American male students, but was not a

significant indicator of persistence for African-American females. Attendance at large institutions, where social integration was more difficult to achieve, had a negative effect on persistence for African-American males.

Academic integration was also studied in the Stoecker, Pascarella, and Wolfe (1988) study. The results indicated a positive effect on academic integration and subsequent persistence for African-American women attending predominantly black institutions and at more selective institutions.

Studies of social integration and African-American males have generally suggested a greater importance on the social integration leaving to increased persistence. Pascarella (1985) notes social integration is more important for African-American male students for degree completion than for comparison group of white male students or for African-American or white female students. In a study of African-American students conducted at a predominately white campus, Suen (1983) found male and female students who where least socially integrated were most likely to persist.

Mexican-American Students

Attinasi (1989) notes, "One racial minority that has been particularly underserved by American higher education, in general, and by the four-year institution, in particular, is the Mexican American" (p. 247). The Commission on the Higher Education of Minorities (1982) notes students of Hispanic descent are underrepresented in graduate programs, primarily due to high attrition in undergraduate college and university settings.

Attinasi conducted an exploratory study to determine factors affecting the decision to persist at a four-year institution. Although the sample size was extremely small (only eighteen students), the research pointed to results that do not support the

persistence foundations from Durkheim. Attinasi proposes a model that values interactions between students as a way to negotiate the necessary paths to persistence. This model does not support the models of Tinto, Spady, and Durkheim that are founded on the basis student withdrawal as a lack of affiliation and congruence with the institution.

Nora (1987) notes Hispanics have high dropout rates in higher education and low levels of participation in all facets of college. Nora's study indicates there are three primary factors affecting dropout rates and participation, including a lack of commitment to higher education goals, insufficient financial aid and financial resources, and a lack of academic integration into the institution. The findings support the foundations of Tinto's theory of persistence and departure.

First-Generation College and Continuing-Generation Students

Introduction and Definition

The study of first-generation students is important for several reasons. As noted in Somers, Woodhouse, and Cofer (2000), first-generation students differ in many ways from continuing-generation students. First-generation students, for the purpose of this study, are students whose parents have not earned a degree from a postsecondary institution. Continuing-generation students are students who had at least one parent with a postsecondary degree.

Continuing-generation students are students entering postsecondary education with specific background variables that can be measured. Some of these variables, such as family income, test scores, and GPA are typically predictors of persistence. First-generation students who had the same background characteristics as continuing-

generation students are not as successful (Cofer, 1998; Cofer & Somers, 1999a, 1999b, 2000a, 2000b). As Somers, Woodhouse, and Cofer (2000) note, "These traditional advantages are not significantly associated with persistence for first-generation college students" (p. 10).

First-generation students also tend to be less involved in the social and community structures of postsecondary education (Nuñez & Cuccaro-Alamin, 1998). Nuñez and Cuccaro-Alamin studied several variables to determine social integration, including attendance at lectures, participation in study groups, meeting with an academic advisor, and meeting with faculty. They found first-generation students had lower scores when compared to continuing-generation students. Nuñez and Cuccaro-Alamin summarized the differences between first-generation and continuing-generation students by noting, "…even when controlling for many of the characteristics that distinguished them from their peers, such as socioeconomic status, institutional type, and attendance status, first-generation student status still had a negative effect on persistence and attainment" (1998, p. iv).

CHAPTER 3

Research Design and Method of Study

Introduction

This study used the integrated model proposed in the Cabrera, Nora, Castaneda, and Hengstler (1992) study. The model also draws upon Duggan's (2000) study on persistence and social capital. As suggested in Duggan, this dissertation considers any student to be persisting in postsecondary education if the student is enrolled at any institution, including transferring to a different institution, for the second year. This operational definition of year-to-year persistence is the dependent variable in this study. The dissertation examines the rate of transfer between two-year and four-year institutions, and determines if there are significant differences between first-generation and continuing-generation persistence at two-year and four-year institutions.

This study also used models and theory proposed by Somers, Woodhouse, and Cofer (2000) for first-generation students. Their model is founded on the work of St. John and several colleagues and graduate students (Somers et al., 2000). The model proposed by Somers and Associates used NPSAS:96, and included several persistence factors related to student financial aid. The model used five factors and more than 30 variables.

The method for research analysis in this dissertation is based upon association research. Association research is used to determine if there is a relationship between two or more quantifiable variables. If there is a relationship, the degree to which the variables are related can be determined with various statistical techniques (Gay & Airasian, 2000).

The method for the dissertation includes two parts. First, a Chi-square test is run on the BPS variables to determine which to include in the persistence model. All students are included, with additional analysis for socioeconomic status and type of institution. The second step of analysis includes a sequential binary logistic regression of the identified variables. This is the preferred approach for the dichotomous persistence variable.

Purpose

The purpose of this study is to develop and test a theoretical framework to describe the year-to-year persistence of beginning postsecondary education students at both two-year and four-year institutions. There are few studies on the year-to-year persistence of first-generation college students (Terenzini, Springer, Yeager, Pascarella, & Nora, 1996). There are even fewer studies of first-generation student persistence at both two-year and four-year institutions (Duggan, 2002). There is not yet an integrated model to predict the factors that influence persistence decisions (Cabrera, Castaneda, Nora, & Hengstler, 1992; Duggan, 2002; Pascarella & Chapman, 1983). This research may also outline a method to identify students with a greater probability of withdrawal during their first year of postsecondary education. By identifying the students early, administrators and faculty may be able to get involved in the persistence matrix, providing proactive enrollment in academic assistance and personal development opportunities and services designed to improve persistence rates.

Research Questions

This dissertation is based upon analysis of data collected through the Beginning Postsecondary Survey 1996/1998 subset of NPSAS:96 to compare the effect of

socioeconomic status and other factors on year-to-year persistence of first-generation and continuing-generation college students at two-year and four-year institutions. This section reviews the methodology and provides summary information regarding the research methodology for both two-year and four-year analysis. Detailed results are in separate chapters.

Four research questions have been identified, based primarily upon a review of the relevant literature and examination of the conceptual framework models in the research literature.

Research Question One

How does socioeconomic status, including social capital variables, positively or negatively influence the year-to-year persistence of first-generation college students, compared to continuing-generation students?

The variables in the question should have an influence on the persistence of first-generation students. Students who have lower socioeconomic status and lower social capital background variables should persist at rates lower than students who have higher social capital and socioeconomic status indicators.

Research Question Two

What effect does socioeconomic status suggest for persistence of students at two-year institutions compared to four-year institutions?

If socioeconomic status is an indicator of persistence, there may be similar socioeconomic status indicators at both two-year and four-year institutions. Exploration of the differences or similarities in socioeconomic status at two-year and four-year postsecondary education institutions may yield a unified predictive model.

Research Question Three

How do background, high school, college-entry, financial, social integration, academic integration, and college performance factors affect year-to-year persistence at two-year and four-year institutions for first-generation and continuing-generation students, and are there differences between first-generation and continuing-generation student persistence at two-year and four-year institutions based on the factors?

If specific background and demographic characteristics are associated with college persistence for first-generation and continuing-generation students at two-year and four-year institutions, administrators and policy-makers may be able to use a model to identify and support specific students. An integrated model to predict persistence at both two-year and four-year institutions for first-generation and continuing-generation students could be used to identify first-semester students at greatest risk of leaving postsecondary education.

Research Question Four

What implications do these findings have for future federal and institutional policy decisions for first-generation and continuing-generation students at two-year and four-year institutions?

Recent state and federal court cases seem, at the time of this writing, supportive of limited measures to provide admission and retention programs based upon race at postsecondary education institutions. Several legal challenges in public postsecondary education have placed the status of race-based admissions and retention programs at the front of both legal review and common discussion in postsecondary education.

As Somers, Woodhouse, and Cofer (2000) suggest, the information in this study may be used to develop new admission and retention strategies that "*Hopwood*-proof" institutions from legal concerns focused on race-based admission and retention programs. A new model based on first-generation status and other factors reviewed in this research may yield an effective and legal method for postsecondary institutions to admit and support students. A new model that includes race as a part of a factor, but not as the primary or only factor, may stand up to legal challenges. Such a model could effectively identify postsecondary applicants as individuals likely to face persistence challenges. Institutions could establish admission criteria and support services designed to admit and support the student.

Sources of Data

This study used data from the Beginning Postsecondary Students Longitudinal Study (BPS:96/98). BPS is a longitudinal research study following beginning students at two-year and four-year postsecondary institutions. The population consisted of all first-time beginning students in postsecondary education in the United States and Puerto Rico, who started their postsecondary education in the 1995-1996 academic year, defined as terms starting between May 1, 1994 and April 30, 1995 (Berkner, He, & Cataldi, 2002). Only institutions eligible to participate in NPSAS studies were eligible for subsequent BPS participation and analysis. Wine, Whitmore, Heuer, Biber, and Pratt, (2000) provide detailed methodology and samples guidelines in the BPS methodology report.

BPS is a nationally representative study designed to provide additional information about the patterns of educational attainment and persistence for a subset of the more than 51,000 students included in the NPSAS:96 survey. This study used all

students enrolled as first-time, beginning students at two-year and four-year institutions. BPS is a subset of the 1996 National Postsecondary Student Aid Study (NPSAS). NPSAS was administered by the Department of Education in 1995-1996. As noted by Riccobono, Cominole, Siegel, Gabel, Link, and Berkner (2002), "NPSAS is a comprehensive nationwide study designed to determine how students and their families pay for postsecondary education, and to describe some demographic and other characteristics of the students enrolled in postsecondary education" (p. 1). Information was received from more than 830 postsecondary institutions in the United States and associated territories (Berkner, He, & Cataldi, 2002) . During that academic year, the National Center for Education Statistics estimates 16.7 million students were enrolled in postsecondary education (National Center for Education Statistics, 2002). From that population, more than 44,500 undergraduate students were surveyed for NPSAS (NCES, 2002).

The initial sample for BPS consisted of a two-stage sampling process. In the first stage, NCES selected eligible institutions. Eligible institutions included two-year and four-year institutions, and were selected based upon characteristics reported to the United States Department of Education (Wine, Whitemore, Heuer, Biber, & Pratt, 2000). The second stage identified specific students from the eligible institutions (Wine et al., 2000)

BPS is a complete study surveying the universe of first-time, beginning new students. BPS followed 12,410 students initially enrolled in NPSAS:96, who were starting postsecondary education for the first time (Berkner, He, & Cataldi, 2002). BPS survey methodology asked survey participants additional questions in eight categories. Nearly 300 potential questions were asked of participants.

The first follow-up, in 1998, included interviews with approximately 10,300 students from the original cohort. The first follow-up had an overall weighted response rate of 79.8 percent (Berkner et al., 2002). The un-weighted response rate for interviews of all types was 84.3%. The second, and final, follow-up was in 2001, six years after the initial NPSAS/BPS survey (Berkner et al., 2002). According to Berkner, et al. (2002), the weighted response rate for this follow-up was 83.6 percent. At this interval, more than 9,100 students were interviewed. The final data collection was in 2001 (National Center for Education Statistics, 2002).

Collection of data for the BPS survey was conducted through mail, telephone, and individual interview. Telephone interviewers were specially trained by NCES to achieve specific goals of increasing data accuracy, standardization of data, and nonjudgmental interview techniques (Wine, Whitmore, Heuer, Biber, & Pratt, 2000). Students who initially failed to respond to survey requests were questioned by more than 50 trained specialists to retrieve information from subjects.

The design of BPS to track participants across multiple institutions through the longitudinal progress of the study is critical to validity of data collection on persistence. Berkner, Cataldi, and He (2002) found differences between the type of institution first attended and the type of institution last attended by survey participants. Based on the analysis of BPS data, the majority of first-time students attended two-year public institutions (46 percent), but ended at public four-year institutions. According to Berkner, et al, "About one-third (32 percent) of the beginners transferred from their first institution to a different one, and 11 percent were sometimes co-enrolled, taking courses at more than one institution at the same time" (p. 4).

Table 5 outlines the enrollment percentages for the BPS survey. In this dissertation, only students attending two-year or four-year institutions were included in the survey sample.

Table 5

Enrollment Percentages, BPS Survey

Type of Institution	First Institution Percentage	Last Institution Percentage
Public two-year	46%	34%
Public four-year	26%	35%
Private four-year	15%	16%
Private two-year	10%	11%
All other types	3%	5%

Source: Berkner, Cataldi and He, 2002

BPS was selected as the data source for this research study based on several factors. Several previous research projects, including Duggan (2000) used BPS as a foundation for research. Below (2003) and Freeman (2003) also used BPS as a source for persistence research. BPS asks additional questions of survey respondents, including questions with responses related to both bridging and bonding social capital models.

Access to the full BPS and NPSAS data are restricted due to concerns about individually-identifiable information. The researcher initiated the request process for an individual site license for the BPS database in August, 2003, and received the data in January, 2004. The researcher adhered to all guidelines and requirements as outlined in the NCES Security Plan submitted with the license application.

Study Sample

The initial sample size used for NPSAS:96 and BPS:96/98 is based on all first-time students enrolled in postsecondary education terms starting May 1, 1994 through

April 30, 1995. The NPSAS:96 survey includes more than 50,000 students, with the BPS survey containing more than 12,000 students

The study sample of more than 12,000 students, the BPS 96/98 subset of NPSAS:96, was refined to 3,506 total cases. Cases with substantial amounts of incomplete or missing data were excluded, based on the intended research result to develop a model to predict year-to-year persistence. Imputation of missing data or estimates could not be accomplished without introducing significant error. The refined sample represents nearly 25% of the original 12,000 cases.

This study design is based upon the year-to-year persistence of students at two-year and four-year institutions; only those students who enrolled in the fall, 1995 semester and in the subsequent fall, 1996 semester were included in the study sample. Descriptive statistics for the two-year and four-year study samples are included in later chapters.

Limitations and accuracy

This research is based upon a sample. As a sample, the final product is an estimate and is subject to errors in sampling and non-sampling categories. Sampling error in this case may be introduced because BPS sampled 9,100 students (at the final interview) of the millions of students enrolled in postsecondary education. Non-sampling errors include errors resulting from the inability to obtain correct information from participants, data collection and recording errors, and other data manipulation errors.

Reliability for the questions was established by NCES. NCES established an 85% agreement with the initial interview response for more than 50% of the questions (Wine,

Whitmore, Heuer, Biber, & Pratt, 2000). As reported by Wine and Associates, no question fell below 66% agreement during reliability testing.

This study used data from the BPS full data set as the population. A full-sample analysis was conducted to identify only students enrolled as first-time, beginning students at two-year and four-year institutions. Weighting, imputation, and other data replacement or supplement methods were not used in this study. Results weighted through use of the NCES longitudinal analysis weight table B01LWT2 may introduce sampling errors (Berkner, He, & Cataldi, 2002). Weighting was not used in this research study.

Research Model

The model used in this dissertation is based on previous work using BPS: 96/98 to study social capital and other factors that influence persistence for postsecondary students at four-year institutions (Duggan, 2002). The model also incorporates research conducted on two-year student persistence (Cofer & Somers, 2000; St. John & Starkey, 1994). Statistical analysis of the model will be based on the method proposed by Freeman's (2003) study of persistence by African-American students at two-year institutions. Model specifications include research by Below (2003) and other NPSAS and BPS studies (Cofer, 1998; Cofer & Somers, 1999a, 1999b, 2000a, 2000b; Hippensteel, St. John, & Starkey, 1996; St. John, 1992, 1994; St. John & Starkey, 1994, 1995; Somers, Cofer, Martin-Hall, & VanderPutten, 2000; Somers, Woodhouse, & Cofer, 2000).

Persistence studies are used to analyze the persistence of students from semester-to-semester, or year-to-year. The purpose of this study, to test a theoretical model of year-to-year persistence, utilizes persistence variables in the BPS survey to measure

attendance during the first semester of postsecondary education and subsequent attendance one year later.

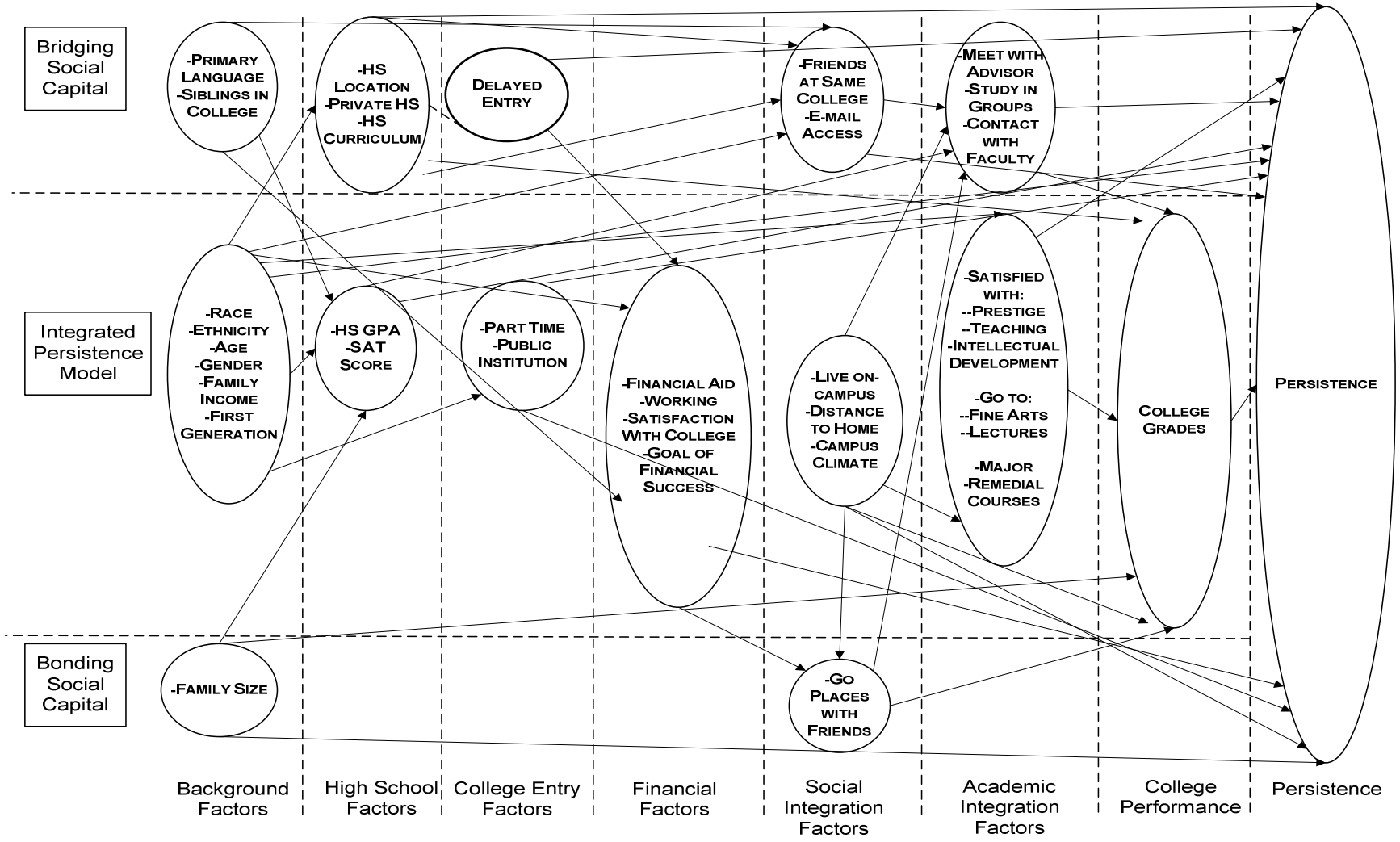
This study differs from previous research by examining two-year persistence and four-year persistence using BPS. This study also focuses on the effects of socioeconomic status as a predictor of success at both two-year and four-year institutions, using first-generation and continuing-generation status as the dependent variable.

Theoretical Model and Coding Scheme

The theoretical model presented in Table 5 is based upon previous research using BPS to study the persistence of first-generation students at four-year institutions (Duggan, 2002). The model is also based on previous research using NPSAS to study persistence of first-generation students at two-year institutions (Cofer & Somers, 2000; Hippensteel et al., 1996; Martin, 2000; St. John & Starkey, 1994). This study differs from pervious research by examining year-to-year persistence of students at both two-year and at four-year institutions for students based on first-generation and continuing-generation status, and discussing the persistence of those students with continuing-generation students in the same groups.

Figure 5

Persistence Model with Social Capital Integrated



Note: Adapted from Duggan (200).

The variables grouped into factors is based on previous theoretical models found in the literature (Bean & Metzner, 1985; Cofer & Somers, 2000; Duggan, 2002; Martin, 2000; Nora & Cabrera, 1996; Tinto, 1993). The coding scheme developed for the factors in Table XXX is also based upon previous studies (Cofer, 1998; Cofer & Somers, 1997; DeAngelis, 1997; Duggan, 2002; Martin, 2000).

The initial model includes 42 different variables grouped into seven factors. Using SPSS logistic regression analysis software, the best subset of variables in each factor were determined, based on regressions yielding probabilities closest to 1. This method, proposed by Furnival and Wilson (1974), used complex software analysis to determine the best model (Hosmer & Lemeshow, 2000).

Factors included in initial model

Factor 1: Background variables. Nine dichotomous demographic background variables are included in this factors. Included in this factor are variables noting first-generation or continuing-generation status, age of student, gender of student, and race of student. The number of family members in college and family size are also included in this factor. Based upon research from Duggan (2002) indicating English as a primary language at home was a predictor of persistence, that variables is also included in this factor. Finally, the family income level is also included.

Factor 2: High school variables. Five variables are included in the high school factor. Two variables describe the academic environment of the high school; high school curriculum and high school GPA. A variable indicating private or public high school status is included, along with the location of the high school (comparing rural, urban, and

suburban). A variable for test scores is included. ACT scores are converted to equivalent SAT scores when SAT data is missing.

Factor 3: College-entry variables. The college-entry factor includes three variables. This dissertation is focused on full-time students, so attendance status (full-time versus part-time) is included in this factor. Public versus private institution attendance is also included. Finally, the third variable is delayed entry status, to include analysis of students who postponed entry to college after graduation from high school.

Factor 4: Financial variables. There are five variables included in the financial factor. Two of the variables, financial aid status and financial aid amounts, focus on the amount and type of financial aid awarded for the first year of attendance at postsecondary education. A third variable measures the satisfaction of cost of attendance. The hours of work while in college are included, along with the student's financial goals.

Factor 5: Social integration variables. The social integration variables are based largely upon Duggan's (2002) work with social capital and persistence. The six variables measure a student's involvement in the social environment of postsecondary education. The variables, as suggested by Duggan, are a means to measure the social integration of a student, including the student's ability to gather and use social capital.

Factor 6: Academic integration variables. Eleven academic integration variables are used in this model. Three measure a student's satisfaction with academic activities and instructional activities at the institution. Three more variables measure participation in academically-based groups or activities. Three measure the reported frequency of contact between students and faculty members. The final two variables included enrollment status in remedial courses and planned major course of study.

Factor 7: College performance variables. College performance is measured by the grade point average of the student during the first year of attendance in postsecondary education.

Table 6 notes the coding for all variables in the proposed model.

Table 6

Variable coding for proposed model

Factor/Variable	Coding	Reference Criterion
Background Factors		
First-generation	0=2nd gen. 1=1st gen.	Father's graduation, postsecondary education (part of dependent variable)
First-generation	0=2nd gen. 1=1st gen.	Mother's graduation, postsecondary education (part of dependent variable)
Age	0= ≤21 yrs 1= ≥21 yrs.	Age of student; compares to 22+
Male	0=male 1=female	Gender of Student; compares to females
Family Size	0=2 1=3-4 2=5-6 3=7+	Compares to families of 7+
Race	0=Black 1=Asian 2=Hispanic 3=Other & Native American 4=Caucasian	Compares to Caucasian and others

Family in College	0=1 (student) 1=1-2 2=3+	Compares to 3+ family in college
English is Primary Language (language spoken as first language)	0=no 1=yes	Compares to English as primary language in home
Family Income	0=0-44,999 1=45,000-74,999 2=75,000-124,999 3=125,000+	Compares for family income level stratification (in thousands of dollars). Will compare upper, upper-middle, middle, and low family income levels
<u>High School Factors</u>		
Attended Public High School	0=no 1=yes	Compares public to private secondary education
High School Curriculum	0=did not meet basic curriculum 1=met basic curriculum or slightly rigorous 2=rigorous	Compares to rigorous curriculum
High School GPA	0=A's 1=B's 2=C's or less	Compares academic achievement
High School Location	0=urban 1=suburban 2=rural	Compares to rural
SAT Scores	0=400-749 1=750-900 2=901-1049 3=1050+	Compares to scores of 1050 or more
<u>College-entry Factors</u>		
Attend Part-Time	0=no	Compares to those attending part-time

	1=yes	
Delayed Entry Into College	0=no	Compares to those who did not delay
	1=yes	
Attended Public Institution	0=no	Compares to private institutions
	1=yes	
<u>Financial Factors</u>		
Satisfied With College Cost	0=no 1=yes	Compares to Yes
Goal: To be Financially Successful	0=no 1=yes	Compares to Yes
Financial Aid Status	0=aided, no loans 1=aided, with loans 2=only Loans 3=no aid	Compares to no aid
Financial Aid Amounts	0=high award of grants/scholarships 1=low award of grants/scholarships 2=high award of work study 3=low award of work study 4=high award of loans 5=low award of loans 6=total aid value	
Work Status	0=no work	Compares to working 31+ hours
	1=1-10 hours 2=11-20 hours 3=21-30 hours 4=31+ hours	
<u>Social Integration Factors</u>		
Distance from Home to College	0=1-15 miles	Compares to 150+
	1=16-50 2=51-150	

	3=150+	
College Housing	0=non-resident 1=in campus housing	Compares to living on campus
Friends Attend Same	0=no 1=yes	Compares to yes
Has E-mail Account	0=no 1=yes	Compares to yes
Satisfied with Campus Climate	0=no 1=yes	Compares to satisfied
Go Places with Friends	0=never 1=sometimes 2=often	Compares to often
<u>Academic Integration Factors</u>		
Satisfied with Intellectual Development	0=no 1=yes	Compares to yes
Satisfied with College's Prestige	0=no 1=yes	Compares to yes
Satisfied with Instructor's ability to teach	0=no 1=yes	Compares to yes
Participation in Fine Arts Activities	0=never 1=sometimes 2=often	Compares to often
Meet with Advisor About Plans	0=never 1=sometimes 2=often	Compares to often
Go to Lectures with Friends	0=never 1=sometimes 2=often	Compares with often
Social Contact with Faculty	0=never	Compares with often

	1=sometimes 2=often	
Took One or More Remedial Courses	0=no 1=yes	Compares to those taking remedial courses
Participate in Study Groups	0=never 1=sometimes 2=often	Compares with often
College Major	0=undeclared 1=declared major	Compares with those with a declared major
Talk with Faculty Outside Class	0=never 1=sometimes 2=often	Compares with often
<u>College Performance</u>		
College GPA	0=mostly A's 1=A's & B's 2=Mostly B's 3=B's & C's 4=Mostly C's 5=C's and D's 6=D's or lower	Compares to mostly D's or lower
Year-to-Year Persistence	0=no 1=yes	Outcome variable

Statistical Methods

Introduction

This study used several statistical methods to determine relationships between the independent variable, persistence, and several dependent variables. SPSS 12.0 was used for all data entry and coding functions. SPSS was also used for most analytical functions. SPSS 12.0 with the supplemental logistic regression analysis package was used for

complex sample survey analysis. The use of WesVar or other similar statistical software packages were excluded after a review of the additional functions included in the SPSS logistic regression analysis package.

Complex Survey Analysis

In complex surveys that include multistage sampling that is stratified, over-sampling and homogeneous clustering should be a concern to researchers (Thomas & Heck, 2001). In complex surveys, including BPS, over-sampling is done to insure representation of traditionally under-represented sample constituencies. This can yield distortions in the raw data through over-representation of responses from traditionally minority sample respondents.

Because of the use of weighting during sample analysis, a software package such as the SPSS logistic regression analysis package, AM Statistical Software, WesVar, or a similar product must be used (Brogan, 1998). As Brogan notes,

> Most standard statistical packages can perform weighted analyses, usually via a WEIGHT statement added to the program code. Use of standard statistical packages with a weighting variable may yield the same point estimates for population parameters as sample survey software packages. However, the estimated variance often is not correct and can be substantially wrong, depending upon the particular program within the standard software package (p. 1).

An incorrect estimated variance can increase the likelihood of Type 1 error (Brogan, Thomas & Heck, 2001). Brick, Morganstein, and Valliant (2000) suggest using replication methods to accurately approximate standard errors of the estimator. Jackknife and balanced repeated replication methods are suggested (Brick et al.). "Replication methods can be implemented using WesVar," (Brick et al,. .p. 2).

Type 1 error can also be corrected through use of the Bonferroni correction, regarded by some as the simplest correction method (Miles & Shelvin, 2001). This

method involves correction of the significance level by dividing the original significance level by the number of comparisons made in the analysis.

The use of SPSS for both descriptive and complex statistical analysis helps to insure the reliability of data. Third-party software packages such as WesVar and others must import data from a SPSS export function, introducing opportunities for data read errors.

This survey used the supplemental multiple logistic regression analysis package available for SPSS. This software was used to perform the logistic regressions for both models and for each of the three data samples in the bifurcated data.

Because of the concerned noted above with the use of weighted data, this study used only actual BPS:96/01 data selected for all first-time students enrolled in four-year institutions. The results of this study are based on the actual data from BPS 96/01. Imputation, weighting, and other similar measures used to account for missing data or incorrect data were not used in this study. This is a departure from the Duggan (2002) study that used two different BPS weighting factors in analysis and also used imputation of data for the large number of missing data points. The use of actual data also varies from the Somers (1992) study that used weighting and imputation based on dummy variables.

Below (2003) studied persistence using a similar model and coding scheme. In that study, the university of NPSAS:96 and BPS:96/98 data were reduced to a similar number of 3,146 students. Below did not use weighting for background data, but did use imputation via dummy variables for some financial aid variables.

The methodological approach to use actual data instead of weighted or imputed data is one of the aspects of this study that makes it unique from previous persistence studies using BPS 96/01.

Cross-tabulations

Cross-tabulations are a preliminary method for initial assessment of the relationship between the independent variable and dependent variable. This study used cross-tabulation to compare first-generation students at two-year and four-year institutions and the dependent variable, first-year persistence, with the other independent variables.

The Chi-square statistic was used to determine the statistical significance of differences between the two groups of students, the dependent variable, and the independent variables.

Odds ratio

Use of the odds ratio is a statistically appropriate method to determine the probability of a relationship is the same for two groups. As the odds ratio approach 1, there is a greater probability that the relationship is exactly the same. Ratios above or below 1 indicate probability in favor of either group.

The odds ratio analysis was used to determine the probability of a relationship between the variables in the study.

Logistic Regression

Regression models are used to describe the relationship between at least two variables. Logistic regression supports analysis of multiple variables and varying measurement scales. Binary logistic regression, using SPSS Advanced Regressions

software package, was used to analyze the data. SPSS is the best choice for this type of analysis, as SPSS can correct for design effects of BPS, including stratification, weighting, and clustering of cases. Binary logistic regression is the most appropriate technique for statistical analysis of models using dichotomous response variables, such as the model in this study. Logistic regression is also appropriate for dichotomous qualitative outcomes such as persistence, as the liner regression transformations are ineffective (Cabrera, 1994). Logistic regression is preferred over forms of linear regression because the relationship between the binary response variable of persistence may be related to more than one explanatory variable. The use of logistic regression allows a model that can include many variables, including those that operate on varying measurement scales (Hosmer & Lemeshow, 2000).

Using logistic regression for analysis is preferred also because logistic regression makes fewer assumptions about homogeneity of data (Cabrera, 1994; SPSS, 2002). In this study, persistence is a dichotomous variable, as students either attend a postsecondary institution the following year or they do not. Logistic regression is preferred over a variety of other methods, including ordinary least squares (OLS) when using a dichotomous dependent variable (Pampel, 2000). Advances in computer software and statistical modeling make use of OLS less common, even though OLS is generally regarded as easier to compute and to interpret. Use of the OLS method in analysis for a dichotomous variables and multiple scales of measurement.

For this study, the proposed method for multiple prediction used the logarithmic formulas below. In the formula, X is the regression matrix of predictor variables, Y is the dichotomous outcome variable, β_0 is the regression constant, β_1 is the regression

coefficient, and P is the expected probability (Rogue Wave, 2002). The effects of the independent variables are reported with the beta coefficients. For a description of the logarithmic formula, see Figure 6.

Figure 6

Logarithmic Formula

$$\mathbf{P(Y = 1|x) = \pi(x)}$$

$$\boldsymbol{\pi}(\mathbf{x}) = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_{p-1} x_{p-1})}{1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_{p-1} x_{p-1})}$$

The initial model for regression includes 42 different variables grouped into seven factors. Using SPSS logistic regression analysis software, the best subset of variables in each factor were determined, based on regressions yielding probabilities closest to 1. This method, proposed by Furnival and Wilson (1974), used complex software analysis to determine the best model (Hosmer & Lemeshow, 2000).

The use of the best subsets in linear regression is accomplished through analysis using the formula noted below:

$$n \times (p+1) = \begin{bmatrix} 1 & x_{11} & x_{12} & \Lambda & x_{1p} \\ 1 & x_{21} & x_{22} & \Lambda & x_{2p} \\ \mathrm{M} & \mathrm{M} & \mathrm{M} & \Lambda & \mathrm{M} \\ 1 & x_{n1} & x_{n2} & \Lambda & x_{np} \end{bmatrix}$$

Maximum likelihood estimates are determined through iterative sequences of regression (Hosmer & Lemeshow, 2000). Maximum likelihood fit of logistic regression is calculated for each case using the formulas outlined in Hosmer & Lemeshow:

Case weight: $v_i = \hat{\pi}_i \left(1 - \hat{\pi}_i\right)$

Dependent variable maximum likelihood logistic regression formula:

$$z_i = \left(1, x_i'\right)\hat{\beta} + \frac{\left(y_i = \hat{\pi}_i\right)}{\hat{\pi}_i\left(1-\hat{\pi}_i\right)}$$

$$= \hat{\beta}_0 + \sum_{j=1}^{p}\hat{\beta}_j x_{ij} + \frac{\left(y_i = \hat{\pi}_i\right)}{\hat{\pi}_i\left(1-\hat{\pi}_i\right)}$$

$$= \ln\left(\frac{\hat{\pi}_i}{1-\hat{\pi}_i}\right) + \frac{\left(y_i - \hat{\pi}_i\right)}{\hat{\pi}_i\left(1-\hat{\pi}_i\right)}$$

From this point, fitted values, $\hat{\pi}_i$, are used to compute the values of z_i and v_i. Using SPSS liner regression models with z_i as dependent variable and x_1 as the matrix of independent variables.

In the equation noted above, case weighting can be used to compute the value of v_i. In this study, case weighting was not used, so v_i is 1 in all computations (Hosmer & Lemeshow, 2000).

To determine residual sum-of-squares, the following formulas are used, adapted for no case weights:

$$\left(Z_i - \hat{Z}_i\right) = \frac{\left(y_i - \hat{\pi}_i\right)}{\hat{\pi}_i\left(1 - \hat{\pi}_i\right)} \text{ to produce } \sum_{i=1}^{n}\left(Z_i - \hat{Z}_i\right)^2 = \sum_{i=1}^{n}\frac{\left(y_i - \hat{\pi}_i\right)}{\hat{\pi}_i\left(1-\hat{\pi}_i\right)}$$

As noted in Hosmer and Lemeshow (2000), "the subsets of variables selected for 'best' models depends on the criterion chosen for 'best.'" (p. 131). In this study, best is

defined as the combination of variables in each factor leading to the logistic regression yield with the best fit of the model, nearest to a probability of 1.

The Δ-*p* statistic is calculated for all variables. Petersen (1985) outlines the method for calculating the Δ-*p* to be used. This statistic measures the change in the probability of persistence that is attributable to a change in an independent variable (beta coefficient). The Δ-*p* is a more easily interpreted measure of influence (Paulsen & St. John, 2002). The Δ-*p* statistic is also useful because of previous use and application in data analysis by researchers such as St. John, Somers, and Cofer when studying BPS and NPSAS.

The Δ-*p* statistic is important in this type of research because it can provide a standard measure of the change in the dependent variable. Δ-*p* quantifiably measures the dependent variable change when using dichotomous variables. When analyzing continuous variables, the Δ-*p* is reported as a percentage change measure. The Δ-*p* statistic is a measure of association to explain how the change in a variable contributes to the outcome, or dependent variable (Hosmer & Lemeshow, 2000). Put another way, Petersen's Δ-*p* statistic measures the increase or decrease in the outcome probability (Freeman, 2003).

The Δ-*p* statistic used in this research is based on the research of Petersen (1985). This method was discussed in Cabrera (1992), as the formula:

$$Delta - p = \frac{e^{L_1}}{1 + e^{L_1}} - P_0$$

In the case where:

$L_1 = L_0 + B_{(variable)}$

$L_0 = \ln[P_0/(1-P_0)]$

P0=sample mean for dependent variable

As Cabrera (1992) notes, the Δ-*p* statistic is a convenient method to measure change in the dependent variable. This statistic provides a standard for studies using a variety of research methods, thus improving the readability and understanding of different studies. The Δ-*p* statistic is easily interpreted in persistence studies, as a Δ-*p* of .10 indicates a 10% increase in the probability of persisting for the variable studied.

The Δ-*p* statistic is relevant to the methodology of this study because of statistical and methodological use in previous NPSAS and BPS studies by St. John, Cofer, Somers, Langrehr, Below, Freeman, and others.

The Δ-*p* statistic is easily converted into percentage, and is easily compared across varying survey samples. In this study, the primary objective is to review persistence at four-year and two-year institutions and to then subsequently compare differences between persistence and predictive factors and variables at the two institutions. The Δ-*p* statistic and associated percentage calculations makes comparisons easier to interpret, to compare, and to contrast. Then use of the Δ-*p* statistic also allows for determination of significance based upon similarities and differences in the sample data and not constrained only by significance determined by p-values at preset significance levels, such as $p \leq 0.001$, $p \leq 0.01$, or $p \leq 0.05$.

Analytical Procedure

The study used the analytical processes from several theoretical and research foundations to compute the logistic regression analysis of the model. Processes from Freeman (2003), Below (2003), and Cabrera (1992) are included.

The analytical process developed by Freeman (2003) in his study of persistence of African-American community college students is included as a foundation of this analysis. Freeman's process includes analysis to determine goodness-of-fit, logistic regression, and correction for complex survey errors. Freeman also suggests the use of Δ-*p* measures as an alternative to odds ratios, based on Petersen (1985). Petersen's Δ-*p* model was also used by Below (2004); Somers, Cofer, Martin-Hall, and VanderPutten (2000); Somers, Cofer, and VanderPutten (1999); and Somers, Woodhouse, and Cofer (2000).

The model in Figure 7 is reflective of Freeman's work, as applied to the research questions in this study.

Figure 7

Freeman's Analysis Procedure, modified

Step 1: Extract data from BPS:96:98. Enter data in SPSS 12.0. Check integrity of data and determine relevant cases.

Step 2: Re-code variables for analysis.

Step 3: Using bi-variate correlation, identify variables for analysis with logistic regression.

Step 4: Determine beta coefficients for the model using stepwise backward likelihood ration logistic regression.

Step 5: Review model using odds ratio, confidence intervals, Δ-p measures, and goodness-of-fit.

Step 6: Compare odds ratios and significance using SPSS.

Step 7: Repeat procedure for two-year, four-year, first-generation, and continuing-generation students.

This study includes additional information on descriptive statistics, based upon the work of Duggan (2002), who demonstrated the value of analysis of descriptive statistics for this type of research using complex samples with a large number of variables grouped into several factors.

Below's (2003) procedure for recoding BPS variables was followed. After BPS variables were identified from the BPS codebook, The variables were recoded with new names to maintain accuracy and to preserve the original data extracted from the BPS data set. Recoding of each variable was conducted after referencing the BPS codebook and insuring all data ranges were logged and coded properly.

As in Below's (2003) and Freeman's (2003) analysis, the original sample was subdivided into different groups. Below and Freeman separated the sample by ethnicity. This study separates the sample by institution of first-year attendance, at two-year or four-year attendance, and tests the proposed model as a predictor for year-to-year persistence.

SPSS regression analysis computed the beta coefficients for both groups. Beta coefficients were converted to Δ-p statistics with Microsoft Excel. The resulting data were analyzed and compared to current and previous research on student persistence.

The primary concern of the research was the testing of the proposed model to predict the year-to-year persistence of first-generation college students at two-year or four-year institutions, based on first-generation or continuing-generation status.

Summary

This study used a variety of models based on student persistence to investigate four primary research questions. The purpose of the research was to develop and test a theoretical framework to describe the year-to-year persistence of beginning postsecondary education students at two-year and four-year institutions. Statistical analysis was conducted on a population of data from the restricted data access for the Beginning Postsecondary Students Longitudinal Study, years 1996-1998. The nationally representative study surveyed more than 12,400 students. The method for study for this paper was based on actual cases meeting the model and methodological criteria.

The research model was based on seven factors and 42 variables distributed into the factors. The factor and variable selection was based upon previous research on social capital, student persistence, and college choice.

The statistical methods used included complex survey analysis, cross-tabulations, odds ratios, and logistic regression. The analysis method was based upon the work of freeman (2003), modified for this study.

CHAPTER 4

Results: Four-year students

Introduction

The purpose of this study was to develop and test a model for year-to-year persistence of first-generation, first-time students at two-year and four-year colleges. Determining a model to describe persistence is of growing importance to postsecondary institutions struggling with social and financial concerns. Particularly at state-funded public institutions, revenue from student payments is increasingly important as state legislative and governing organizations decrease the state funding to postsecondary education.

Based upon the literature, it was anticipated that first-generation college students were at a greater risk of dropping out when compared with continuing-generation students. An accurate model to identify those students who may be more likely to drop out can result in development of specific targeted measures to improve persistence. Additionally, a model may serve as a proxy for race, an important factor in the current era of concern regarding race-based admissions, financial aid, and other support services.

Specifically, this study examined 42 variables grouped into seven factors. The factors were based on the research of Duggan (2002) and Somers, Woodhouse, and Cofer (2000) that included social capital variables in persistence studies. The integrated model of many variables grouped into factors is based on the research of Cabrera, Castaneda, Nora, and Hengstler (1992), founded on the theories of Tinto and Bean.

For this study, the seven factors included background, high school experience, college-entry, finances, social integration, academic integration, and college

performance. This chapter presents and analyzes the descriptive statistics and logistic regressions for the study sample of students attending four-year institutions, including all students, first-generation students, and continuing-generation students.

Descriptive Statistics

For descriptive statistics, all results are based on BPS:96/01 data selected for all first-time students enrolled in four-year institutions. As noted in the methods chapter of this study, weighting, imputation, or dummy variables are not used in the analysis of data.

The results of this study are based on the actual case data from BPS 96/01. As suggested by Duggan (2002), the initial sample size of 15,851 cases was significantly reduced to eliminate missing data, contradictory data, or other data not suitable for testing because of integrity problems. The first reduction in case size removed 7,587 cases, or 47.86%, because of missing persistence data, as that variable was the dependent variable for this study. Using variables contained in the background factor, an additional 1,490 cases, or 9.40% of the original cases, were eliminated. Removing the 1,888 cases with missing data in the high school factors, or 11.91% of the original cases, left a total of 4,886 valid cases. Of the remaining cases, 199 were removed for missing data in the financial factor variables, or 1.26% of the original. Using the variables in the social integration factor, an additional 546 cases were removed, or 3.44% of the original 15,851 cases. Finally, 635 cases were removed for missing data in the academic integration factor, or 4.01% of the original cases. With removal of all missing data points, the total number of cases remaining for examination were 3,506, or 22.12%.

The descriptive statistics presented in this chapter were based solely upon those students in the final model who attended a postsecondary institution offering four-year

degrees through professional degrees. Table 7 contains a breakdown of the total sample frequency by institution and shows the number of cases analyzed at two-year and four-year institutions.

Table 7

Sample Frequency by Type of Institution

	Frequency	Percent
Two-Year Institution	310	8.8
Four-Year Institution	3196	91.2

The original model proposed for this study included several variables that were not dichotomous, based upon previous research used for model development. Although the original research, literature review, and data extraction contained non-dichotomous variables, this revised model used for statistical analysis required dichotomous variable coding in all cases. Table 8 contains a complete listing of the revised model, as recoded for dichotomous variables. The dichotomous coding scheme was based upon work of Freeman (2003) in his analysis of year-to-year persistence of two-year college students.

Table 8

Original Model Recoding for Dichotomous Variable

Factor/Variable	Original Coding	Dichotomous Coding
Background Factor		
First-generation	0=1st gen. 1=2nd gen.	Same. Parent (mother and father) variables computed and coded into one dichotomous variable indicating if either parent had postsecondary education meeting the definition for first-generation. Dependent Variable.
Age	0= ≤21 yrs 1= ≥21 yrs	Same

Male	0=male 1=female	Same
Family Size	0=2 1=3-4 2=5-6 3=7+	1=1; a "traditional" family with 2 or 3 additional family members 0=2,3,4; a "nontraditional" family with student and 1 other; or a larger family of more than 5
Race	0=Black 1=Asian 2=Hispanic 3=Other & Native American 4=Caucasian	4=4; Caucasian 0=0,1,2,3; Compares Caucasian to all other races
Family in College	0=1 (student) 1=1-2 2=3+	1= 1,0; Student plus up to 2 family members in college 0=2; Three or more family in college
English is Primary Language (language spoken as first language)	0=no 1=yes	Compares to English as primary language in home
Family Income	0=0-44,999 1=45,000-74,999 2=75,000-124,999 3=125,000+	1=0,1; family income below $75,000 0=2,3; family income of $75,000 or more
<u>High School Factor</u> Attended Public High School	0=no 1=yes	Same
High School Curriculum	0=did not meet basic curriculum 1=met basic curriculum or slightly rigorous 2=rigorous	0=Did not meet basic curriculum 1=Basic, slightly rigorous, or rigorous curriculum
High School GPA	0=A's (only A's) 1=B's (B's and some A's) 2=C's or less (C's with some B's; D's, or F's)	0=0,1; A and B level students 1=2; C or lower level student

High School Location	0=urban 1=suburban 2=rural	0=2; rural location 1=0,1; suburban or urban
SAT Scores	0=400-750 1=750-900 2=900-1049 3=1050+	0=3; Test score of 1050+ 1=0,1,2; Test score of 1049 or lower
<u>College-entry Factor</u>		
Attend Part-Time	0=no 1=yes	Same
Delayed Entry Into College	0=no 1=yes	Same
Attended Public Institution	0=no 1=yes	Same
<u>Financial Factor</u>		
Satisfied With College Cost	0=no 1=yes	Same
Goal: To be Financially Successful	0=no 1=yes	Same
Financial Aid Status	0=aided, no loans 1=aided, with loans 2=only Loans 3=no aid	0=3; No aid 1=0,2,3; Has aid
Financial Aid Amounts	0=high award of grants/scholarships 1=low award of grants/scholarships 2=high award of work study 3=low award of work study 4=high award of loans 5=low award of loans 6=total aid value	This variable was removed from the final model.
Work Status	0=no work	0=4; working 31 or more hours

	1=1-10 hours 2=11-20 hours 3=21-30 hours 4=31+ hours	1=0,1,2,3; working less than31 hours.
<u>Social Integration Factor</u>		
Distance from Home to College	0=1-15 miles 1=16-50 2=51-150 3=150+	0=3; 150 or more miles from home 1=0,1,2; less than 150 miles from home
College Housing	0=non-resident 1=in campus housing	Same
Friends Attend Same	0=no 1=yes	Same
Has E-mail Account	0=no 1=yes	Same
Satisfied with Campus Climate	0=no 1=yes	Same
Go Places with Friends	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
<u>Academic Integration Factor</u>		
Satisfied with Intellectual Development	0=no 1=yes	Same
Satisfied with College's Prestige	0=no 1=yes	Same
Satisfied with Instructor's ability to teach	0=no 1=yes	Same
Participation in Fine Arts Activities	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
Meet with Advisor	0=never	0=0 Never

About Plans	1=sometimes 2=often	1=1,2; compares with never versus sometimes or often
Go to Lectures with Friends	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
Social Contact with Faculty	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
Took One or More Remedial Courses	0=no 1=yes	Compares to those taking remedial courses
Participate in Study Groups	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
College Major	0=undeclared 1=declared major	Same
Talk with Faculty Outside Class	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
<u>College Performance</u>		
College GPA	0=mostly A's 1=A's & B's 2=Mostly B's 3=B's & C's 4=Mostly C's 5=C's and D's 6=D's or lower	0=0,1,2,3,4 1=5,6
Year-to-Year Persistence	0=no 1=yes	Dependent variable, Compared to students who did not persist.

The sample included first-generation students and continuing-generation students with complete data in the BPS system for all variables in the study, as outlined in the definitions. The sample size resolved to a selected group of 3,506 students, or 22.12% of the original sample of all students in the BPS data of 15,851 cases. Dividing students

into the model proposed for two-year and four-year institution students removed 310 additional students from the four-year student model.

Students who persisted from year-to-year were in the study, along with students who did not persist from year-to-year. Table 9 contains a breakdown of the total sample frequency by institution type and shows the number of cases analyzed at two-year and four-year institutions.

The percentage of four-year students who persisted was 18.12% higher when compared to the entire sample of students included in the BPS:96/01 data set (Table 9), although when the BPS data were corrected for only two-year and four-year full-time attendees, the sample difference decreased to a variance of 6.72% between the sample and total population (Table 10).

Table 9

Comparison of BPS:96/01 Study Sample to 1996 College Student Population

	Study Sample		1996 Four-Year, Public and Private College Student Population	
	N	% of Total	N	% of Total
4-year Institution	3196	91.12	10196	73.01
2-year Institution	310	8.84	3770	26.99

Table/Figure 10

Comparison of BPS:96/01 Study Sample to 1996 Full-time College Student Population

	Study Sample		1996 Four-Year, Public and Private College Student Population	
	N	% of Total	N	% of Total
Full-time, 4-year Institution	3196	91.12	10018	84.44
Full-time, 2-year Institution	310	8.84	1846	15.56

Cross-tabulations

To compare first-generation students with continuing-generation students, cross-tabulations were run using SPSS. First-generation status was used as the independent variable, and each variable within the appropriate factor was cross-tabulated.

First-Generation Status

The BPS:96 data provided variables for the educational attainment of the mother or female guardian and the father or male guardian, if applicable to the student's situation. Each variable was re-coded to meet the definition of first-generation or continuing-generation students as defined by this study. The two variables were then merged into a new variable that accurately noted a student's first-generation or continuing-generation status based upon the educational attainment of the mother or the father. The model for students attending a four-year institution of postsecondary education yielded first-generation student status at 58.00%, while continuing-generation students made up the remaining 42.00% of the sample.

Background Factor

This model used nine variables in the background factor. The background factor variables were generally associated with the student experience before entering the postsecondary institution. The model adds a variable concerning English spoken as a primary language as a direct result of previous work by Duggan (2002). Table 11 compares the background variables for first-generation students at four-year institutions.

Table 11

Comparison of Background Variables by First-generation Status at four-year Institutions

		First-generation	Continuing-generation
Age			
	21 or younger	99.95	99.78
	22 or older	0.05	0.22
Gender			
	Male	27.33	68.75
	Female	72.67	31.25
Size of Family			
	"Traditional" Family	73.64	44.89
	"Nontraditional" Size	26.36	55.11
Race			
	Caucasian	76.66	83.15
	Non-Caucasian (all groups	23.34	15.85
Family in College			
	Student and up to 2 others	76.01	39.75
	Student and 3 or more	23.99	60.25
Primary Language			
	English	92.29	95.30
	Non-English	7.71	4.70
Family Income			
	Below $75,000	80.75	60.40
	$75,000 or more	19.25	39.90

High School Factor

The model had five variables that comprised the high school factor. The high school factor was made up of variables that were outside of the control of the postsecondary institution. The model included academic predictors in high school suggested by Below (2003), Freeman (2003), and Duggan (2002). Table 12 compares the factor variables for first-generation students at four-year institutions.

Table 12

Comparison of High School Variables by First-generation Status at four-year institutions

		First-generation	Continuing-generation
Public High School			
	No	10.30	16.48
	Yes	89.70	83.52
Rigorous High School Curriculum			
	No	25.23	20.36
	Yes	74.78	79.66
High School GPA			
	A or B Level Student	92.08	93.06
	C Level or Lower Student	7.92	6.94
High School Location			
	Rural Location	34.12	23.12
	Urban or Suburban	65.88	76.88
SAT Score			
	1050 or higher	32.13	50.63
	1049 or lower	67.87	49.37

College-entry Factor

The college-entry factor was made up of three variables. Based upon the work of Duggan (2002); Somers, Cofer, Martin-Hall, and VanderPutten (2000); Somers, Cofer, and VanderPutten (1999); and Somers, Woodhouse, and Cofer (2000), several hundred pre-college-entry factors were narrowed to the three variables demonstrated as significant in the works cited above. These three variables were the full-time or part-time student status, if the student delayed entry into postsecondary education after high school graduation, and the public or private control of the postsecondary education institution. Table 13 compares the college-entry variable for first-generation students at four-year colleges.

Table 13

Comparison of College-entry Variables by First-generation Status at four-year institutions

	First-generation	Continuing-generation
Attend Part-Time		
No	89.14	89.48
Yes	10.86	10.52
Delayed Entry Into College		
No	94.18	96.12
Yes	5.82	3.88
Attended Public Institution		
No	32.94	32.66
Yes	67.06	67.34

Financial Factor

Four variables made up the financial factor. These variables were satisfaction measurement about the cost of attendance, the financial goal of the student, a general financial aid variable, and the student's work status during the time of the study. Table 14 compares the factor variables for first-generation students at four-year institutions.

Table 14

Comparison of Financial Variables by First-generation Status at four-year institutions

		First-generation	Continuing-generation
Satisfied with College Cost			
	No	32.9	32.7
	Yes	67.1	67.3
Goal: To Be Financially Successful			
	No	22.9	25.9
	Yes	77.1	74.1
Financial Aid Status			
	No Aid	18.2	25.4
	Received Aid	81.8	74.6
Work Status			
	Working 31 or more hours	7.2	7.1
	Working 30 or fewer hours	92.8	92.9

Social Integration Factor

Six variables were included in the social integration factor. These variables were suggested by social capital research. The work by Duggan (2002) and research referenced earlier in this study served as a foundation for the selection of variables. These variables indicated the involvement of the student into the social opportunities at the institution. The postsecondary institution can have significant input into these variables through offering housing on campus, managing the campus climate as perceived by students, and through the campus activities. Table 15 compares the social integration variables for first-generation students at four-year colleges.

Table 15

Comparison of Social Integration Variables by First-generation Status at four-year institutions

		First-generation	Continuing-generation
Distance from Home to College			
	150 or more miles	31.27	44.37
	Fewer than 150 miles	68.73	55.63
College Housing Status			
	Non Resident	28.09	21.10
	In Campus Housing	71.91	78.90
Friends Attending Same Institution			
	No	94.12	94.18
	Yes	5.88	5.82
Has e-mail Account			
	No	54.12	42.88
	Yes	45.88	57.12
Satisfied With Campus Climate			
	Never	11.81	12.83
	Sometimes or Often	88.19	87.17
Go Places with Friends			
	Never	4.74	3.06
	Sometimes or Often	95.26	96.94

Academic Integration Factor

The academic integration factor was constructed with eleven variables. The variables were selected for the model based on research suggesting them to be the most likely to be associated with persistence through involvement in the academic life of postsecondary education students. Selection of the specific variables from BPS:96 was based upon the work of Freeman (2003), Below (2003), Dugan (2002), and the theories of student persistence previously reviewed. The variables in this factor were under direct control of the postsecondary institution through the offering of programs, services,

events, and activities. Table 16 compares the academic integration variables for first-generation students at four-year colleges.

Table 16

Comparison of Academic Integration Variables by First-generation Status at four-year institutions

	First-generation	Continuing-generation
Satisfied with Intellectual Development		
No	6.8	5.3
Yes	93.2	94.7
Satisfied with College's Prestige		
No	11.4	9.5
Yes	88.6	90.5
Satisfied with Instructor's ability to teach		
No	10.3	7.6
Yes	89.7	92.4
Participation in Fine Arts Activities		
Never	37.7	33.3
Sometimes or Often	62.3	66.7
Meet with Advisor About Plans		
Never	11.6	11.0
Sometimes or Often	88.4	89.0
Go to Lectures with Friends		
Never	40.5	37.8
Sometimes or Often	59.5	62.2
Social Contact with Faculty		
Never	00.0	00.0
Sometimes or Often	100.0	100.0
Took One or More Remedial Courses		
No	86.4	89.6
Yes	13.6	10.4
Participate in Study Groups		
Never	24.4	19.9
Sometimes or Often	75.6	80.1
College Major		
Undeclared	19.3	24.5
Declared Major	80.7	75.5
Talk with Faculty Outside Class		
Never	15.5	12.1
Sometimes or Often	84.5	87.9

College Performance

The grade point average for the student measured college performance. Grade point average was the sole variable in this factor. Table 17 shows the college grade point average comparison for first-generation and continuing-generation students at four-year colleges.

Table 17

Comparison of College Performance Variables by First-generation Status at four-year institutions

		First-generation	Continuing-generation
College GPA			
	A, B, or C –level Student	88.2%	90.8%
	D or lower –level Student	11.8%	9.2%

Descriptive Statistics on Persistence

The sample of students at four-year postsecondary institutions included the total sample size of 3,195 cases. As noted in Table 18, continuing-generation students persisted to the second year of postsecondary education at a rate of 3.95% greater than first-generation students. Continuing-generation students were more likely to persist when compared to first-generation students, consistent with current research and theory.

Table 18

Comparison of Persistence Result for all Students at four-year institutions

Year-to-Year Persistence	First-generation	Continuing-generation
Did not Persist	9.92%	5.97%
Did Persist	90.08%	94.03%

Correlation

This section describes results of a basic correlation between first-generation status and the dependent variable, persistence, for students at four-year postsecondary education institutions. The correlation analysis is not bifurcated by first-generation and continuing-generation status.

To compare first-generation students with continuing-generation students using persistence as the dependent variable, a simple correlation was run using SPSS. First-generation status was used as the correlation factor based on the research questions for this study and the focus on the persistence of first-generation college students in postsecondary education. Table 19 shows the results for persistence correlations for all students at four-year colleges.

Table 19

Correlation of Persistence Result for All Students at four-year Institutions

Statistical Test	First-generation student	Dependent Variable Persistence
Pearson Correlation	1	-.071(**)
Sig. (2-tailed)	.	.000
Sum of Squares and Cross-products	778.334	-30.806
Covariance	.244	-.010
N	3196	3195

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

Logistic Regression Analysis

This section describes results of the logistic regression analysis for students at four-year postsecondary institutions. The regression analysis was bifurcated by first-generation and continuing-generation student status, as this was the primary research goal of this paper. Additionally, the regression analysis for all students included in the sample for four-year postsecondary institutions is presented.

This regression analysis was based on the student choice to persist, coded as a dichotomous variable. Logistic regression is a widely used statistical method to determine the relationship between a number of variables to a dichotomous result variable (Schuster & von Eye, 1998).

The logistic regression calculated beta weights for each variable used in the equation. According to Cabrera (1994), beta weights are then easy to transform and use to accept or reject the null hypothesis.

In the discussion of results for each group, figures are reported for each variable. The Δ-*p* statistic is presented in the text for variables with a Δ-*p* probability percentage value of 5.00% or greater. The full results for all variables, at all percentage levels, are included in later discussion, in table format. This methodology is similar to the process used by Below (2003). The 5.00% probability statistic of the Δ-*p* value is listed as a significant variable affecting the increase or decrease in the probability of persistence, the dependent variable.

Models

All students model. The variables previously discussed were used in the logistic regression analysis with all four-year students. Both first-generation and continuing-generation students were included in this model. A total of 3,196 students were considered, with six cases removed for missing data in one of the variables. The dependent variable was the year-to-year persistence of the student from the fall 1995 semester to the fall 1996 semester.

Logistic regression analysis results indicated each background variable was significant in this model with all students. Students entering four-year postsecondary

education under the age of 21 were 51.5% less likely to persist than students entering at age 21 or above. For the entire sample, men were more likely to persist, at 35.21% higher. Students with a "nontraditional" family unit of other than 2 or 3 additional family members were more likely, by 30.95%, to persist. Race was a less significant predictor, at 9.07%. Students started postsecondary education with only one additional sibling in college were 14.29% more likely to persist. Students with a high family income were more likely to persist than middle-income students at 20.10%. The language spoken in the home environment was a significant predictor of persistence, with students speaking a language other than English at home being 10.97% less likely to persist.

The high school factor had fewer significant Δ-*p* predictors. Of the five variables in the factor, only two predicted at the 5.00% or higher level. The SAT score associated at 11.82%, with high scoring students persisting. High school location was associated at 10.75%, with those students in rural locations persisting at a lower rate when compared to the group of suburban and urban students.

Only one college-entry variables was significant above the 5.00% level, the delayed entry into college variable. This variable, significant at 12.61%, showed students who delayed entry into college were more likely to persist.

Two of the financial variables were significant with a Δ-*p* value at the 5.00% or higher level. Students with a goal to be financially successful in the future demonstrated a 5.75% greater probability of persistence, and students who had no financial aid were 9.98% more likely to persist.

Two of the six social integration variables were significant with a Δ-*p* at the 5.00% or greater level. The distance from home was significant at 8.56%; students who

were less than 150 miles from home were more likely to persist. Students who only sometimes or never went places with friends were 8.18% less likely to persist from year-to-year.

The academic integration variables included the only variable that returned a constant predictive value of 1.00, or 100%, for all students who persisted from year-to-year. This variable, social contact with faculty, was answered by every student who persisted from year to year as having some social contact with faculty. All students who persisted in this sample, regardless of first-generation or continuing-generation status, responded they had social contact with the faculty at the postsecondary institution. Review of the universe data indicated students who did not persist had both social contact and not social contact with faculty. In addition to the constant variable, three additional variables were significant at the 5.00% or greater level. Students who reported they were not satisfied with their intellectual development were 5.72% less likely to persist. Students who participated in fine arts activities never or sometimes were 10.11% less likely to persist. Finally, students who never talked with faculty outside of class were 6.81% less likely to persist.

The final factor, college performance, was the single variable measuring the performance based on the grade point average of the student. Students who achieved A, B, or C grades were 3.39% more likely to persist when compared to students with lower grades.

The logistic regression evaluated 37 variables in seven factors. The all student regression examined year-to-year persistence for both first-generation and continuing-generation students at four-year institutions. Table 20 shows the Δ-p values, beta-

coefficients, and significance levels for the model. The Nagelkerke R^2 for the model was 0.245. The chi-square statistic for this sample of all four-year students was 326.064 with 37 degrees of freedom. The model correctly predicted 99.01% of all students who persisted. The model predicted 10.23% of students who did not persist. The overall predictive percentage for the model was 91.66% for all persistence decisions.

Table 20

Analysis of Year-to-Year Persistence of all Students at Four-Year Postsecondary Institutions

Factors and Variables	Delta- *p*	Beta Coefficient	Significance Level
Background			
Age	-0.5149	-2.980499273	
Gender	0.3521	2.303285265	
Size of Family	0.3095	1.766335248	**
Race	0.0907	0.388798406	
Family in College	0.1429	0.636490830	
Primary Language	-0.1097	-0.4506910665	**
Family Income	0.2007	0.948243099	
High School			
Public High School	0.0405	0.16889476	
Rigorous High School Curriculum	-0.0125	-0.050974411	
High School GPA	-0.0161	-0.065956953	
High School Location	-0.1075	-0.4328437	
SAT Score	0.1182	0.516108616	
College-entry			
Attend Part-Time	-0.0402	-0.163289962	
Delayed Entry Into College	0.1261	0.553934595	**
Attended Public College	-0.0047	-0.01911962	
Financial			
Satisfied with College Cost	-0.0082	-0.033549917	**
Goal: To Be Financially Successful	0.0575	0.242011556	
Financial Aid Status	0.0998	0.430182657	
Work Status	0.0437	0.182646386	**

Social Integration			
Distance from Home to College	0.0856	0.365859133	
College Housing Status	-0.0058	-0.023800495	
Friends Attending Same Institution	-0.0082	-0.033579655	
Has e-mail Account	-0.0248	-0.100960257	***
Satisfied With Campus Climate	0.0243	0.100481284	
Go Places with Friends	-0.0818	-0.33010261	
Academic Integration			
Satisfied with Intellectual Development	-0.0572	-0.231395553	
Satisfied with College's Prestige	-0.0334	-0.135788441	
Satisfied with Instructor's ability to teach	-0.0490	-0.198810724	
Participation in Fine Arts Activities	-0.1011	-0.40708564	
Meet with Advisor About Plans	0.0075	0.030888369	
Go to Lectures with Friends	0.02883246	0.119688113	
Social Contact with Faculty	1.0000	1.0000	
Took One or More Remedial Courses	0.0220	0.09114451	
Participate in Study Groups	-0.0157	-0.0640524	**
College Major	0.0404	0.168587	
Talk with Faculty Outside Class	-0.0681	-0.275372	
College Performance			
College GPA	0.0339	0.14093159	***
Logistic Regression Statistics			
Nagelkerke R^2	0.245		
Chi-square	362.064		
Degrees of Freedom	37		
Correct Prediction	Persisting	99.01%	
	Did Not Persist	10.23%	
	Overall	91.66%	

Note:
*** Significant at $p \leq 0.001$
** Significant at $p \leq 0.01$
* Significant at $p \leq 0.05$

First-generation students model. The model variables were used in the next step of model testing for only first-generation students. This second logistic regression used subsets of the original sample of students persisting at a four-year institution. This section covers the regression analysis for first-generation students.

A total of 1,340 students were considered. Of the sample, 1,260 persisted to the next year, or 94.03%, Only one case was removed for missing data in one of the variables. The dependent variable was the year-to-year persistence of the student from the fall 1995 semester to the fall 1996 semester.

All of the background characteristics were significant variables in this sample. Six of the seven variables in this factor were significant at the 5.00% or greater level. In the first-generation subset, students entering four-year postsecondary education over the age of 21 were 9.92% more likely to persist than students entering at age 21 or less. Gender was the only variable in this factor that demonstrated no significant difference. Students with a "nontraditional" family unit of other than 2 or 3 additional family members were less likely, by 16.36%, to persist. Race was associated with persistence, with students who were not Caucasian persisting at 12.09% less. Students with three or more siblings in college were less likely to persist by 12.09%, and students who grew up in an environment where English was not the primary language showed significantly less likelihood of persistence with a negative predictor of 25.55% Students with a high family income were more likely to persist than middle-income students, at 13.34%.

The high school factor analysis yielded fewer significant Δ-p statistic results. Of the five variables in the factor, only one had a Δ-p at the 5.00% or higher level. Students

who attended a private high school were 5.98% more likely to persist. The SAT score did not significantly associate with persistence with a Δ-*p* of 2.70%

Two of the three college-entry variables were significant above the 5.00% level. Students who attended college part-time as first-generation students were 6.16% more likely to persist from year-to-year. First-generation students who delayed entry into college were less likely to persist at 17.65%

Two of the four financial variables were significant at the 5.00% or higher level. Students with a goal to be financially successful in the future demonstrated a 7.08% greater persistence rate, and students who worked while attending postsecondary education were more likely to persist by 21.60%. Financial aid status was not an accurate predictor of persistence, with a Δ-*p* value of less than 5.00%.

In the social integration factor, three variables were significant with a Δ-*p* value of 5.00% or greater. First-generation students who had no friends attending the same institution were 19.87% less likely to persist. Students with an e-mail account were 23.41% more likely to persist, and students who said they went places with friends often were 18.89% more likely to persist from year-to-year.

The academic integration factor contain the only variable that returned a perfect 1.00 association value for all students who persisted from year-to-year, social contact with faculty. All students in this sample who persisted, regardless of first-generation or continuing-generation status, indicated they had social contact with the faculty at the postsecondary institution. Because this result was very significant and common for all students who persisted, the researcher reviewed the entire sample of BPS data for

students who both persisted and did not persist. Students who did not persist had mixed results; some had social contact with faculty and others did not.

In addition to the social contact variable, five additional variables were significant and had a Δ-*p* value of 5.00% or greater. Students who reported they were satisfied with their intellectual development were 7.09% more likely to persist. Students reporting satisfaction with the college's prestige were less likely to persist, by 8.00%. Students who participated in fine arts activities never or sometimes were 17.16% less likely to persist. Students who met with their academic advisor to discuss their plans were 7.69% more likely to persist. Attendance at lectures with friends was a predictor of persistence at 10.99%. Students who participated in study groups were 20.66% more likely to persist. Finally, first-generation students with an undeclared major were 16.36% more likely to persist.

The final factor in the model was college performance. This factor was a single variable measuring the performance based on the grade point average of the student, and was significant. Students who achieved A, B, or C grades were 36.76% more likely to persist.

The logistic regression evaluated 37 variables in seven factors. The regression examined the relationship to the dichotomous year-to-year persistence outcome for first-generation students. Table 21 shows the Δ-*p* values, beta-coefficients, and significance levels for the model. The Nagelkerke R^2 for the model was 0.277. The chi-square statistic for this sample of first-generation four-year students was 142.366 with 36 degrees of freedom. The model correctly predicted 99.44% of the first-generation

students who persisted. The model predicted 10.00% of students who did not persist. The overall predictive percentage for the model was 94.10% for all persistence decisions.

Table 21

Analysis of Year-to-Year Persistence of First-generation Students at Four-Year Postsecondary Institutions

Factors and Variables	Delta- *p*	Beta Coefficient	Significance Level
Background			
Age	0.0992	18.27512855	
Gender	-0.0043	-0.017449623	
Size of Family	-0.1636	-0.660179107	**
Race	-0.1209	-0.48695939	
Family in College	-0.1209	-0.351936176	
Primary Language	-0.2555	-1.055873891	
Family Income	-0.1334	-0.537109961	
High School			
Public High School	0.0598	0.251819274	
Rigorous High School Curriculum	0.0211	0.08718564	
High School GPA	-0.0181	-0.073891245	
High School Location	0.0448	0.187135113	
SAT Score	0.0270	0.112183623	
College-entry			
Attend Part-Time	0.0616	0.259484277	
Delayed Entry Into College	-0.1765	-0.713658139	
Attended Public College	-0.0146	-0.059861581	
Financial			
Satisfied with College Cost	0.0708	0.299948418	
Goal: To Be Financially Successful	-0.0373	-0.151684993	
Financial Aid Status	0.0455	0.190291848	
Work Status	0.2160	1.040053098	**
Social Integration			
Distance from Home to College	-0.0087	-0.03554418	
College Housing Status	0.0438	0.183126696	
Friends Attending Same	-0.1987	-0.806557148	

Institution			
Has e-mail Account	0.2341	1.155835558	***
Satisfied With Campus Climate	0.0439	0.183253438	
Go Places with Friends	0.1890	-0.806557148	
Academic Integration			
Satisfied with Intellectual Development	0.0709	0.300590543	
Satisfied with College's Prestige	-0.0800	-0.322863348	
Satisfied with Instructor's ability to teach	0.0175	0.072523421	
Participation in Fine Arts Activities	-0.1716	-0.693140447	**
Meet with Advisor About Plans	0.0769	0.326834971	
Go to Lectures with Friends	0.1099	0.477433619	
Social Contact with Faculty	1.00	1.00	
Took One or More Remedial Courses	0.0311	0.129317013	
Participate in Study Groups	0.2066	0.983073442	***
College Major	0.1636	0.742495872	**
Talk with Faculty Outside Class	-0.0147	-0.060016292	
College Performance			
College GPA	-0.3676	-1.632122045	***
Logistic Regression Statistics			
Nagelkerke R^2	0.277		
Chi-square	142.366		
Degrees of Freedom	36		
Correct Prediction	Persisting	99.44%	
	Did Not Persist	10.00%	
	Overall	94.10%	

Note:
*** Significant at $p \leq 0.001$
** Significant at $p \leq 0.01$
* Significant at $p \leq 0.05$

Continuing-generation students model. The variables previously discussed were used in the logistic regression analysis, with all students who persisted. This logistic

regression analysis used a subset of the original sample of all students persisting at a four-year institution. This section covers the regression analysis for continuing-generation students only.

A total of 1,855 students were considered. Of that group, 1,666 persisted, or 89.81%. All of the 1,666 cases had complete data and were considered in the analysis. The dependent variable was the year-to-year persistence of the student from the fall 1995 semester to the fall 1996 semester.

Two of the background characteristics had a Δ-p statistic that was significant at the 5.00% level for the continuing-generation sample. Continuing-generation students entering four-year postsecondary education under the age of 21 were 5.97% more likely to persist than students entering at age 21 or above. The language spoken in the home was an indicator of persistence, with those not speaking English as the language predicting an 11.55% decrease in year-to-year persistence.

The high school factor analysis showed no associations with a Δ-p of 5.00% level or higher. Of the five variables in the factor, only three even reached above the 1.00% level, and each of those were only slightly above 1.00% It is notable that the SAT score did not significantly predict persistence for continuing-generation students.

Logistic regression of the variables in the college-entry factor indicated only one variable with a Δ-p statistic above the 5.00% level, the delayed entry into college variable. Similar to the first-generation student findings, this variable was significant with a Δ-p value of 6.03%, showing students who delayed entry into college were more likely to persist.

The financial factor variables showed no significant predictors of persistence for continuing-generation college students. Two of the four variables were above the 2.00% level; students who worked while attending postsecondary education, and students who indicated they are satisfied with the college cost.

There were no variables in the social integration factor with a Δ-*p* statistic significantly associated with persistence at 5.00% or above. Continuing-generation students with an e-mail account were 3.89% more likely to persist.

The academic integration variables included the only variable that returned a perfect associational value of 1.00 or 100% for all students who persisted from year-to-year, social contact with faculty. All students in this sample, regardless of first-generation or continuing-generation status, who persisted indicated they had social contact with the faculty at the postsecondary institution. A review of the full set of data for both students who persisted and students who did not persist indicated students who did not persist had social contact with faculty and others did not have social contact with faculty. Other than the constant variable, there were no variables with a Δ-*p* statistic association with persistence at the 5.00% or higher level.

The final factor, college performance, was a single variable measuring the performance based on the grade point average of the student. Students who achieved A, B, or C grades were 18.37% more likely to persist.

The logistic regression evaluated 37 variables in seven factors. The regression examined the relationship to the dichotomous year-to-year persistence outcome for continuing-generation students. Table 22 shows the Δ-*p* values, beta-coefficients, and significance levels for the model. The Nagelkerke R^2 for the model was 0.252. The chi-

square statistic for this sample of continuing-generation four-year students was 236.628 with 8 degrees of freedom. The model correctly predicted 98.44% of continuing-generation students who persisted. The model predicted 10.87% of students who did not persist. The overall predictive percentage for the model was 87.73% for all persistence decisions.

Table 22

Analysis of Year-to-Year Persistence of Continuing-generation Students at Four-Year Postsecondary Institutions

Factors and Variables	Delta- *p*	Beta Coefficient	Significance Level
Background			
Age	0.0597	-1.207883357	
Gender	0.0063	0.005910084	
Size of Family	0.0122	-1.207883357	
Race	-0.0050	0.005910084	
Family in College	-0.0259	-0.387908072	
Primary Language	-0.1155	-1.207883357	**
Family Income	0.0003	0.005910084	
High School			
Public High School	-0.0120	-0.196270805	
Rigorous High School Curriculum	0.0014	0.024828309	
High School GPA	-0.0060	-0.101614947	
High School Location	0.0109	0.212934221	
SAT Score	-0.0118	-0.19333899	
College-entry			
Attend Part-Time	0.0193	0.410781673	
Delayed Entry Into College	-0.0603	-0.765026716	**
Attended Public College	-0.0119	-0.194624717	
Financial			
Satisfied with College Cost	0.0216	0.471493384	**
Goal: To Be Financially Successful	0.0034	0.06135974	
Financial Aid Status	0.0122	0.2422979	
Work Status	0.0261	0.60291062	**

Social Integration			
Distance from Home to College	0.0077	0.147125242	
College Housing Status	0.0085	0.162826453	
Friends Attending Same Institution	0.0022	0.039560061	
Has e-mail Account	0.0389	1.094860137	***
Satisfied With Campus Climate	-0.0053	-0.090938069	
Go Places with Friends	0.0136	0.274181479	
Academic Integration			
Satisfied with Intellectual Development	0.0216	0.473512208	
Satisfied with College's Prestige	-0.0137	-0.221459262	
Satisfied with Instructor's ability to teach	0.0116	0.22905502	
Participation in Fine Arts Activities	0.0027	0.048855761	
Meet with Advisor About Plans	-0.0004	-0.007399468	
Go to Lectures with Friends	0.0079	0.150766223	
Social Contact with Faculty	1.00	1.00	
Took One or More Remedial Courses	-0.0019	-0.033013628	
Participate in Study Groups	0.0081	0.155158991	
College Major	-0.0107	-0.176076514	
Talk with Faculty Outside Class	0.0173	0.361515406	
College Performance			
College GPA	-0.1837	-1.623379355	***
Logistic Regression Statistics			
Nagelkerke R^2	0.252		
Chi-square	236.628		
Degrees of Freedom	36		
Correct Prediction	Persisting	98.44%	
	Did Not Persist	10.87%	
	Overall	89.73%	

Note:

*** Significant at $p \leq 0.001$

** Significant at $p \leq 0.01$

* Significant at $p \leq 0.05$

The value of the Δ-*p* statistic is best illustrated with the example in Appendix A, from Somers (2003), detailing the use of Δ-*p* as a comparative statistic in a variety of studies examining the persistence of students at four-year colleges against a variety of variables.

Discussion of Logistic Regression Analysis

The logistic regression analysis confirmed differences between first-generation and continuing-generation students at four-year postsecondary education institutions, using the proposed model for evaluating year-to-year persistence. According to the findings, there were differences between variables influencing persistence of first-generation and continuing-generation students, based on the proposed model, in every factor except the high school factor. Seventeen of the 37 total examined variables were different at 5.00 percentage points or greater, while 20 of the variables were not significantly different at with a Δ-*p* difference of 5.00 p.p. or greater.

Background factor. Five of the seven variables, or 71.43%, were at least 5.00 p.p. different from first-generation students to continuing-generation students. The greatest difference was in the size of family, a total difference between Δ-*p* values of 15.14.

High school factor. None of the variables had a Δ-*p* difference of 5.00 or greater between first-generation and continuing-generation students. Attendance at public versus private high school was close, at a total difference of 4.78 p.p.

College-entry factor. One of the three variable had a difference between Δ-*p* values of 5.00 or greater. The total difference for first-generation and continuing-generation students for delaying entry into college was 11.62 p.p.

Financial factor. The four variables in the financial factor yielded only one variable with a difference between Δ-*p* values of 5.00 percentage points or greater. The results for the variable regarding work status during the first year of attendance in postsecondary education resulted in a 18.99p.p. difference between first-generation and continuing-generation college students at four-year institutions.

Social integration factor. Six variables make up the factor. Three were significant with a Δ-*p* at the 5.00% or greater level. The largest was the difference between first-generation and continuing-generation students for those having friends attending the same institution. For this variable, the difference was 19.65 p.p., the second largest difference of any single variable between first-generation and continuing-generation college students at four-year institutions.

The third-largest difference between first-generation and continuing-generation students was also in the social integration factor; the variable expressing difference between first-generation and continuing-generation students with an e-mail account. This result is similar to the results found by Duggan (2002) in his research on social capital and persistence.

Academic integration factor. As noted previously, the academic integration factor contains the only variable associated at 100% for all students who persisted, both first-generation and continuing-generation. The factor also has an additional ten variables. Six of the remaining variables were significant with a Δ-*p* of 5.00% or higher.

The largest difference between first-generation and continuing-generation students was found in the academic integration factor. There was a 19.85 p.p. difference

between first-generation and continuing-generation students regarding participation in study groups relating to year-to-year persistence.

College performance factor. The single variable in this factor, the measure of the college grade point average, indicated a difference in Δ-*p* values of 18.39 p.p. between first-generation and continuing-generation students.

Table 23 shows results for all variables for first-generation and continuing-generation students at four-year institutions, including Δ-*p* values for the three tested models. Table 23 also notes differences between the Δ-*p* values for first-generation and continuing-generation students of 5.00 or more percentage points.

Table 23

Differences Between First-generation and Continuing-generation Persistence, by Percentage Point, at Four-Year Institutions

Factors and Variables	All Students	First-generation	Continuing-generation	Difference: first-generation and continuing-generation	Percentage Point difference	Delta-*p* of 5.00% or greater?
Background						
Age	-0.5149	0.0992	0.0597	0.0395	3.95%	No
Gender	0.3521	-0.0043	0.0063	-0.002	-0.20%	No
Size of Family	0.3095	-0.1636	0.0122	0.1514	15.14%	Yes
Race	0.0907	-0.1209	-0.005	0.1159	11.59%	Yes
Family in College	0.1429	-0.1209	-0.0259	0.095	9.50%	Yes
Primary Language	-0.1097	-0.2555	-0.1155	0.14	14.00%	Yes
Family Income	0.2007	-0.1334	0.0003	0.1331	13.31%	Yes
High School						
Public High School	0.0405	0.0598	-0.012	0.0478	4.78%	No
Rigorous High School Curriculum	-0.0125	0.0211	0.0014	0.0197	1.97%	No
High School GPA	-0.0161	-0.0181	-0.006	0.0121	1.21%	No
High School Location	-0.1075	0.0448	0.0109	0.0339	3.39%	No
SAT Score	0.1182	0.027	-0.0118	0.0152	1.52%	No
College-entry						
Attend Part-Time	-0.0402	0.0616	0.0193	0.0423	4.23%	No
Delayed Entry Into College	0.1261	-0.1765	-0.0603	0.1162	11.62%	Yes

Attended Public College	-0.0047	-0.0146	-0.0119	0.0027	0.27%	No
<u>Financial</u>						
Satisfied with College Cost	-0.0082	0.0708	0.0216	0.0492	4.92%	No
Goal: To Be Financially Successful	0.0575	-0.0373	0.0034	0.0339	3.39%	No
Financial Aid Status	0.0998	0.0455	0.0122	0.0333	3.33%	No
Work Status	0.0437	0.216	0.0261	0.1899	18.99%	Yes
<u>Social Integration</u>						
Distance from Home to College	0.0856	-0.0087	0.0077	0.001	0.10%	No
College Housing Status	-0.0058	0.0438	0.0085	0.0353	3.53%	No
Friends Attending Same Institution	-0.0082	-0.1987	0.0022	0.1965	19.65%	Yes
Has e-mail Account	-0.0248	0.2341	0.0389	0.1952	19.52%	Yes
Satisfied With Campus Climate	0.0243	0.0439	-0.0053	0.0386	3.86%	No
Go Places with Friends	-0.0818	0.189	0.0136	0.1754	17.54%	Yes
<u>Academic Integration</u>						
Satisfied with Intellectual Development	-0.0572	0.0709	0.0216	0.0493	4.93%	No
Satisfied with College's Prestige	-0.0334	-0.08	-0.0137	0.0663	6.63%	Yes

Satisfied with Instructor's ability to teach	-0.049	0.0175	0.0116	0.0059	0.59%	No
Participation in Fine Arts Activities	-0.1011	-0.1716	0.0027	0.1689	16.89%	Yes
Meet with Advisor About Plans	0.0075	0.0769	-0.0004	0.0765	7.65%	Yes
Go to Lectures with Friends	0.0288325	0.1099	0.0079	0.102	10.20%	Yes
Social Contact with Faculty	1.00	1.00	1.00			
Took One or More Remedial Courses	0.022	0.0311	-0.0019	0.0292	2.92%	No
Participate in Study Groups	-0.0157	0.2066	0.0081	0.1985	19.85%	Yes
College Major	0.0404	0.1636	-0.0107	0.1529	15.29%	Yes
Talk with Faculty Outside Class	-0.0681	-0.0147	0.0173	-0.0026	-0.26%	No
<u>College Performance</u>						
College GPA	0.0339	-0.3676	-0.1837	0.1839	18.39%	Yes

Summary

Descriptive statistics, correlations, and regression analyses confirm substantial differences between first-generation and continuing-generation students in four-year college settings. The model, based on a sample of 3,196 students at four-year postsecondary education institutions, evaluated year-to-year persistence for first-

generation and continuing-generation students based on 37 variables grouped into seven factors.

First-generation students comprised 58.00% of the sample. The remaining 42.00% were continuing-generation students. Analysis of year-to-year persistence of the group showed continuing-generation students persisted at a rate 3.95% greater than first-generation college students.

The proposed model was tested with three separate groupings of students. In the first model test, all students, including both first-generation and continuing-generation were considered. The second model included only first-generation students, and the third model was tested with continuing-generation students. This model testing was conducted to evaluate the association between persistence and the variables in the model. The all student model predicted 99.01%. of the persisting students, but only 10.23%. of students who did not persist were predicted. The overall associational evaluation of the model for all students was 91.66%.

Model-testing for first-generation students only yielded an association between students and persistence at 99.44%. This was the highest association between the model and year-to-year persistence. Similar to the results from the all student model, the model did not accurately associate first-generation students who would not persist, with a model test association accuracy of 10.00%. The overall successful association between the model and year-to-year persistence was 94.10% for all first-generation students.

Evaluation of the proposed model for continuing-generation student persistence yielded an association between persistence and the model of 98.44%. As was found in testing of the previous two models, the association between the proposed model and

students who did not persist was 10.87%. The overall association between the proposed model and continuing-generation students who persisted and did not persist was 87.73%.

The findings show a 100% association with both first-generation and continuing-generation students who persist from year-to-year and their reported social contact with faculty members. This finding is supported by several main theories of student persistence, including social capital theory and several theories using Durkheim (1897/1951) as a foundation. The work of Spady (1970, 1971) and Tinto (1975) using Durkheim's work as a foundation support the finding that students who are more connected to faculty and advisors are less likely to withdraw from school.

Results showing the importance of social contact with faculty is congruent with Spady's (1970) theory of normative congruence. When a student's personality, interests, goals, and attitudes match the institution, the student is likely to persist. Ensuring the match of interest, goals, and attitudes through discussion with faculty, staff, and advisors is a powerful way to encourage persistence in postsecondary education.

CHAPTER 5

Results: Two-year students

Introduction

The purpose of this study was to develop and test a model for year-to-year persistence of first-generation, first-time students at two-year and four-year colleges. Determining a model to describe and predict persistence is of growing importance to postsecondary institutions struggling with social and financial concerns. Particularly at state-funded public institutions, revenue from student payments is increasingly important as state legislative and governing organizations decrease the state funding to postsecondary education.

Based upon the literature, it was anticipated that first-generation college students were at a greater risk of dropping out when compared with continuing-generation students. An accurate model to identify those students who may be more likely to drop out can result in development of specific targeted measures to improve persistence. Additionally, a model may serve as a proxy for race, an important factor in the current era of concern regarding race-based admissions, financial aid, and other support services.

Specifically, this study examined 42 variables grouped into seven factors. The factors were based on the research of Duggan (2002) and Somers, Woodhouse, and Cofer (2000) that included social capital variables in persistence studies. The integrated model of many variables grouped into factors is based on the research of Cabrera, Castaneda, Nora, and Hengstler (1992), founded on the theories of Tinto and Bean.

For this study, the seven factors included background, high school experience, college-entry, finances, social integration, academic integration, and college

performance. This chapter presents and analyzes the descriptive statistics and logistic regressions for the study sample of students attending two-year institutions, including all students, first-generation students, and continuing-generation students.

Descriptive Statistics

For descriptive statistics, all results are based on BPS:96/01 data selected for all first-time students enrolled in two-year institutions. As suggested by Duggan (2002), the initial sample size of 15,851 cases was significantly reduced to eliminate missing data, contradictory data, or other data not suitable for testing because of integrity problems. The first reduction in case size removed 7,587 cases, or 47.86%, because of missing persistence data, as that variable was the dependent variable for this study. Using variables contained in the background factor, an additional 1,490 cases, or 9.40% of the original cases, were eliminated. Removing the 1,888 cases with missing data in the high school factors, or 11.91% of the original cases, left a total of 4,886 valid cases. Of the remaining cases, 199 were removed for missing data in the financial factor variables, or 1.26% of the original. Using the variables in the social integration factor, an additional 546 cases were removed, or 3.44% of the original 15,851 cases. Finally, 635 cases were removed for missing data in the academic integration factor, or 4.01% of the original cases. With removal of all missing data points, the total number of cases remaining for examination were 3,506, or 22.12%.

The descriptive statistics presented in this chapter were based solely upon those students in the final model who attended a postsecondary institution offering two-year degrees only. Table 24 contains a breakdown of the total sample frequency by institution and shows the number of cases analyzed at two-year and four-year institutions.

Table 24

Sample Distribution of Survey Population

Type of Institution	Frequency	Percent
Two-Year Institution	310	8.84
Four-Year Institution	3196	91.16

The original model proposed for this study included several variables that were not dichotomous. Although the original research, literature review, and data extraction included non-dichotomous variables, this revised model used for statistical analysis required dichotomous variable coding in all cases. Table 24 contains a complete listing of the revised model, as recoded for dichotomous variables. The dichotomous coding scheme was based upon work of Freeman (2003) in his analysis of year-to-year persistence of two-year college students.

Table 24

Original Model Recoding for Dichotomous Variable

Factor/Variable	Original Coding	Dichotomous Coding
Background Factors		
First-generation	0=1st gen. 1=2nd gen.	Same. Parent (mother and father) variables computed and coded into one dichotomous variable indicating if either parent had postsecondary education meeting the definition for first-generation
Age	0= ≤21 yrs 1= ≥21 yrs	Same
Male	0=male 1=female	Same
Family Size	0=2 1=3-4 2=5-6 3=7+	1=1; a "traditional" family with 2 or 3 additional family members 0=2,3,4; a "nontraditional" family with student and 1 other; or a larger

		family of more than 5
Race	0=Black 1=Asian 2=Hispanic 3=Other & Native American 4=Caucasian	4=4; Caucasian 0=0,1,2,3; Compares Caucasian to all other races
Family in College	0=1 (student) 1=1-2 2=3+	1= 1,0; Student plus up to 2 family members in college 0=2; Three or more family in college
English is Primary Language (language spoken as first language)	0=no 1=yes	Compares to English as primary language in home
Family Income	0=0-44,999 1=45,000-74,999 2=75,000-124,999 3=125,000+	1=0,1; family income below $75,000 0=2,3; family income of $75,000 or more
<u>High School Factors</u> Attended Public High School	0=no 1=yes	Same
High School Curriculum	0=did not meet basic curriculum 1=met basic curriculum or slightly rigorous 2=rigorous	0=Did not meet basic curriculum 1=Basic, slightly rigorous, or rigorous curriculum
High School GPA	0=A's (only A's) 1=B's (B's and some A's) 2=C's or less (C's with some B's; D's, or F's)	0=0,1; A and B level students 1=2; C or lower level student
High School Location	0=urban 1=suburban 2=rural	0=2; rural location 1=0,1; suburban or urban
SAT Scores	0=400-750 1=750-900 2=900-1049	0=3; Test score of 1050+ 1=0,1,2; Test score of 1049 or lower

	3=1050+	
College-entry Factors		
Attend Part-Time	0=no 1=yes	Same
Delayed Entry Into College	0=no 1=yes	Same
Attended Public Institution	0=no 1=yes	Same
Financial Factors		
Satisfied With College Cost	0=no 1=yes	Same
Goal: To be Financially Successful	0=no 1=yes	Same
Financial Aid Status	0=aided, no loans 1=aided, with loans 2=only Loans 3=no aid	0=3; No aid 1=0,2,3; Has aid
Financial Aid Amounts	0=high award of grants/scholarships 1=low award of grants/scholarships 2=high award of work study 3=low award of work study 4=high award of loans 5=low award of loans 6=total aid value	This variable was removed from the final model.
Work Status	0=no work 1=1-10 hours 2=11-20 hours 3=21-30 hours 4=31+ hours	0=4; working 31 or more hours 1=0,1,2,3; working less than31 hours.
Social Integration Factors		
Distance from Home to	0=1-15 miles	0=3; 150 or more miles from home

College	1=16-50 2=51-150 3=150+	1=0,1,2; less than 150 miles from home
College Housing	0=non-resident 1=in campus housing	Same
Friends Attend Same	0=no 1=yes	Same
Has E-mail Account	0=no 1=yes	Same
Satisfied with Campus Climate	0=no 1=yes	Same
Go Places with Friends	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
<u>Academic Integration Factors</u>		
Satisfied with Intellectual Development	0=no 1=yes	Same
Satisfied with College's Prestige	0=no 1=yes	Same
Satisfied with Instructor's ability to teach	0=no 1=yes	Same
Participation in Fine Arts Activities	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
Meet with Advisor About Plans	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
Go to Lectures with Friends	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
Social Contact with	0=never	0=0 Never

Faculty	1=sometimes 2=often	1=1,2; compares with never versus sometimes or often
Took One or More Remedial Courses	0=no 1=yes	Compares to those taking remedial courses
Participate in Study Groups	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
College Major	0=undeclared 1=declared major	Same
Talk with Faculty Outside Class	0=never 1=sometimes 2=often	0=0 Never 1=1,2; compares with never versus sometimes or often
<u>College Performance</u>		
College GPA	0=mostly A's 1=A's & B's 2=Mostly B's 3=B's & C's 4=Mostly C's 5=C's and D's 6=D's or lower	0=0,1,2,3,4 1=5,6
Year-to-Year Persistence	0=no 1=yes	Same

The sample included first-generation and continuing-generation students with complete data in the BPS system for all variables in the study, as outlined in the definitions. The sample size resolved to a selected group of 3,506 students, or 22.12% of the original sample of all students in the BPS data of 15,851 cases. Eliminating students at four-year institutions removed 3,190 additional students, to yield 310 cases, or 1.96% of the BPS sample.

Students who persisted from year-to-year were included in the study, along with students who did not persist from year-to-year. This is consistent with the research

questions. Students who persisted from year-to-year were the basis for regression analysis to determine the associational relationship of the model for both students who persisted and for those students who did not persist.

The percentage of two-year students who persisted was 18.16% lower when compared to the entire sample of the students included in the BPS:96/01 data set (Table 24), although when the BPS data were corrected to include only two-year and four-year full-time attendees, the sample difference decreases to a variance of 6.76% between the sample and total population. (Table 26).

Table 25

Comparison of BPS:96/01 Study Sample to 1996 College Student Population

	Study Sample		1996 Public and Private College Student Population, All Students	
	N	% of Total	N	% of Total
4-year Institution	3196	91.12	10196	73.00
2-year Institution	310	8.84	3770	27.00

Table 26

Comparison of BPS:96/01 Study Sample to 1996 Full-time College Student Population

	Study Sample		1996 Public and Private College Student Population, Full-time Students	
	N	% of Total	N	% of Total
Full-time, 4-year Institution	3196	91.12	10018	84.44
Full-time, 2-year Institution	310	8.84	1846	15.56

Cross-tabulations

To compare first-generation students with continuing-generation students, cross-tabulations were run using SPSS. First-generation status was used as the independent variable, and each variable within the appropriate factor was cross-tabulated.

First-Generation Status

The BPS:96 data provided variables for the educational attainment of the mother or female guardian and the father or male guardian, if applicable to the student's situation. Each variable was re-coded to meet the definition of first-generation or continuing-generation students as defined by this study. The two variables were then merged into a new variable that accurately noted a student's first-generation or continuing-generation status based upon the educational attainment of the mother or the father. The model for students attending a two-year institution of postsecondary education yielded first-generation student status at 40.00%, while continuing-generation students made up the remaining 60.00% of the sample. Previous research noted in the review of literature would suggest a higher percentage of first-generation students attending two-year institutions, not the results noted in this research. It is possible that the method used to select valid cases for the research may have removed two-year first-generation students from the analysis. This is an opportunity for future research.

Background Factor

This model used nine variables in the background factor. The background factor variables were items generally associated with the student experience before entering the postsecondary institution. The model adds a variable concerning English spoken as a

primary language as a direct result of previous work by Duggan (2002). Results for the comparison of background variables are shown in Table 27.

Table 27

Comparison of Background Variables by First-generation Status at Two-year Institutions

		First-generation	Continuing-generation
Age			
	21 or younger	98.39	100.0
	22 or older	1.61	00.0
Gender			
	Male	54.03	37.63
	Female	45.97	62.37
Size of Family			
	"Traditional" Family	31.45	43.01
	"Nontraditional" Size	68.55	56.99
Race			
	Caucasian	81.45	69.89
	Non-Caucasian (all groups	18.55	30.11
Family in College			
	Student and up to 2 other	75.81	81.72
	Student and 3 or more	24.19	18.28
Primary Language			
	English	95.97	90.86
	Non-English	4.03	9.14
Family Income			
	Below $75,000	21.77	6.99
	$75,000 or more	78.23	93.01

High School Factor

The model had five variables that comprised high school factor. The high school factor was made up of variables that were outside of the control of the postsecondary institution. This model included academic predictors in high school suggested by Below (2003), Freeman (2003), and Duggan (2002). Results for comparison of high school variables are shown in Table 28.

Table 28

Comparison of High School Variables by First-generation Status at Two-year Institutions

		First-generation	Continuing-generation
Public High School			
	No	9.68	9.68
	Yes	90.32	90.32
Rigorous High School Curriculum			
	No	40.32	39.25
	Yes	59.68	60.75
High School GPA			
	A or B Level Student	70.16	67.20
	C Level or Lower Student	29.84	32.80
High School Location			
	Rural Location	39.52	34.41
	Urban or Suburban	60.48	65.59
SAT Score			
	1050 or higher	10.48	8.06
	1049 or lower	89.52	91.94

College-entry Factor

The college-entry factor was made up of three variables. Based upon the work of Duggan (2002); Somers, Cofer, Martin-Hall, and VanderPutten (2000); Somers, Cofer, and VanderPutten (1999); and Somers, Woodhouse, and Cofer (2000), several hundred pre-college-entry factors were narrowed to the three variables demonstrated as significant in the works cited above. These three variables included the full-time or part-time student status, if the student delayed entry into postsecondary education after high school graduation, and the public or private control of the postsecondary education institution. Results for college-entry variables are shown in Table 29.

Table 29

Comparison of College-entry Variables by First-generation Status at Two-Year Institutions

	First-generation	Continuing-generation
Attend Part-Time		
No	58.20	71.74
Yes	41.80	28.26
Delayed Entry Into College		
No	85.48	93.01
Yes	14.52	6.99
Attended Public Institution		
No	16.94	26.34
Yes	83.06	73.66

Financial Factor

Four variables made up the financial factor. These variables included satisfaction measurement about the cost of attendance, the financial goal of the student, a general financial aid variable, and the student's work status during the time of the study. Financial factor variable comparison results are shown in Table 30.

Table 30

Comparison of Financial Variables by First-generation Status at Two-Year Institutions

		First-generation	Continuing-generation
Satisfied with College Cost			
	No	12.90	11.83
	Yes	87.10	88.17
Goal: To Be Financially Successful			
	No	14.52	16.67
	Yes	85.48	83.33
Financial Aid Status			
	No Aid	56.45	34.95
	Received Aid	43.55	65.05
Work Status			
	Working 31 or more hours	29.84	21.51
	Working 30 or fewer hours	70.16	78.49

Social Integration Factor

Six variables were included in the social integration factor. These variables were suggested by social capital research. The work by Duggan (2002) and research referenced earlier in this study served as a foundation for the selection of variables. These variables indicated the involvement of the student into the social opportunities at the institution. The postsecondary institution can have significant input into these variables through offering housing on campus, managing the campus climate as perceived by students, and through the campus activities. Results for social integration variables are shown in Table 31.

Table 31

Comparison of Social Integration Variables by First-generation Status at Two-year Institutions

		First-generation	Continuing-generation
Distance from Home to College			
	150 or more miles	4.84	5.41
	Fewer than 150 miles	95.16	94.59
College Housing Status			
	Non Resident	89.52	89.25
	In Campus Housing	10.48	10.75
Friends Attending Same Institution			
	No	97.58	95.70
	Yes	2.42	4.30
Has e-mail Account			
	No	94.35	92.47
	Yes	5.65	7.53
Satisfied With Campus Climate			
	Never	2.42	2.15
	Sometimes or Often	97.58	97.85
Go Places with Friends			
	Never	19.35	18.28
	Sometimes or Often	80.65	81.72

Academic Integration Factor

Academic integration included eleven variables. The variables were selected for the model based on research suggesting them to be the most likely to be associated with persistence through involvement in the academic life of postsecondary education students. Selection of the specific variables from BPS:96 was based upon the work of Freeman (2003), Below (2003), Dugan (2002), and the theories of student persistence previously reviewed. The variables were under direct control of the postsecondary education through offering of programs, services, events, and activities. Academic integration variable comparison results are shown in Table 32.

Table 32

Comparison of Academic Integration Variables by First-generation Status at Two-year Institutions

	First-generation	Continuing-generation
Satisfied with Intellectual Development		
No	14.52	5.91
Yes	85.48	94.09
Satisfied with College's Prestige		
No	18.55	10.22
Yes	81.45	89.78
Satisfied with Instructor's ability to teach		
No	8.06	11.83
Yes	91.94	88.17
Participation in Fine Arts Activities		
Never	64.52	73.66
Sometimes or Often	35.48	26.34
Meet with Advisor About Plans		
Never	25.00	24.73
Sometimes or Often	75.00	75.27
Go to Lectures with Friends		
Never	62.10	59.14
Sometimes or Often	37.90	40.86
Social Contact with Faculty		
Never	0.00	0.00
Sometimes or Often	100.0	100.0
Took One or More Remedial Courses		
No	78.23	79.57
Yes	21.77	20.43
Participate in Study Groups		
Never	54.03	56.99
Sometimes or Often	45.97	43.01
College Major		
Undeclared	22.58	18.28
Declared Major	77.42	81.72
Talk with Faculty Outside Class		
Never	29.84	33.33
Sometimes or Often	70.16	66.67

College Performance Factor

The grade point average for the student measured college performance. Grade point average was the sole variable in this factor. First-generation and continuing-generation results for two-year institutions are shown in Table 33.

Table 33

Comparison of College Performance Variables by First-generation Status at Two-year Institutions

		First-generation	Continuing-generation
College GPA			
	A, B, or C –level Student	79.84	75.81
	D or lower –level Student	20.16	24.19

Descriptive Statistics on Persistence

The sample of students at two-year postsecondary institutions included the total sample size of 310 cases. As noted in Table 34, continuing-generation students persisted to the second year of postsecondary education at a rate of 9.20% less than first-generation students. Continuing-generation students were less likely to persist at two-year institutions than first-generation students. This is the opposite result from the four-year postsecondary education institution data. This finding does not match the results suggested from previous studies and research indicating continuing-generation students are more likely to persist, based on a wide variety of factors and variables. The BPS survey is designed to correctly track students who transfer to a different postsecondary education, ensuring relational integrity for assessment of the student's progress through postsecondary education. The findings noted here may be an indicator, based on descriptive statistics, of continuing-generation students who transfer during the academic

year to a different institution of postsecondary education, even though the BPS:96/01 study was designed to prevent transfer tracking problems. This is an opportunity for further research and study, particularly to determine if there are significant differences between first-generation and continuing-generation persistence at two-year institutions, and what factors and variables influence persistence for the students.

Table 34

Comparison of Persistence Result by First-generation Status at Two-year Institutions

	First-generation	Continuing-generation
Year-to-Year Persistence		
Did not Persist	16.13	25.27
Did Persist	83.87	74.73

Correlation

This section describes results of a basic correlation between first-generation status and the dependent variable, persistence, for students at two-year postsecondary education institutions. The correlation analysis is not bifurcated by first-generation and continuing-generation status.

To compare first-generation students with continuing-generation students using persistence as the dependent variable, a simple correlation was run using SPSS. First-generation status was used as the correlation factor based on the research questions for this study and the focus on the persistence of first-generation college students in postsecondary education. Table 35 summarizes the results of the correlations for first-generation students, using persistence as the dependent variable.

Table 35

Correlation of Persistence Result for All Students at two-year Institutions

	First-generation student	Dependent Variable Persistence
Pearson Correlation	1	-.109
Sig. (2-tailed)	.	.056
Sum of Squares and Cross-products	74.400	-6.800
Covariance	.241	-.022
N	310	310

Logistic Regression Analysis

This section describes results of the logistic regression analysis for students at two-year postsecondary institutions. The regression analysis was bifurcated by first-generation and continuing-generation student status, as this was the primary research goal of this paper. Additionally, a regression analysis for all students included in the sample for two-year postsecondary institutions is presented in this section.

This regression analysis was based on the student choice to persist, coded as a dichotomous variable. Logistic regression is a widely used statistical method to determine the relationship between a number of variables to a dichotomous result variable (Schuster & von Eye, 1998).

The logistic regression calculated beta weights for each variable used in the equation. According to Cabrera (1994), beta weights are easy to transform and use to accept or reject the null hypothesis.

In addition to the beta weight calculation, the research results also compute Petersen's Δ-p measure (1985) as a method to calculate the increase or decrease in probability of the independent variable outcome based on change in the individual

variable. Use of Δ-*p* is based on previous work by several persistence researchers referenced earlier in this study.

The logistic regression calculated beta weights for each variable used in the equation. According to Cabrera (1994), beta weights are then easy to transform and use to accept or reject the null hypothesis.

In the discussion of results for each group, figures are reported for each variable. The Δ-*p* statistic is presented in the text for variables with a Δ-*p* probability percentage value of 5.00% or greater. The full results for all variables, at all percentage levels, are included in later discussion, in table format. This methodology is similar to the process used by Below (2003). The 5.00% probability statistic of the Δ-*p* value is listed as a significant variable affecting the increase or decrease in the probability of the dependent variable, persistence.

Models

All students model. The variables previously discussed were used in the logistic regression analysis with all two-year students. Both first-generation and continuing-generation students were included in this model. A total of 310 students were considered. There were no additional cases removed during model-testing. The dependent variable was the year-to-year persistence of the student from the fall 1995 semester to the fall 1996 semester.

Analysis showed all of the background variables were significant in this model. Students entering two-year postsecondary education under the age of 21 were 60.00% less likely to persist than students entering at age 21 or above. For the entire sample, men were more likely to persist, at 11.02% higher. Students with a “nontraditional” family

unit of other than 2 or 3 additional family members were less likely, by 16.59% to persist. Race was a less significant predictor, at 9.11%, the least significant of all background variables. Students with a high family income were more likely to persist than middle-income students, at 22.71%. Students who spoke a language other than English at home were less likely to persist, at 9.27%.

The high school factor had fewer significant Δ-*p* associations with persistence decisions. Of the five variables in the factor, all but two were associated at the 5.00% or higher level. Attendance at a public high school was inversely associated with persistence, at 5.09%. Students who did not have a high to medium grade point average in high school were 5.67% less likely to persist, while those students in locations other than rural areas were 7.34% more likely to persist.

The college-entry variables were significant above the 5.00% level. The highest association was attendance at a public college, where students were 17.26% less likely to persist. Students who delayed entry to college saw a decrease in persistence of 5.47%, and attendance as a part-time student was associated with withdrawal at 15.31%.

All four of the financial variables were significant at the 5.00% or higher level. Students who had a goal to be financially successful in the future were 6.28% more likely to persist, and students who had financial aid were 12.26% more likely to persist. Students who were satisfied with the cost of attendance at the college were more likely to persist at 10.84%, and students who worked were more likely to predict at 8.91%

Four of the six social integration variables were significant at the 5.00% or greater level. The college housing status was significant at 10.61%. Students who had friends attending the same institution yielded a Δ-*p* value of 6.98%. Students who had an e-mail

account had the same results. Students who only sometimes or never went places with friends were 6.85% more likely to persist from year-to-year.

The academic integration variables included the only variable that returned a constant value for all students who persisted from year to-year. This variable, social contact with faculty, was answered by every student who persisted from year to year. Every student responded they had some social contact with faculty. All students in this sample, regardless of first-generation or continuing-generation status, who persisted indicated they had social contact with the faculty at the postsecondary institution. A secondary review of the BPS:96/01 data showed students who did not persist had both social contact with faculty and no social contact with faculty. In addition to the constant variable, three additional variables were significant at the 5.0% or greater level. Students who reported they were not satisfied with their intellectual development were 5.72% less likely to persist. Students who participated in fine arts activities never or sometimes were 10.11% less likely to persist. Finally, students who never talked with faculty outside class were 6.81% less likely to persist.

The final factor, college performance, was a single variable measuring the performance based on the grade point average of the student. Students who achieved A, B, or C grades were 3.39% more likely to persist.

The logistic regression evaluated 37 variables in seven factors. The "all students" model regression examined year-to-year persistence both first-generation and continuing-generation students at two-year institutions. Table 36 summarizes the results of the analysis, including significance levels when appropriate.. The Nagelkerke R^2 for the model was 0.392. The chi-square statistic for this sample of all two-year students was

89.483 with 36 degrees of freedom. The model correctly predicted 93.72% of all students who persisted. The model predicted 42.42% of students who did not persist. The overall predictive percentage for the model was 82.62% for all persistence decisions.

Table 36

Analysis of Year-to-Year Persistence of All Students at Two-Year Postsecondary Institutions

Factors and Variables	Delta- *p*	Beta Coefficient	Significance Level
Background			
Age	-0.6000	-21.12168629	
Gender	0.1102	0.491114768	
Size of Family	-0.1659	-0.670758788	
Race	0.0911	0.39972762	
Family in College	0.1128	0.50336247	
Primary Language	-0.0927	-0.376071176	
Family Income	0.2271	1.160043299	
High School			
Public High School	-0.0509	-0.208475892	
Rigorous High School Curriculum	-0.0225	-0.092780057	
High School GPA	0.0566	0.242874772	
High School Location	0.0734	0.318212778	
SAT Score	-0.0332	-0.1366691	**
College-entry			
Attend Part-Time	-0.1531	-0.618567084	
Delayed Entry Into College	-0.0547	-0.223673478	
Attended Public College	-0.1726	-0.697863114	
Financial			
Satisfied with College Cost	0.1084	0.482371389	
Goal: To Be Financially Successful	-0.0628	-0.256583704	
Financial Aid Status	0.1226	0.551911591	**
Work Status	0.0891	0.390289342	
Social Integration			
Distance from Home to College	-0.0193	-0.07973963	

College Housing Status	0.1061	0.470886792	
Friends Attending Same Institution	0.0698	0.301918859	
Has e-mail Account	0.0698	0.301918859	
Satisfied With Campus Climate	-0.0120	-0.049908381	
Go Places with Friends	0.0685	0.295815152	**
Academic Integration			
Satisfied with Intellectual Development	0.1571	0.731415356	**
Satisfied with College's Prestige	0.1740	0.82536347	
Satisfied with Instructor's ability to teach	-0.1694	-0.68492683	
Participation in Fine Arts Activities	-0.1546	-0.624891619	
Meet with Advisor About Plans	0.0058	0.024189424	
Go to Lectures with Friends	0.0030	0.012658734	
Social Contact with Faculty	1.0000	1.0000	
Took One or More Remedial Courses	-0.0853	-0.346653017	
Participate in Study Groups	-0.0497	-0.203758591	
College Major	-0.0363	-0.149183933	
Talk with Faculty Outside Class	0.0647	0.278723721	
College Performance			
College GPA	0.1607	0.75127996	***
Logistic Regression Statistics			
Nagelkerke R^2	0.392		
Chi-square	89.483		
Degrees of freedom	36		
Correct prediction			
	Persisting	93.72%	
	Did not persist	42.42%	
	Overall	82.62%	

Note:
*** Significant at $p \leq 0.001$
** Significant at $p \leq 0.01$
* Significant at $p \leq 0.05$

First-generation students model. The model variables were used in the next step of model testing for only first-generation students. This second logistic regression analyzed only first-generation students persisting at two-year institutions. This section discusses the logistic regression results for first-generation students. A total of 183 first-generation students from the total two-year sample of 310 students were considered. Of the sample, 183 persisted to the next year, or 60.00%. Five cases were removed for missing data in one of the variables. The dependent variable was the year-to-year persistence of the student from the fall 1995 semester to the fall 1996 semester.

Four of the background characteristics were significant for first-generation students. For the 183 first-generation students evaluated in the model, all were in the same age range, 21 years of age or less. Race was a significant predictor with students who were not Caucasian persisting at 22.01% less. Students for whom English was not the primary language in the home had a Δ-p of 27.56%. Students from a high income family were more likely to persist than middle-income students, at 25.11%

The high school factor analysis showed several significant Δ-p statistic results. Of the five variables in the factor, three had a Δ-p association at the 5.00% or greater level. First-generation students at two-year institutions with a low SAT score, as defined by the model, were 60.00% less likely to persist from year-to-year. Excluding the 100% association with age due to sampling, the SAT score result is the largest Δ-p statistic for first-generation students at two-year institutions. First-generation students who attended a high school in an urban or suburban area demonstrated a 13.52% increase in persistence over students from a rural area. Students who had a high school grade point average denoting A and B level work saw a Δ-p statistic with a 15.49% positive association with

persistence. Students who attended a private high school were 12.56% less likely to persist.

Each of the three college-entry variables had a Δ-*p* above the 5.00% level. First-generation students who attended the first year of the two-year postsecondary education in a part-time attendance pattern were 23.13% less likely to persist. Students who delayed entry to two-year postsecondary education were 13.35 less likely to persist. Finally, students attending a private two-year institution were 22.97% more likely to persist when compared to students attending public school.

All of the four financial variables had a Δ-*p* at the 5.00% or higher level. The results show satisfaction with the cost of college for first-generation students at two-year institutions to be of no importance to first-generation students. The results show an association between satisfaction with cost and persistence as a Δ-*p* of -17.82%. Students who had a goal to be financially successful in the future demonstrated a 28.72% greater persistence rate, and students who worked while attending postsecondary education were more likely to persist by 10.90%. Financial aid status was associated with persistence at 9.17%.

In the social integration factor, each of the six variables had a Δ-*p* at the 5.00% or greater level. The social integration factor also contained a variable with a 100% association, the variable asking if students had friends attending the same institution. All students who persisted reported having some friends attending the same institution. Analysis showed students attending postsecondary education within 150 miles of their home were associated positively with persistence through a Δ-*p* statistic of 36.30%. Students living on campus were also associated positively with persistence, at 25.46%.

Students who had an e-mail account were 31.38% more likely to persist, and students who reported they went places with friends often were 11.86% more likely to persist from year-to-year. As theorized by Van Gennep (1960), student satisfaction with the campus climate is positively associated with persistence. The Δ-*p* statistic for this variable was 38.92%.

The academic integration factor included the only variable that returned a perfect 1.00 association value for all students, in all models, who persisted from year-to-year, social contact with faculty. Because this result was very significant and common for all students who persisted, the researcher reviewed the entire sample of BPS data for students who both persisted and did not persist. Students who did not persist had mixed results; some had social contact with faculty and others did not.

In addition to the social contact variable, eight of the remaining eleven variables were significant with a Δ-*p* at the 0.05 or greater level. Students who reported they were satisfied with their intellectual development were 52.02% more likely to persist. Students reporting satisfaction with the college's prestige were also more likely to persist, by 6.52%. Students who participated in fine arts were 7.61% more likely to persist. Attendance at lectures with friends was associated with persistence at 21.14%. Students who took one or more remedial courses demonstrated a positive association with persistence, with by a Δ-*p* statistic of 20.02%. Students who talked with faculty outside of class were positively associated with persistence at 10.24%. Students who participated in study groups were 14.09% less likely to persist.

Satisfaction with the instructor's ability to teach had no significant association with persistence. The Δ-*p* statistic for the variable was -1.95%, indicating a very small

negative association with persistence for students who were satisfied with the ability of the instructor.

The final factor, college performance, is a single variable measuring the performance based on the grade point average of the student. Students who achieved A, B, or C grades were 48.83% less likely to persist.

The logistic regression evaluated 37 variables in seven factors. The "first-generation" model regression examined year-to-year persistence both first-generation and continuing-generation students at two-year institutions. Table 37 summarizes the analysis, including significance levels for variables when appropriate. The Nagelkerke R^2 for the model was 0.436. The chi-square statistic for this sample of first-generation two-year students was 63.840 with 34 degrees of freedom. The model correctly predicted 92.70% of all first-generation students who persisted. The model predicted 54.35% of first-generation students who did not persist. The overall predictive percentage for the model was 83.06% for all persistence decisions.

Table 37

Analysis of Year-to-Year Persistence of First-generation Students at Two-Year Postsecondary Institutions

Factors and Variables	Delta- *p*	Beta Coefficient	Significance Level
Background			
Age	1.000	1.00	
Gender	0.0206	0.112174152	
Size of Family	-0.0353	-0.145263774	
Race	-0.2201	-0.895299843	
Family in College	-0.0416	-0.170596599	
Primary Language	-0.2756	-1.138978742	
Family Income	-0.2511	-1.029147218	
High School			
Public High School	-0.1256	-0.507939552	
Rigorous High School Curriculum	0.0108	0.045313415	
High School GPA	0.1549	0.71934517	
High School Location	0.1352	0.615722003	
SAT Score	-0.6000	-20.61350227	
College-entry			
Attend Part-Time	-0.2313	-0.943083647	
Delayed Entry Into College	-0.1335	-0.539811558	
Attended Public College	-0.2297	-0.936414367	
Financial			
Satisfied with College Cost	-0.1782	-0.720873907	
Goal: To Be Financially Successful	-0.2872	-1.192627088	
Financial Aid Status	-0.1090	-0.441440042	
Work Status	0.0917	0.402428634	**
Social Integration			
Distance from Home to College	0.3630	2.852334843	
College Housing Status	0.2546	1.365562775	
Friends Attending Same Institution	See Discussion	See Discussion	
Has e-mail Account	0.3138	1.955396224	
Satisfied With Campus Climate	0.3892	4.108593033	**

Go Places with Friends	0.1186	0.532260911	
Academic Integration			
Satisfied with Intellectual Development	-0.5202	-2.849863514	**
Satisfied with College's Prestige	0.0652	0.280972921	
Satisfied with Instructor's ability to teach	-0.0195	-0.080781449	
Participation in Fine Arts Activities	0.0761	0.330289261	
Meet with Advisor About Plans	0.0349	0.147855804	
Go to Lectures with Friends	0.2114	1.053682664	**
Social Contact with Faculty	1.0000	1.0000	
Took One or More Remedial Courses	0.2020	0.993335279	
Participate in Study Groups	-0.14088174	-0.569357962	
College Major	-0.0080	-0.033298072	
Talk with Faculty Outside Class	0.1024	0.453153563	
College Performance			
College GPA	-0.4883	-2.479310013	***
Logistic Regression Statistics			
Nagelkerke R^2	0.436		
Chi-square	63.840		
Degrees of freedom	34		
Correct prediction			
	Persisting	92.70%	
	Did not persist	54.35%	
	Overall	83.06%	

Note:
*** Significant at $p \leq 0.001$
** Significant at $p \leq 0.01$
* Significant at $p \leq 0.05$

Continuing-generation students model. The variables previously discussed were used in the logistic regression analysis with all students who persisted. This logistic regression analysis used subsets of the original sample of students persisting at a two-

year institution. This section covers the regression analysis for continuing-generation students.

All variables in all factors were significant with a Δ-*p* statistic level of 0.05 or greater. All variables were significant with a Δ-*p* statistic of either 0.8387 or 0.1613, as shown in Table 38.

The logistic regression evaluated 37 variables in seven factors. The regression examined the relationship to the dichotomous year-to-year persistence outcome for continuing-generation students. The results of the regression indicate a model that correctly predicted all persisting continuing-generation students at two-year institutions. The Nagelkerke R^2 for the model is 1.0000. The chi-square statistic for this model was 108.857 with 35 degrees of freedom. The model correctly predicted 100% of all continuing-generation students who persisted. The model correctly predicted 100% of all continuing-generation students who did not persist. The overall predictive percentage for the model was 100.00 percent.

The persistence of continuing-generation students at two-year institutions is an opportunity for future research. The BPS:96/01 data set contains data on more 3,593 students attending two-year institutions. The larger sample size may yield different results, although eliminating first-generation students from the larger sample size reduces the sample to 769 cases. The sample examined in this research represents 15.87% of the total sample of first-generation students at two-year institutions.

Table 38

Analysis of Year-to-Year Persistence of Continuing-generation Students at Two-Year Postsecondary Institutions

Factors and Variables	Delta- *p*	Beta Coefficient	Significance Level
Background			
Age	-0.8387	-429.0676044	
Gender	-0.8387	-167.3163738	
Size of Family	-0.8387	-31.09670871	
Race	-0.8387	-42.15844173	
Family in College	0.1613	64.73193518	
Primary Language	0.1613	22.69962806	
Family Income	-0.8387	-499.3339118	
High School			
Public High School	0.1613	110.2337233	
Rigorous High School Curriculum	-0.8387	-55.20067782	
High School GPA	-0.8387	-294.6044072	
High School Location	-0.8387	-78.29816738	
SAT Score	-0.8387	-508.1426996	
College-entry			
Attend Part-Time	0.1613	8.446588319	
Delayed Entry Into College	0.1613	74.48138883	
Attended Public College	-0.8387	-148.3732086	
Financial			
Satisfied with College Cost	0.1613	80.88798098	
Goal: To Be Financially Successful	0.1613	106.8481022	
Financial Aid Status	-0.8387	-149.8453126	
Work Status	0.1613	201.6399227	
Social Integration			
Distance from Home to College	-0.8387	-516.996726	
College Housing Status	0.1613	476.619592	
Friends Attending Same Institution	See Discussion	See Discussion	
Has e-mail Account	-0.8387	-366.2136043	
Satisfied With Campus	0.1613	599.2501454	

Climate		
Go Places with Friends	0.1613	42.22738336
Academic Integration		
Satisfied with Intellectual Development	-0.8387	-98.32533125
Satisfied with College's Prestige	0.1613	83.04185095
Satisfied with Instructor's ability to teach	-0.8387	-215.1573224
Participation in Fine Arts Activities	-0.8383	-9.474571934
Meet with Advisor About Plans	-0.8387	-33.50451872
Go to Lectures with Friends	-0.8387	-62.5409119
Social Contact with Faculty	1.0000	1.0000
Took One or More Remedial Courses	0.1613	242.5992788
Participate in Study Groups	-0.8387	-103.3268771
College Major	0.1613	103.402865
Talk with Faculty Outside Class	-0.8387	-102.7887902
College Performance		
College GPA	-0.8387	-276.375422
Logistic Regression Statistics		
Nagelkerke R^2	1.000	
Chi-square	108.857	
Degrees of freedom	35	
Correct prediction		
	Persisting	100.00%
	Did not persist	100.00%
	Overall	100.00%

Note:
*** Significant at $p \leq 0.001$
** Significant at $p \leq 0.01$
* Significant at $p \leq 0.05$

The importance of the Δ-*p* statistic is best illustrated with the example noted in Appendix B from Below (2003), comparing significant Δ-*p* statistics from several research projects related to persistence at two-year colleges.

Discussion of Logistic Regression Analysis

The logistic regression analysis found differences in the variables affecting persistence between first-generation and continuing-generation students at two-year postsecondary education institutions, using the reduced model for evaluating year-to-year persistence. According to the findings, there were differences between variables influencing persistence of first-generation and continuing-generation students for every factor. Thirty-three of the 37 total examined variables had a Δ-p of 0.05 or greater.

Background factor. In the background factor, each of the seven variables were at least 5.00% different from first-generation students to continuing-generation students. All but two of the variables indicated a negative difference between first-generation and continuing-generation students. The greatest difference was in the gender of students, a total difference of 81.81%

High school factor. All variables except for one were different between first-generation and continuing-generation students at a 5.00% level or greater. Attendance at public versus private high school was below 5.00%, at 3.57%. The largest difference between first-generation and continuing-generation students was in the rigor of the high school curriculum, a total difference between the two Δ-p values of 0.8279.

College-entry factor. Two of the three college-entry factor variables were different at 5.00% or greater. The total difference in Δ-p values for first-generation and continuing-generation students for the variable regarding attendance at public versus private colleges was 0.6090. The association with persistence between first-generation and continuing-generation students who attended the first year of postsecondary education was different between the two groups with a Δ-p difference of 0.7000.

Financial factor. The four variables in the financial factor yielded only one variable not significant at 5.00% or greater. The greatest difference between first-generation and continuing-generation students was the variable noting financial aid status. The total difference between the two groups of students was 72.97%. There was no significant difference between first-generation and continuing-generation students with the variable measuring satisfaction with college cost.

Social integration factor. Six variables make up the social integration factor. Of the six, all were significant with a Δ-*p* at the 5.00% or greater level. The variable asking if friends attended the same institution was the second variable in the model that associated at 100% for both first-generation and continuing-generation students. The largest difference was between first-generation and continuing-generation students who had an e-mail account. The total difference in Δ-*p* between first-generation and continuing-generation students for this variable was .05249. This result is similar to the results found by Duggan (2002) in his research on social capital and persistence.

Academic integration factor. As noted previously, the academic integration factor contains the other variable associated at 100% for all students who persisted, both first-generation and continuing-generation. The factor also has an additional ten variables. All but one of the remaining variables were significant with a Δ-*p* of 5.00% or higher.

Of the remaining ten variables, there are six variables where the difference between first-generation and continuing-generation students is greater that 50.00%. These variables include the satisfaction with the instructors' ability to teach, participation in fine arts activities, meeting with advisor about plans, attending lectures with friends, participation in study groups, and talking with faculty outside of class.

College performance factor. The single variable in this factor, the measure of the college grade point average, indicated a difference in the Δ-*p* values of 0.3504 difference between first-generation and continuing-generation students.

Table 39 shows the differences between the Δ-*p* values for the three tested models. The difference between first-generation and continuing-generation students is also noted. In addition, Table 39 notes variables with a total difference in Δ-*p* values of 5.00 or more percentage points.

Table 39

Differences between First-generation and Continuing-generation Persistence, by Percentage Point, at Two-Year Institutions

Factors and Variables	All Students	First-generation	Continuing-generation	Difference: first-generation and continuing-generation	Percent. Point difference	Δ-*p* different at more than 5%?
Background						
Age	-0.6000	1.0000	-0.8387	0.1613	16.13%	Yes
Gender	0.1102	0.0206	-0.8387	-0.8181	-81.81%	Yes
Size of Family	-0.1659	-0.0353	-0.8387	-0.8034	-80.34%	Yes
Race	0.0911	-0.2201	-0.8387	-0.6186	-61.86%	Yes
Family in College	0.1128	-0.0416	0.1613	-0.1197	-11.97%	Yes
Primary Language	-0.0927	-0.2756	0.1613	0.1143	11.43%	Yes
Family Income	0.2271	-0.2511	-0.8387	-0.5876	-58.76%	Yes
High School						
Public High School	-0.0509	-0.1256	0.1613	-0.0357	-3.57%	No

Rigorous High School Curriculum	-0.0225	0.0108	-0.8387	-0.8279	-82.79%	Yes
High School GPA	0.0566	0.1549	-0.8387	-0.6838	-68.38%	Yes
High School Location	0.0734	0.1352	-0.8387	-0.7035	-70.35%	Yes
SAT Score	-0.0332	-0.6000	-0.8387	-0.2387	-23.87%	Yes
<u>College Entry</u>						
Attend Part-Time	-0.1726	-0.2313	0.1613	0.0700	7.00%	Yes
Delayed Entry Into College	-0.1531	-0.1335	0.1613	-0.0278	-2.78%	No
Attended Public College	-0.0547	-0.2297	-0.8387	-0.6090	-60.90%	Yes
<u>Financial</u>						
Satisfied with College Cost	0.1084	-0.1782	0.1613	0.0169	1.69%	No
Goal: To Be Financially Successful	-0.0628	-0.2872	0.1613	0.1259	12.59%	Yes
Financial Aid Status	0.1226	-0.1090	-0.8387	-0.7297	-72.97%	Yes
Work Status	0.0891	0.0917	0.1613	-0.0696	-6.96%	Yes
<u>Social Integration</u>						
Distance from Home to College	-0.0193	0.3630	-0.8387	-0.4757	-47.57%	Yes
College Housing Status	0.1061	0.2546	0.1613	0.0933	9.33%	Yes
Friends Attending Same Institution						No

Has e-mail Account	0.0698	0.3138	-0.8387	-0.5249	-52.49%	Yes
Satisfied With Campus Climate	-0.0120	0.3892	0.1613	0.2279	22.79%	Yes
Go Places with Friends	0.0685		0.1613	-0.1613	-16.13%	Yes
<u>Academic Integration</u>						
Satisfied with Intellectual Development	0.1571	-0.5202	-0.8387	-0.3185	-31.85%	Yes
Satisfied with College's Prestige	0.1740	0.0652	0.1613	-0.0961	-9.61%	Yes
Satisfied with Instructor's ability to teach	-0.1694	-0.0195	-0.8387	-0.8192	-81.92%	Yes
Participation in Fine Arts Activities	-0.1546	0.0761	-0.8383	-0.7622	-76.22%	Yes
Meet with Advisor About Plans	0.0058	0.0349	-0.8387	-0.8038	-80.38%	Yes
Go to Lectures with Friends	0.0030	0.2114	-0.8387	-0.6273	-62.73%	Yes
Social Contact with Faculty	1.0000	1.0000	1.0000	1.0000	100.00%	Yes
Took One or More Remedial Courses	-0.0853	0.2020	0.1613	0.0407	4.07%	No
Participate in Study	-0.0497	-0.1409	-0.8387	-0.6978	-69.78%	Yes

Groups						
College Major	-0.0363	-0.0080	0.1613	-0.1533	-15.33%	Yes
Talk with Faculty Outside Class	0.0647	0.1024	-0.8387	-0.7363	-73.63%	Yes
College Performance						
College GPA	0.1607	-0.4883	-0.8387	-0.3504	-35.04%	Yes

Summary

Descriptive statistics, correlations, and regression analyses confirm substantial differences between first-generation and continuing-generation students in two-year college settings. The model, based on a sample of 310 students at two-year postsecondary education institutions, evaluated year-to-year persistence for first-generation and continuing-generation students based on 37 variables grouped into seven factors.

Of the total sample, 40.00% were first-generation students and the remaining 60.00% were continuing-generation students. First-generation students persisted at a rate 9.14% greater than continuing-generation college students. This is a very different result from the four-year model, where continuing-generation students persisted at a higher rate than first-generation students.

The proposed model was tested with three separate groupings of students. In the first model test, all students, including both first-generation and continuing-generation were considered. The second model included only first-generation students, and the third model was tested with continuing-generation students. This model testing was conducted

to evaluate the association between persistence and the variables in the proposed model. The all students model predicted 93.72% of the persisting students, but only 42.42% of students who did not persist. The overall associational evaluation of the model for all students was 82.62%.

Model-testing for only first-generation students yielded an association between students and persistence at 92.70%. Similar to the results from the all student model, the model did not accurately associate first-generation students who would not persist, with a model test association accuracy of 54.35%. The overall successful association between the model and year-to-year persistence was 83.06% for all first-generation students.

Evaluation of the proposed model for continuing-generation student persistence yielded an association between both persistence and non-persistence decisions and the model of 100.00%.

The findings show a 100% correlation with both first-generation and continuing-generation students who persist from year-to-year and their reported social contact with faculty members. This finding is supported by several main theories of student persistence, including social capital theory and several theories using Durkheim (1897/1951) as a foundation. The work of Spady (1970, 1971) and Tinto (1975) using Durkheim's work as a foundation support the finding that students who are more connected to faculty and advisors are less likely to withdraw from school.

Similarly, the findings also show a 100% association with both first-generation and continuing-generation students who persist from year-to-year and the positive response to having friends attend the same institution. This finding supports the work of Spady (1970, 1971) and Tinto (1975) using Durkheim's work as a foundation support the

finding that students who are more connected their environment, community, and social grouping are less likely to withdraw from school.

Spady's (1970) normative congruence theory is supported by the social contact with faculty variable. When a student's personality, interests, goals, and attitudes match the institution, the student is likely to persist. Ensuring the match of interest, goals, and attitudes through discussion with faculty, staff, and advisors is a powerful way to confirm place in postsecondary education.

CHAPTER 6

Conclusions, Discussion, Recommendations

Introduction

This chapter summarizes and reviews the study, methodology of the study, responds to the research questions, reviews implications, and suggests opportunities for future research.

First-generation students, those students from a family background where no parent attended a postsecondary education or earned a bachelor's degree, represent 47% of the new students attending two-year or four-year institutions (Kojaku & Nuñez, 1998). Assisting these students to continue postsecondary education from the start of the first year through to the start of the second year is of growing importance for the students who struggle with social and financial concerns, and for institutions which struggle with funding levels and revenues.

First-generation students persist at lower rates than continuing-generation students (Nuñez & Cuccaro-Alamin, 1998). The opportunity to establish a model to estimate persistence of first-generation students at two-year and four-year postsecondary education is important for students and postsecondary educational institutions. A model could form the framework for admission and support service programs for first-generation students, especially if the model is free from entanglements of race-based concerns under continued review by the United States Supreme Court, the Office of Civil Rights, and the Department of Education. In addition, the long-term socioeconomic effect of persistence an attainment of a college degree is significant. The combination of increasing numbers of first-generation students attending postsecondary education, the

lower persistence and degree attainment rates for first-generation students, the widespread cuts in funding for higher education, and the significant differences in income based on educational attainment forms a strong need for continued study of the factors that effect persistence of first-generation students.

Purpose of the Study

This study examined the factors that affect the year-to-year persistence of first-generation and continuing-generation students at two-year and four-year postsecondary education institutions. Factors related to socioeconomic status and social capital theory were used as a framework. This study added to the limited literature available on the persistence of first-generation students, based upon socioeconomic status and social capital theory.

A model useful for evaluating persistence of first-generation college students at both two-year and four-year institutions was proposed and tested. The model can be used to modify current financial aid, student support, and admissions policies at two-year and four-year institutions. Many institutions provide support for first-year students through financial aid and discrete programs for minority students; very few, if any, institutions provide integrated support for students based upon a persistence model that includes socioeconomic status. As Somers, Woodhouse, and Cofer (2000) suggest, the information in this study may be used to develop new admission and retention strategies that "*Hopwood*-proof" institutions from legal concerns focused on race-based admission and retention programs.

Significance of the Study

This study was the first to use BPS:96/01 data to study the persistence of first-generation and continuing-generation students at both two-year and four-year institutions, using persistence theory, social capital, and socioeconomic status. The findings are significant for several reasons. First, the study confirms the proposed model is useful to describe the persistence patterns of students, particularly first-generation students, at four-year institutions. The analysis confirms similar results of previous studies (Cofer & Somers, 2000; Duggan, 2002; Somers, Woodhouse, & Cofer, 2000) showing the effect of socioeconomic status, social capital, and other factors are significantly associated with student persistence. Persistence is closely associated with the "fit" of the college student and their environment (Spady, 1970; Tinto, 1975), proposed by several student development theorists and reviewed in Duggan (2002).

This study confirmed the need for all students, including first-generation and continuing-generation, to have meaningful relationships with faculty members. The relationship with faculty must extend beyond the classroom interactions, and must include interactions that occur informally and outside of the classroom environment.

This study also shows the need for effective first-generation support programs and interventions. With a significant current number of first-generation students in postsecondary education and a projected influx of minority students (U.S. Department of Education, 1999) who are typically first-generation, persistence of first-generation students is of growing importance.

Research Questions

This dissertation focused on the development of a model for first-generation student persistence at both two-year and four-year institutions, using socioeconomic status and social capital as primary factors. Four primary research questions were established to guide the review of literature, determination of methods, testing of the model, and eventual results. The four research questions were formed to evaluate the effect of socioeconomic status on first-generation versus continuing-generation students, to then compare the effect of socioeconomic status on persistence for students at two-year versus four-year institutions, to evaluate the association of persistence with a proposed model based on seven factors, and to discuss implications for future policy decisions for two-year and four-year institutions at the various levels of government. The specific research questions listed below were the basis for this dissertation.

1. How does socioeconomic status, including social capital variables, positively or negatively influence the year-to-year persistence of first-generation college students, compared to continuing-generation students?
2. What effect does socioeconomic status suggest for persistence of students at two-year institutions compared to four-year institutions?
3. How do background, high school, college-entry, financial, social integration, academic integration, and college performance factors affect year-to-year persistence at two-year and four-year institutions for first-generation and continuing-generation students, and are there differences between first-generation and continuing-generation student persistence at two-year and four-year institutions based on the factors?

4. What implications do these findings have for future federal and institutional policy decisions for first-generation and continuing-generation students at two-year and four-year institutions?

Sources of Data

This study used data from the Beginning Postsecondary Students Longitudinal Study (BPS:96/98). BPS is a longitudinal research study following beginning students at two-year and four-year postsecondary institutions. The BPS:96/98 population consisted of all first-time beginning students in postsecondary education in the United States and Puerto Rico, who started their postsecondary education in the 1995-1996 academic year, defined as terms starting between May 1, 1994 and April 30, 1995 (Berkner, He, & Cataldi, 2002). BPS is a nationally representative study designed to provide additional information about the patterns of educational attainment and persistence for a subset of the more than 51,000 students included in the NPSAS:96 survey. This study used all students enrolled as first-time, beginning students at two-year and four-year institutions.

BPS was selected as the data source for this research study based on several factors. Previous research, including Duggan (2000), used BPS as a foundation for research. Below (2003) and Freeman (2003) also used BPS as a source for persistence research. Moreover, BPS gathered additional questions from survey respondents, including questions with responses related to both bridging and bonding social capital models.

Study Sample

The initial population for BPS:96/98 was all first-time students enrolled in postsecondary education terms starting May 1, 1994 through April 30, 1995. The full BPS survey contained more than 12,000 students

During the analysis process, the study sample was refined to 3,506 total cases. Cases with substantial amounts of incomplete or missing data were excluded, based on the intended research result to develop a model to predict year-to-year persistence. The refined sample represents nearly 25% of the original 15,000 cases.

The study design was based upon the year-to-year persistence of students at two-year and four-year institutions. The study tested the research questions for only those students who enrolled in the fall, 1995 semester and in the subsequent fall, 1996 semester.

Statistical Method

Logistic regression was run on six sets of BPS:96/01 samples using SPSS 12.0 software. The six samples were all students, first-generation students, and continuing-generation students attending two-year institutions, and the same three sets of students attending four-year institutions. Binary logistic regression is the most appropriate technique for statistical analysis of models using dichotomous response variables, such as the model in this study. Logistic regression is also appropriate for dichotomous qualitative outcomes such as persistence, as the liner regression transformations are ineffective (Cabrera, 1994). Logistic regression is preferred over forms of linear regression because the relationship between the binary response variable of persistence may be related to more than one explanatory variable. The use of logistic regression

allows a model that can include many variables, including those that operate on varying measurement scales (Hosmer & Lemeshow, 2000). In addition, use of logistic regression is preferred because logistic regression makes fewer assumptions about the homogeneity of data (Cabrera, 1994; SPSS, 2002). In this study, persistence was a dichotomous variable, as students either attend a postsecondary institution the following year or they do not.

For this study, the method used the logarithmic formulas is noted below. In the formula, X is the regression matrix of predictor variables, Y is the dichotomous outcome variable, β_0 is the regression constant, β_1 is the regression coefficient, and P is the expected probability (Rogue Wave, 2002). The effects of the independent variables are reported with the beta coefficients. The logistic regression formula used, based on Menard (1995), has the following equation for use in probability calculations with multiple variables:

$$\mathbf{P(Y = 1|x) = \pi(x)}$$

$$\pi(x) = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_{p-1} x_{p-1})}{1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_{p-1} x_{p-1})}$$

The Δ-*p* statistic was calculated for all variables. Petersen (1985) outlines the method for calculating the Δ-*p*. This statistic measured the change in the probability of persistence that was attributable to a change in an independent variable (beta coefficient). The Δ-*p* is a more easily interpreted measure of influence (Paulsen & St. John, 2002). The Δ-*p* statistic was also useful because of previous use and application in data analysis by researchers such as St. John, Somers, and Cofer when studying BPS and NPSAS.

The Δ-*p* statistic was important in this type of research because it can provide a standard measure of the change in the dependent variable. The statistic quantifiably measured the dependent variable change when using dichotomous variables. When analyzing continuous variables, the Δ-*p* is reported as a percentage change measure. The Δ-*p* statistic is a measure of association to explain how the change in a variable contributes to the outcome, or dependent variable (Hosmer & Lemeshow, 2000). Put another way, Petersen's Δ-*p* statistic measured the increase or decrease in the outcome probability (Freeman, 2003). The Δ-*p* statistic is easily interpreted in persistence studies, as a Δ-*p* of .10 indicates a 10% increase in the probability of persisting for the variable studied. Then use of the Δ-*p* statistic also allowed for determination of significance based upon similarities and differences in the sample data and not constrained only by significance determined by p-values at preset significance levels, such as $p \leq 0.001$, $p \leq 0.01$, or $p \leq 0.05$.

The Δ-*p* statistic used in this research was based on the research of Petersen (1985). This method was discussed in Cabrera (1992), as the formula:

$$Delta - p = \frac{e^{L_1}}{1 + e^{L_1}} - P_0$$

In the case where:

$L_1 = L_0 + B_{(variable)}$

$L_0 = \ln[P_0/(1-P_0)]$

P0=sample mean for dependent variable

The Δ-*p* statistic was relevant to the methodology of this study because of statistical and methodological use in previous NPSAS and BPS studies by Below (2004),

Duggan (2002), Freeman (2004), Langrehr (2003) ,Cofer (1998, 1999a, 1999b, 2000a, 2000b), Somers (1999, 2000), St. John (1992, 1994, 1996, 1995), and others.

Summary of Results

Two-year Student Persistence

All two-year students. Of the 37 variables considered, 29 were significantly associated with the persistence of all students, both continuing-generation and first-generation, at two-year institutions. All students who persisted had friends attending the same institution and had social contact with faculty members outside of the classroom. Both of these variables were associated with year-to-year persistence at a 1.000 or "perfect" association.

In addition to the two constant association variables, several other variables were strongly associated with persistence to the second year. Students who were older than 21 years of age were much more likely to persist. Other significant variables included coming from a family of 2 or 3 additional family members, having at least one other family member in college, attending full-time, not delaying entry into postsecondary education, satisfaction with the cost of the college, having financial aid, and living on-campus. Students who persisted also indicated satisfaction with their intellectual development and the college's prestige. Students who had some level of dissatisfaction with the instructor's ability to teach and did not participate in fine arts activities were associated with persistence. Finally, grade point average was significantly associated with persistence; students who had "A" and "B" level grades were more likely to persist.

Four of the 37 variables were significant at the $p \leq 0.01$ level, and the grade point average was significant at the $p \leq 0.001$ level.

First-generation students. For the 37 variables, 30 were significantly associated with persistence for first-generation students at two-year institutions. As in the all student model, every student who persisted had friends attending the same institution and had social contact with faculty members outside of the classroom. Both of these variables were associated with year-to-year persistence at a 1.000 or "perfect" association. In addition, all first-generation students who persisted were also over the age of 21.

Several other variables were strongly associated with persistence. Nine of the 30 significant variables were associated with persistence with a $\Delta p \leq 0.25$, or 25%. First-generation students who persisted were associated with attendance at a school within 150 miles of their home, living on campus, having an e-mail account, being satisfied with the campus climate and their intellectual development, going places with friends, having a lower SAT score, and earning "B" and "C" grades.

The Δ-*p* statistic for the study group participation variable was -0.14088. This result was different from the result predicted by the review of the literature. The result is also very different from the Δ-*p* statistic computed for other groups.

Four of the 37 variables were significant at the $p \leq 0.01$ level, and the grade point average was significant at the $p \leq 0.001$ level.

Continuing-generation students. Of the 37 variables, all but four were significantly associated with year-to-year persistence. As in the all-student and first-generation student models, every student who persisted had friends attending the same institution and had social contact with faculty members outside of the classroom. Both of

these variables were associated with year-to-year persistence at a 1.000 or "perfect" association.

Of the 33 variables associated with persistence, 19 were very strongly associated, with a $\Delta p \leq 0.50$. Continuing-generation students who persisted were likely to be male, from either a very small family of only two persons or a large family of more than four persons, from a non-rigorous high school curriculum located in rural areas, not on any financial aid, dissatisfied with the instructor's ability to teach, not participating in fine arts activities, did not meet with advisor about academic plans, and did not talk with faculty outside of class.

None of the 37 variables were significant at the $p \leq 0.001$, 0.01, or 0.05 levels.

Four-year Student Persistence

All four-year students. Of the 37 model variables considered, eighteen were significantly associated with the persistence of all students, both continuing-generation and first-generation, at four-year institutions. For the combined student model, all students who persisted had social contact with faculty members outside of the classroom. This was the only variable associated with year-to-year persistence at a 1.000 or "perfect" association.

In addition to the constant association variable, several other variables were strongly associated with persistence to the second year. Three of the eighteen significant variables were associated with persistence with a $\Delta p \leq 0.50$.

There was a strong association with persistence and all of the seven background variables. Students over age 21 were much more likely to persist. Female students were more likely to persist.

Other significant variables included coming from a family of 2 or 3 additional family members, having at least one other family member in college, and speaking English as the primary language in the home. Race was significant, but at the lowest associational level of all background variables.

For the all-student model, a high SAT score was positively associated with persistence. This was the only high school variable of significance in this model.

Not delaying entry into postsecondary education was significant, but part-time attendance was not significant. Attendance at a public or private four-year institution was not significantly associated with persistence.

In aggregate, the social integration variables, generally measuring social capital, were not highly significant for the all-student model. Participation in fine arts activities was negatively associated with persistence.

Finally, grade point average was not significantly associated with persistence.

Six of the 37 variables were significant at the $p \leq 0.01$ level. The grade point average and e-mail account variables were significant at the $p \leq 0.001$ level.

First-generation students. For the 37 variables considered in the model, 23 were significantly associated with persistence for first-generation students at four-year institutions. For the first-generation student model, all students who persisted had social contact with faculty members outside of the classroom. This was the only variable associated with year-to-year persistence at a 1.000 or "perfect" association.

Several other variables were strongly associated with persistence, and none of the 23 significant variables were associated with persistence with a $\Delta p \leq 0.50$. Background characteristics were strongly associated with persistence, including the language spoken

at home. For first-generation students, speaking a language other than English as the primary language was negatively associated with persistence through a Δ-*p* of 25.55%.

High school and college entry variables were not strongly associated with persistence, although three of the variables were associated through a Δ-*p* of at least 5.00 p.p. and less than 20.00%. First-generation students attending a public school were weakly associated with persistence, along with attending postsecondary education part-time. Students who delayed entry into college had a small negative association with persistence.

First-generation students at four-year institutions had a negative association with persistence if the student reported having friends attending the same institution. This is a unique finding, with continuing-generation students showing a very weak positive association with persistence. Two other social integration variables were significantly associated with persistence, including student having an e-mail account and going places with friends.

Five of the eleven academic integration variables were significantly associated with persistence, including the social contact with faculty variable. Participation in fine arts activities was negatively associated with persistence. The remaining significant variables, attending lectures with friends, participating in study groups, and having a selected college major; were all positively associated with persistence.

A high grade point average was negatively associated with persistence, at 36.76 p.p. Other than the constant association variable of contact with faculty members, the grade point average had the largest Δ-*p* value of any other variable.

Four of the 37 variables were significant at the $p \leq 0.01$ level. Having an e-mail account, participating in study groups, and the grade point average were significant at the $p \leq 0.001$ level.

Continuing-generation students. Of the 37 variables considered for continuing-generation students at four-year institutions, five were significantly associated with year-to-year persistence. As in the all student and first-generation models, every student who persisted had social contact with faculty members outside of the classroom. This variable was associated with year-to-year persistence at a 1.000 or "perfect" association.

Of the five variables associated with persistence, two were somewhat strongly associated. Continuing-generation students who persisted were likely speak English as the primary language in the home. Other background, high school, college entry, financial, and social integration variables were not significantly associated with persistence or only weakly associated with persistence.

A high grade point average in college was negatively associated with persistence. Other than the direct association between persistence and social contact with faculty members, the grade point average variable had the highest association, albeit negative, of any other variable.

Four of the 37 variables were significant at the $p \leq 0.01$ level. Having an e-mail account and the grade point average were significant at the $p \leq 0.001$ level.

Answers to the Questions

Four research questions served as the basis for this study. The questions addressed the persistence of first-generation and continuing-generation students at both four-year and two-year postsecondary educational institutions, using socioeconomic

status and social capital as the basis for model testing. The findings of the model-testing indicate the model does effectively predict model variables and persistence for first-generation students at two-year and four-year institutions. The model was also accurate for two-year first-generation students, but not for continuing-generation students.

The common factor with all students who persisted was reported contact with a faculty member outside of the classroom, in a social setting. Every student who persisted, in all four models, responded they had at least some social contact with a faculty member.

Question 1

How does socioeconomic status, including social capital variables, positively or negatively influence the year-to-year persistence of first-generation college students, compared to continuing-generation students?

For students attending a four-year institution, there were differences between first-generation and continuing-generation students regarding socioeconomic status. There was a 13.31 p.p. difference in the Δ-*p* results for family income between first-generation and continuing-generation students. Similarly, first-generation students were more likely to work, with a difference in the Δ-*p* results of 18.99 p.p.

Analysis for students at two-year institutions showed greater differences in socioeconomic status effects on persistence. Nearly all of the background variables, high school variables, financial variables, and college entry variables were significantly different between first-generation and continuing-generation students.

Question 2

What effect does socioeconomic status suggest for persistence of students at two-year institutions compared to four-year institutions?

Socioeconomic status variables are more significantly related to persistence of students at two-year institutions than four-year institutions. While a few variables are significant for students at both types of institutions, nearly all of the socioeconomic status variables are significant for students at two-year institutions.

First-generation students at two-year institutions are especially sensitive to socioeconomic status variables.

Question 3

How do background, high school, college-entry, financial, social integration, academic integration, and college performance factors affect year-to-year persistence at two-year and four-year institutions for first-generation and continuing-generation students, and are there differences between first-generation and continuing-generation student persistence at two-year and four-year institutions based on the factors?

Background factors were significantly associated with persistence for students attending four-year institutions. This study indicates all background factors, except race, were significantly associated with persistence for all students attending four-year schools. Background factors were especially important for first-generation students, and less so for continuing-generation students.

High school, college entry, and financial factors were generally not significant for first-generation or continuing-generation students at four-year institutions. Social integration and academic integration factors were variables most significantly associated

with year-to-year persistence for both first-generation and continuing-generation students at four-year institutions. First-generation student persistence was most significantly associated with academic integration on the campus.

Continuing-generation students had very few factors directly associated with year-to-year persistence, other than limited background variables and limited academic integration variables.

Question 4

What implications do these findings have for future federal and institutional policy decisions for first-generation and continuing-generation students at two-year and four-year institutions?

Every student at both two-year and four-year institutions who persisted reported social contact with a faculty member. This suggests the need for institutions to move toward a model of postsecondary education where students and faculty interact much more regularly than is often seen on most campuses, especially large colleges or universities with large classes and faculty who live some distance from campus.

The importance of social capital variables and other variables related to the interaction of the student and the environment validates the research conducted by Duggan (2002), and expands the findings to support first-generation and continuing-generation students at both two-year and four-year institutions.

Suggestions for Further Research

Bourdieu (1986) based the social capital theory and subsequent research on the belief that postsecondary education is, and will continue to be, a social process. Social capital is relevant in these conditions because of the transactional and transitional nature

of the interactions between faculty and students, students and students, and the institution and the community. With changes in the postsecondary education system to include greater access to students through web-based learning and other types of learning that include little, if any actual social interaction, further research into this new paradigm of learning, with little or no social interactions, should be conducted.

The finding that students had social contact with faculty members should be explored through both qualitative and quantitative study. The actual question asked of NPSAS:96 respondents was, "Please tell me how often you participated in the activity. Have informal or social contacts with advisor or other faculty members outside of classrooms and offices?" The overall results from the entire respondent universe included 10,221 students who responded to the question. Of that number, 50.62% responded never, but only the remaining 49.38% of the students who responded sometimes or never were selected for analysis in this study, based on their year-to-year persistence. A quantitative analysis of the effect of year-to-year persistence on first-generation and continuing-generation students based upon their information interactions outside of the classroom and office with advisor and faculty members could provide valuable insight and research in the importance of out-of-class opportunities for interaction between students and faculty members. A concurrent or follow-up qualitative study to identify and evaluate the types of effective interactions that lead to year-to-year persistence could further refine a model for wide-spread use in postsecondary education. Analysis for both two-year and four-year postsecondary education should be conducted separately.

Results for first-generation students at two-year colleges who participated in study groups were different from the results expected based on the review of literature. In addition, the result for the variable for first-generation students at two-year institutions was different from all other groups. A quantitative study to determine the positive or negative effect of study group participation for first-generation students at two-year institutions could be beneficial to faculty and staff when planning academic study opportunities.

Extensive financial aid modeling, including work study eligibility, aid from loans, aid from scholarships, or any of more than three dozen variables were not included in this study for several reasons. First, there is ongoing research into the financial aid factors affecting persistence in postsecondary education. Below's 2003 study included more extensive financial aid variables, and several studies included in the literature review have focused research on financial aid variables as a predictor of persistence. This study demonstrated some differences between first-generation and continuing-generation students regarding general financial aid variables. A more extensive analysis of NPSAS and BPS variables regarding financial aid, possibly using the model proposed by Below and others, could result in findings to significantly affect the financial aid policy at different institutions.

Additional research on the reasons why students do not persist, based on this model, would be helpful for college administrators who wish to identify those students prior to the persistence decision. With the ability to predict who is likely not to persist, administrators and faculty could develop programs and services to intervene and to assist the students.

Implications and Recommendations

The findings from this study suggest several possible implications for changes in institutional policy. Creation of processes and strategies to support the year-to-year persistence of first-generation and continuing-generation students at both two-year and four-year institutions is necessary for the educational success of the new students, the state and local revenue needs of the institution, and creation of support programs that assist students based on needs and data, not solely upon race.

The model proposed in this study accurately predicted the persistence of first-generation and continuing-generation students at a very high rate in the upper 90th percentile. While this may indicate the model has achieved the intended outcome, the model was less successful at identifying students who were likely not to persist . Models for both situations are important for college administrators who need to both select students who are likely to persist, as this study has developed, and also identify those students who are likely not to persist.

Schools need to examine the interactions between faculty and students. This study found a strong association with persistence and the interaction of faculty and students outside of the classroom. College administrators should review policies, processes, and procedures to encourage social contact with faculty and students as a way to support the persistence of first-generation and continuing-generation students.

Social capital issues, including the normative congruence effect proposed by Spady (1970) should be explored thoroughly by administrators and students. Effective matching of the student and the institution, including setting realistic expectations for the

student's goals and attitudes, is likely to increase persistence of both first-generation and continuing-generation students, with the greatest effect seen on first-generation students.

This research indicates grades can be important, but can also be a factor discouraging persistence, at least during the first year. Colleges and administrators should work to insure support for both the academic endeavors of the institution, and must also support the out-of-classroom experiences found through residence halls, study groups, and the social environment of the campus.

Conclusions

This study provided information about the factors that affect college student persistence, at both two-year and four-year postsecondary education institutions. The proposed model can be used as a method to identify students who may struggle with persistence decisions. Identification of students in need may help postsecondary educators to provide services and interventions that will facilitate the year-to-year persistence of these students. This model could be easily adapted to a specific institution, and the validity of the model assessed longitudinally with year-to-year persistence of the students.

Social capital variables, particularly student integration to the collegiate environment, are strongly associated with persistence of first-generation students at both . Contact between the student and faculty member outside of the classroom environment is critical to the persistence of students. The student must match with the social and academic environment of the campus.

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APPENDIX A

Summary of Significant Δ-p Statistics for Four-Year College Persistence Studies

Variable	St. John, Oescher & Andrieu (1992)	St. John, Andrieu, Oescher& Starkey(1994)	St. John & Starkey(1995a)	St. John & Starkey (1995b) Private	St. John & Starkey (1995b) Public	St. John, Paulsen &Starkey(1996)	Cofer (1998) NPSAS: 96 Low-Income	Cofer (1998) NPSAS: 96 Middle-Income
Hispanic	-	-	-	-	-	-	-0.1431	-
Other Minority	NA	NA	NA	NA	NA	NA	0.0976	-
Dependent.	NA	NA	-	-	-	NA	-	-
Under 22	0.0053	-	-	-	-	-	-	0.0322
Over 30	NA	NA	NA	NA	NA	NA	-	-
Income < $11,000	-	-	-	-	-	-	NA	NA
Income > $60,000	-	-	-	-	-	-	NA	NA
Father w/ HiEd Exp.	NA	NA	NA	NA	NA	NA	NA	NA
Aspiration Adv. Deg.	-0.0147	-0.0167	-0.1537	-	-0.060	-0.0186	0.1973	0.0544
Aspiration to Col. Deg.	0.0331	0.0344	0.0337	0.070	-	0.0288	-	0.0259
High Test Score	NA	NA	NA	NA	NA	NA	NA	NA
Low Test Score	NA	NA	NA	NA	NA	NA	NA	NA
Soph..	-	-	-	-	-	-	0.1845	0.0377
Junior	NA	-	-	-	-	-	0.1743	0.0377

Senior	-0.0290	-0.0296	-0.0295	-0.072	-0.055	-0.287	0.2965	0.0614
Live On-Campus	NA	NA	NA	NA	NA	-0.0453	0.1106	-
Attend Full-time	-0.0145	-0.0155	-0.0150	0.038	-	NA	0.1944	0.0577
Low GPA	0.0276	0.0282	-0.0278	0.036	0.054	0.0238	-0.1148	-0.0569
No GPA	NA	NA	NA	NA	NA	NA	-0.1887	-0.1364
Work Full-time	-	-	-	-0.035	-	-	-0.0662	-0.0396
Doctoral institution	NA	NA	NA	NA	NA	NA	0.0736	-
Tuition	-0.0260	-0.0258	-0.0262	-0.064	-0.103	-0.0262	0.0050	-0.0017
Grants	-	-	-	-	-0.022	-0.0036	0.0711	0.0139
Loans	-0.0037	-0.0048	-0.0036	-	-0.016	-0.0034	0.0718	0.0163
Work Study	-0.0190	-0.0205	-0.0191	-0.056	-	-0.0120	-	0.0353
High Debt	NA	NA	NA	NA	NA	NA	-0.1770	-
Med. Debt	NA	NA	NA	NA	NA	NA	-0.0831	-
Low Debt	NA	NA	NA	NA	NA	NA	-0.1310	-

Variable	Cofer (1998) NPSAS: 96 High-Income	Cofer & Somers (1999) Threshold of debt	Somers, Cofer et al (1999) African-American	Somers, Cofer et al (1999) White	Cofer & Somers (2000b) NPSAS:93 Private	Cofer & Somers (2000b) NPSAS:93 Public
Hispanic	-	-	NA	NA	-	-
Other Minority	-	-	NA	NA	-	-
Depend..	-	0.0359	-	0.0271	-	-
Under 22	-	-	-	0.0104	0.0493	0.0437
Over 30	NA	-0.0271	-	-0.0151	-	-
Income < $11,000	NA	0.0352	-	0.0009	-	-0.0414
Income > $60,000	NA	-	-	-	0.0593	0.0310
Father w/HiEd Exp.	0.1457	0.0661	-	0.0246	-	-
Aspiration Adv. Deg.	-	0.0455	0.0745	-	0.0746	0.0729
Aspiration to Deg.	NA	0.0329	-	0.0182	0.0358	0.0587
High Test Score	NA	-	-	0.0159	NA	NA
Low Test Score	0.1882	-	-	0.0042	NA	NA
Soph.	0.1441	0.0375	0.0772	-	-	0.0175
Junior	0.2905	0.0837	0.0758	-	0.0455	0.0331
Senior	0.1361	0.0214	0.1077	-	0.0903	0.0741
Live On-Campus	0.3357	0.0528	0.0567	0.0217	-	0.0183
Attend Full-time	-	-0.1244	0.0835	-	0.0473	0.0521
Low GPA	-	NA	-0.0857	-0.0456	-0.1237	-0.1760
No GPA	-0.1754	-0.0250	-0.2878	-	-	0.0344

Work Full-time	0.0828	-	-	-	-	-0.0262
Doctoral institution	-0.0050	-0.0072	-	0.0064	0.0348	-
Tuition	0.0428	0.0118	-0.0000	-	-0.0038	-0.0104
Grants	0.0200	0.0128	0.0329	-	0.0122	0.0203
Loans	-	0.0224	0.0177	-	0.0105	0.0137
Work Study	-	-0.0314	-	0.0399	-	0.0296
High Debt	-0.1194	-0.0322	-	-0.0614	-0.0679	-
Med. Debt	-	-0.0250	-	-0.0403	-0.0433	-
Low Debt			-0.0888	-0.0501	-0.0364	-

Note. St. John, Oescher, & Andrieu (1992) found age to be significant and positively associated with significance, but coded it as a continuous variable. Most of the St. John and Associates studies coded an aspiration for some college rather than for an aspiration for a college degree, and a few of these studies found it to be significant and positively associated with persistence. Most of the St. John and Associates studies coded students as working, no distinction between full-time or part-time. Most of the St. John and Associates studies coded dependency status as independent rather than dependent.

St. John, Oescher, & Andrieu (1992) ran three samples ("all", private, and public); the significant Δ-*p* statistics for the "all" sample are reported here. St. John, Andrieu, Oescher, & Starkey (1994) ran five versions (prices, prices and unmet need, packages, packages with unmet need, and packages with unmet need and tuition); the significant Δ-*p* statistics for the prices and unmet need version are reported here. St. John & Starkey (1995a) ran three versions (net price, net cost, and multiple prices); the significant Δ-*p* statistics for the multiple prices version are reported here. Cofer & Somers (1999) ran two models (debtload and threshold of debt); the significant Δ-*p* statistics for the threshold of debt version are reported here. Only variables significant at the 0.05, 0.01, and 0.001 levels were reported.

APPENDIX B

Summary of Significant Δ-p Statistics for Two-Year College Persistence Studies

Variable	St. John & Starkey (1994).	Cofer & Somers (2000)	Martin (2000)	Hippensteel et. al., (1996)	Somers, Cofer, Hoef, et. al., (2002)	Langrehr (2003)
Male					0.0193	
African-American	0.0610			0.0561	0.0289	
Other Minority					0.0746	
Depend..		0.0972			0.1143	
Under 22					-0.0454	
Over 30		0.0623				
Disability					-0.0603	
Income < $11,000			-0.1561		-0.0283	-0.1153
Income > $60,000				0.0960	0.0474	0.0726
Parent w/ HiEd Exp.					-0.0344	
Aspiration Adv. Deg.	-0.0726	0.0904			0.2437	
Aspiration to Col. Deg.		0.0791				-0.1543
GED	0.70754	-0.0725				-0.1680
No Diploma						
Public Institution		0.1000			-0.0935	
Low GPA	0.0745	-0.0956	0.3272	0.0755	-0.3013	-0.2847
High GPA					-0.0535	0.0460
Live On-Campus					-0.0882	-0.0884
Work Full-time						-0.1065

Remedial					0.0628	
Attend Full-time	-0.30384	0.2884			0.3267	0.0616
Tuition	-0.1399	-4.9x10-5	-0.1755	-0.1755	-4.96x10-3	-0.0434
Grants	-0.0569	0.1214	-0.0412	-0.0412	0.0999	0.0664
Loans		0.0775			0.0515	0.0381
Work Study		0.1705			0.1739	
High Debt		0.1596				
Low Debt		-0.0485				
Met w/ Friends						0.0462
Met w/ Advisor						0.0526