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Not Graduating in Six Years: Characteristics of First-Time Full-Time College Students Who Drop Out Late and Who Stay Long

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THE FLORIDA STATE UNIVERSITY
COLLEGE OF EDUCATION

NOT GRADUATING IN SIX YEARS:

CHARACTERISTICS OF FIRST-TIME FULL-TIME COLLEGE STUDENTS

WHO DROP OUT LATE AND WHO STAY LONG

By

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ABSTRACT

Student retention, persistence, and graduation have been essential issues in contemporary American higher education. In recent years, the public and public policy makers have been particularly concerned with the measure of six-year graduation rates. However, there does not seem to be an adequate amount of statistically rigorous research with a specific focus on six-year graduation rate, though some national studies pertain to this topic. In addition, research on college student retention, traditionally focused on early dropouts, has paid scant attention to students who drop out late in their college career, or who stay for extended periods of time in college. The purpose of this study is to explore first-time full-time (FTFT) college students that begin at a four-year institution seeking a bachelor's degree, stay at least for four years, but do not graduate within six years at their initial institution, and to investigate factors associated with their non-graduation behavior.

The study is guided by two overarching research questions: 1) What factors are related to graduation within six years for FTFT students who are still enrolled at their initial institution in the fourth year? 2) What factors are related to dropout after four years and what factors related to continued enrollment beyond six years? Data for this quantitative research were collected from a public university in a Southeastern state of the United States. The final sample is consisted of 1,990 students who were enrolled in the fourth year at the university. The outcome for Research Question 1 has two categories: graduation and non-graduation within six years, with the latter being the reference category. The outcome for Research Question 2 has three categories: graduation, late dropout, and extended enrollment, with graduation being the reference. Accordingly, the statistical models for the two research questions are binary logistic regression and multinomial logistic regression, respectively.

The effects of the following sets of independent variables were examined: 1) demographic background: gender, ethnicity, entering age, and residency status; 2) precollege academic preparation: high school GPA, SAT Math score, and SAT Verbal score; 3) college experience: first-year housing status, number of terms enrolled over the first 3 years, attendance pattern first 3 years, major field change over four years, fourth-year major field, fourth-year course load, and four-year cumulative college GPA; and 4)

financial aid: fourth-year financial aid status. The financial aid variable was specified in four alternative approaches in this study: aid package, aid amount for each aid type, receiving aid (Yes=1 or No=0), and aggregate aid amount. Aid types included loan, grant, work/study, state merit aid, and other (athletic and private scholarships).

This research results in the following major findings: 1) Enrollment behavior variables, college major field, and four-year college GPA had highly significant impacts on graduation within six years, late dropout, and extended enrollment; 2) Student demographic characteristics and financial aid did not have significant direct impacts on graduation within six years; 3) Students with a higher SAT Math score were more likely to drop out late or extend enrollment than their peers with a lower SAT Math score; 4) Students who majored in the field of science in the fourth year were more likely than their peers who majored in arts and business to drop out late or extend enrollment beyond the sixth year; and 5) Receiving a higher amount of athletic and private scholarships in the fourth year was associated with a higher likelihood of dropping out late. These findings have practical implications for state and institutional educational policy, and theoretical ramifications for college student retention theory and research.

CHAPTER 1

INTRODUCTION

This study intends to address two important issues in American higher education: student retention and timely degree completion. This introductory chapter begins with a description of the rationale for this study. It then presents the purpose, significance and research questions of the study. The chapter concludes with a brief description of the organization of this manuscript.

1.1 Problem Statement of the Study

Student retention and graduation have been essential and recurrent issues in contemporary American higher education. The public and public policy makers have been particularly concerned with the issue of graduation rate, viewing it as an important indicator of institutional performance and quality. The increasing cost of undergraduate education, the constraint of financial resources available to public institutions, external accountability mandate, and the reported increase in the average elapsed time to complete a bachelor's degree have converged to extend public attention to the issue of time-to-degree for undergraduate students (Adelman, 1999, 2006; Berkner, He, & Cataldi, 2003; Knight & Arnold, 2000; National Center of Educational Statistics, 1996, 2003, 2004; Oklahoma State Regents for Higher Education, 1996, Volkwein and Lorang, 1996).

Public institution accountability advocated by state legislators and other higher education policy makers has contributed to the expansion of student assessment from graduation rate to time-to-degree completion (Oklahoma State Regents for Higher Education, 1996; Knight, 2004). Some states, such as Ohio, encourage timely degree completion by providing performance funding to institutions whose four-year graduation rates exceed certain benchmarks (cited in Knight, 2004). There has been some evidence of success of the performance funding program in shortening time-to-degree at the institutional level (Knight, 2004). Some other states, such as Virginia, have suggested tying institutional funding to graduation rates (Hebel, 1999).

Several states such as California, Florida, Oregon and Texas have proposed or taken actions against students who take excessive accumulated credits or stay at college for extended period of time (Volkwein & Lorang, 1996). A policy has been introduced in

Florida to limit the total number of required credits for particular academic majors. Oregon lawmakers intend to introduce an excess credit surcharge so that students affected do not take excess credits, thus making more room available to new and prospective students.

The reality is that college students are increasingly taking more time to complete a bachelor's degree. The average time-to-degree was 4.58 calendar years (five academic years) for a group of nationally sampled students who were eighth graders in 1988 (Adelman, 2006). A report by National Center for Educational Statistics (NCES) (1993) indicated that only 43.3% of the receivers of a bachelor's degree in 1990 graduated in four years, whereas 56.7% did so in five years or more. Astin, Tsui, and Avalos (1996) reported that only 39.9% of the entering freshmen from 365 four-year institutions in their study obtained a bachelor's degree within four years. It took an average of 4.6 years for those who began at public four-year institutions and who received a bachelor's degree in 1999-2000 to complete the degree (NCES, 2003). The trend of time-to-degree extension has been so strong that the federal government has established a six-year graduation rate reporting mechanism and most national databases have opted to report five- and six-, instead of four-year graduation rates (Volkwein & Lorang 1996; Knight 2002). A case in point is the inclusion of an item on institutional six-year graduation rate in the Graduation Rate Survey within the Institutional Postsecondary Education Data System (IPEDS). The Student Right-to-Know and Campus Security Act of 1990 requires an institution that participates in student financial aid program under Title IV of the Higher Education Act of 1965 to disclose their six-year graduation rates to prospective students. Six-year graduation rate has become a significant indicator of state and institutional performance in higher education.

However, there does not seem to be an adequate amount of statistically rigorous research with a specific focus on six-year graduation rate, though some national studies pertain to this topic. A few studies on time-to-degree have been published in recent years. This line of research, in general, is focused on time-to-degree for an institution or for a state university system, not on students per se. Consequently, not much is exactly known about who do not graduate within six years and why they do not.

1.2 Purpose of the Study

The purpose of this study is to explore who are those first-time full-time (FTFT) college students that begin at a four-year institution seeking a bachelor's degree, stay for at least four years, but do not graduate within six years at their initial institution, and examine what factors are associated with their non-graduation behavior. The term *students not graduating within six years* refers to students who are retained in the same institution in the fourth year, but drop out in the fifth or sixth year, or stay beyond the sixth year. This study intentionally excludes students who drop out within four years since they have received much attention in extant studies. By drawing on previous research on retention and time-to-degree, examining a number of potential variables associated with this group of students such as demographic variables, precollege academic variables, college experience variables (e.g., grade point average and course load), and financial aid, and comparing this population with those who graduate within six years, this research is expected to enhance our understanding of a group of students who should have been a legitimate focus of the research on retention and degree completion.

1.3 Research Questions

The study is guided by two overarching research questions:

1. What factors are related to graduation within six years for FTFT students who are still enrolled at their initial institution in the fourth year?
2. What factors are related to dropout after four years and what factors related to continued enrollment beyond six years?

1.4 Significance of the Study

This research has potentially significant theoretical and practical implications. Theoretically, this study contributes to the literature on student retention and persistence. Although a great deal of empirical research on student retention and persistence has been conducted, and several theoretical models have been proposed, tested and evaluated over the years, this line of research is largely focused on early dropouts for the purpose of addressing student attrition within the traditional notion of four-year college education. The current study, in contrast, is primarily concerned with students who are retained for at least four years but fail to graduate within six years from their initial institution. These students can be categorized into two subgroups. One subgroup is *late dropouts*, students

who drop out after the fourth year, and the other is *extenders*, students who are still enrolled at their initial institution for a first bachelor's degree after the sixth year. A review of relevant literature indicates that we have known a lot about early dropouts but very little about late dropouts and extenders. Tinto (1986, 1993) suggests that students may face different challenges at different stages, and argues for the necessity of studying departure at differing points in the student career. Presumably, it is theoretically meaningful for researchers of college student development and success to study late dropouts and extenders, understand the similarities and differences between early dropouts, late dropouts, and extenders, and investigate how well student retention theories and models apply to late dropouts and extenders.

Moreover, this research may have significant practical implications. From the perspective of the public and policy makers, this type of research may make more sense than research on time-to-degree, since it is specifically and clearly connected to the accountability measure of institutional six-year graduation rate. Here, a distinction should be made between two crucial terms: *institutional completion/graduation rate* and *student completion/graduation rate* (Berkner et al., 2003). Institutional completion/graduation rate describes baccalaureate degree completion of students at the first institution of attendance, and thus it reflects the perspective of the institution. In contrast, student (or system) completion/graduation rate represents baccalaureate degree completion anywhere, regardless of whether students transferred from the original institution or not, and thus it reflects the perspective of students as well as the higher education system as a whole.

The emphasis of this study is on institutional graduation rate, in particular, six-year institutional graduation rate, which directly addresses the interests and concerns of the public and higher education policy makers who tend to perceive and employ six-year graduation rate as a crucial accountability measure of institutional performance. In addition, like studies on time-to-degree, this research will also serve as a data-driven response to the concerns of the public about reducing time-to-degree completion, enhancing institutional effectiveness and efficiency, and saving tax dollars, especially within the context of a declining national economy and shrinking government financial resources.

For the measure of six-year graduation rate, it is expected that three student groups are relevant: students who graduate within six years, student who drop out within six years, and students who persist beyond the sixth year. This research may help administrators at four-year institutions better understand students in the latter two groups that have a bearing on the six-year graduation rates of their institution. The increased understanding of the characteristics and behaviors of these students will enable administrators to develop more effective policies and intervention programs directed towards promoting the persistence and degree completion of these students within a desirable time frame.

More specifically, a good understanding of the predictors of late dropout and extended stay can enhance advising and intervention programs. These programs can pinpoint at-risk students based on a combination of significant predictors of non-graduation that may include fourth-year course load and cumulative college grade point average (GPA) by the end of the fourth year, and monitor their progress through an online student record management system. For examples, a counselor can help targeted at-risk students develop a plan to access resources, pay for tuition, register for classes, and review strategies to improve academic performance. Likewise, an academic advisor may help targeted students follow an appropriate course of academic progression, and decrease the number of failed and repeated classes as well as surplus credits.

Research on six-year graduation rate and efforts to improve the rate will be more warranted if actual six-year graduation rates are undesirably low, and if there is, theoretically at least, much room for improvement. In fact, the average national six-year graduation rate has been far from impressive and few universities and colleges claim that they are satisfied with their graduation rates. For instance, among bachelor's degree seekers beginning at a four-year institution in 1995-96, only 55% had received a bachelor's degree at that institution within six years (without considering students who transferred and earned a degree elsewhere). Isolating public institutions, the six-year graduation rate was 50% (Berkner et al., 2003). According to a synthesis in a more recent popular publication (Adelman, 2006), for students who started in four-year colleges, between 54% and 58% obtained their bachelor's degree from their initial institution within six years, and between 62% and 67% earned their degree from their initial or any

other institution within six years. Research like the current one can have particularly valuable implications for many institutions with disappointing six-year graduation rates.

1.5 Organization of the Study

This study is comprised of five chapters. Chapter 1 introduced the context, rationale, purpose, significance and research questions of this study. Chapter 2 presents a review of relevant literature that includes student retention and attrition theories, research on persistence and degree completion in general, research on dropout and extended stay, and research on time-to-degree. Research methods, including data source, variables, statistical models, and data analysis procedure, are described in Chapter 3. Chapter 4 reports the findings of this study that include descriptive statistics, cross-tabulation results, and results from binary and logistic regressions. This chapter also provides a discussion of the findings in light of relevant theories and previous literature. Finally, Chapter 5 presents several major conclusions of this study and some implications for institutional and public policy and for future research.

CHAPTER 2

LITERATURE REVIEW

This study is guided and informed by student retention and attrition theories, research on persistence and degree completion in general, research on dropout and extended stay, and research on time-to-degree. Relevant literature in these areas is reviewed in the following sections. This chapter concludes with the theoretical framework and research model for this study.

2.1 College Student Retention and Attrition Theories

There are two influential models regarding college student retention and attrition: Tinto's student integration model (1975, 1987, 1993), and Bean's model of college student attrition (Bean, 1980; Bean, 1982; Bean, 1985; Bean & Metzner, 1985). These two models have guided the voluminous research on student retention and persistence over the years.

The sociological model of the dropout process proposed by Spady (1970) is the first theoretical attempt to explain college student attrition. According to this model, the important interaction between the individual student and the particular college environment provides the student the opportunity to integrate into the academic and social systems of the institution. If the student fails to integrate into, or receive sufficient reward from, the two systems, he will have a low level of satisfaction with his experiences and thus a low degree of institutional commitment, which will, in turn, result in his decision to withdraw. Important variables in this model include grade performance, intellectual development, normative congruence, and friendship support. Additional important elements are family and cultural background and academic potential.

Building on Spady's (1970) framework, Tinto (1975, 1987, 1993) has theorized that the student arrives at college with a variety of patterns of personal, family, and academic attributes that affect his initial levels of commitment to a college degree and to the institution he attends. These initial commitments bear on his experiences and interactions with peers and faculty, and affect the level at which he becomes integrated into the social and academic systems of the institution. Social and academic integration, in turn, reshapes the levels of the student's degree and institutional commitments,

ultimately resulting in student decisions to persist or withdraw. The focus of Tinto's model is on the process of student attrition. Specifically, negative interactions between the student and the social and academic systems of the institution and other members of the systems impose barriers to social and academic integration, marginalize the student, and distance the student from the institutional community, thereby undermining the commitments of the student to both the institution and an academic degree, and ultimately leading to his decision to drop out.

Bean (1980) proposed a causal model of student attrition that includes three sets of independent variables: background variables, organizational determinants, and intervening variables. Background variables, such as past academic achievement and socioeconomic status, contribute to organizational determinants. Variables in the category of organizational determinants contain objective measures like college GPA, and subjective measures like the quality of the institution. These variables are supposed to determine the level of student satisfaction with the institution, which, in turn, influence the level of institutional commitment. Institutional commitment has a direct impact on the decision of the student to drop out. Following this theoretical framework, Bean's empirical study produced two final models, one for female students and one for male students. In both models, institutional commitment was the most important variable in predicting dropout. Other important variables included academic performance, routinization, development, and college GPA. A major difference between the two models lies in that satisfaction was a significant intervening variable for women, but not for men.

Bean and Metzner (1985) postulated a conceptual model for nontraditional student attrition. According to this model, attrition decisions are primarily affected by 4 sets of variables: academic performance as represented by GPA (based on past performance), intent to leave (influenced primarily by psychological outcomes such as satisfaction and goal commitment), background and defining variables (primarily high school performance and educational goals), and environmental variables, such as finances, hours of employment, and outside encouragement.

Tinto's and Bean's models, as described above, share some similarities (Cabrera, Nora, & Castaneda, 1993). First, in both models, persistence is the result of a set of

interactions over time. Second, the adjustment of the student to the institution is influenced by the student's precollege characteristics. Furthermore, the degree to which the student and the institution match exerts an impact on persistence. However, major differences exist between the two models. Unlike in Tinto's model, environmental variables external to the institution such as outside encouragement have a significant role in Bean's model. In addition, academic performance (i.e., college grades) is treated differently in the two models. It is conceptualized as an indicator of academic integration in Tinto's model, but hypothesized as an outcome variable resulting from academic and social-psychological experiences in Bean's model.

Building on these two models, Cabrera et al. (1993) proposed an integrated model of student retention. This integrated model treats academic integration and college GPA as two separate variables and assumes that GPA has a direct effect on persistence. The model also postulates that environmental variables like encouragement from friends and family, and financial attitudes, can significantly influence academic integration, institutional commitment, and intent to persist. Student persistence is affected by intent to persist, goal commitment, institutional commitment, social integration, GPA, academic integration, encouragement from family and friends, and finance attitudes. Empirical findings from Cabrera et al. revealed that that intent to persist, GPA, and institutional commitment were the three most important factors.

Both of Tinto's and Bean's models have been extensively tested and employed as theoretical guidance in college student retention research. However, many researchers have pointed out that it is frustrating to operationalize some of the variables in the two models. Tinto's model, despite its paradigmatic status in student retention research, has been criticized for its poor validity with nontraditional college students (Braxton, 2000; Braxton, Hirschy, & McClendon, 2004) and its failure to take the effect of finances into account (Cabrera, Stampen, & Hansen, 1990). There has been some evidence that combining the two models, as exemplified by Cabrera et al.'s (1993) integrated model, improves the explanatory power of student retention modeling (St. John, Paulsen, & Starkey, 1996). Recent years have witnessed a marked increase in using economic theories and models to guide retention studies (Cabrera, Nora, & Castaneda, 1992; St. John, Cabrera, Nora, & Asker, 2000). As a consequence, more and more retention

studies are exploring the effects of variables that have economic implications, such as family income, financial aid, tuition, and financial need.

2.2 Research on Persistence and Degree Completion in General

According to Pascarella and Terenzini (2005), persistence and degree completion can be interpreted as being determined by four kinds of college effects: between-college effects, within-college effects, conditional effects, and long-term effects of college. Between-college effects refer to the differential impacts on student persistence and degree completion between and among institutions; differences can be attributed to the characteristics of the particular institution attended such as institutional type, size or student body selectivity. Within-college effects are concerned with the impacts of different conditions or experiences inside the institution such as residence arrangement and academic major. Conditional effects exist when various collegiate experiences vary in their impacts for different kinds of students. For example, living on campus may be particularly beneficial to students of color, though it tends to be positive for all students in terms of persistence. Long-term effects refer to the durability of the college experience on students' future attitudes, beliefs and behaviors. An illustration of long-term effects is the fact that the tradition of attending college passes from one generation to the next, so that, for instance, students whose parents hold a bachelor's degree are more likely than first-generation students to earn that degree.

The within-college effects as defined by Pascarella and Terenzini (2005) are more relevant to the current study, which is intended to examine personal factors that affect student six-year degree completion within a particular institution. Based on Tinto's and Bean's theoretical models of student persistence as well as Pascarella's (1980) conceptual model of student-faculty informal contact and college outcomes, Pascarella and Terenzini conducted a thorough review of the literature of the 1990s that examined the within-college effects on persistence/degree completion. The within-college effects covered a wide range of categories/factors/variables, including academic performance, academically related experiences (e.g., first-year seminars, academic support programs, advising), financial aid, interactions with faculty members, interactions with peers, residence, learning communities, academic major, and general academic and social integration.

Based on their literature review, Pascarella and Terenzini (2005) have drawn a number of major conclusions about the within-college effects on student persistence and degree completion. To illustrate, academic and social integration has a consistent, significant and positive impact on persistence and graduation. Academic performance as represented by GPA is also a consistent and positive predictor. Programmatic interventions generally enhance student persistence. Specifically, first-year seminars benefit persistence, particularly persistence from the first to the second year.

In the review of Pascarella and Terenzini (2005), studies on the effects of financial aid are less consistent in their findings. It is not clear which types of aid are more effective, though grants and scholarships are generally positive in their effects. Tuition, long off-campus working hours, and unmet need (i.e., the difference between college costs and financial aid and family and student contributions) tend to have negative impacts on persistence and degree completion. Interactions with faculty and peers are positive in their effects, though peers exert more influence than faculty members. Living on campus and participating in learning communities also play a positive role. As for the effect of academic majors, it appears that students in the sciences, engineering, business, and health-related areas are more likely to graduate.

Pascarella and Terenzini's (2005) comprehensive review demonstrates the various effects of a wide range of within-college factors and variables on persistence and degree completion in general. However, their review does not specifically distinguish between four-year and six-year degree completion, nor between persistence in early and late years in college. In addition, their review does not cover the effects of demographic factors like gender and pre-college academic factors such as high school GPA. Furthermore, the focus of their review is not on dropout or extended stay. Relevant literature on dropout and extended stay is reviewed in the following sections.

2.3 Research on Dropout in General

Tinto (1993) defined dropouts as students who enroll in college but do not reenroll or do not complete their intended degree program or set of courses. He proposed that since departure behavior is a complex construct, it is important to distinguish different types of behaviors, for example, transfer behavior, stopout, and system withdrawal. However, many studies treated all nonreturning students within a specified

period of time as dropouts, even if they come back after a short time or transfer to another institution.

Hoyt and Winn (2004) claimed that to understand retention, it is important to differentiate between four specific groups of students: drop-outs, stop-outs, opt-outs, and transfer-outs. According to Hoyt and Winn, drop-outs are those students who do not return to the institution in which they enrolled, have no definite plans to return, and do not transfer to another institution. Stop-outs are students who begin a program of study, leave college for a while, and then reenroll to finish their plan of study. Opt-outs are students who leave without any degree or certificate because they believe they have achieved their intended purpose. Transfer-outs are those who start their college experience at one institution and then transfer to another one. Hoyt and Winn argued that the four groups of students have different characteristics and needs, and that retention for each of the groups is affected by distinct factors.

Student dropout (departure/attrition) has been studied extensively (Bean, 1980; Braxton, 2000; Braxton et al., 2004; Cabrera et al., 1990, 1993; Pascarella and Terenzini 2005; Tinto, 1987, 1993, 2006-07). Three major types of departure frequently studied are stopout, institutional departure, and system departure (Chen, 2007). Stopout and institutional departure are typically the interest of institutional researchers and stakeholders, whereas system departure is normally the focus of researchers interested in policies at the state and national levels. About one quarter of students leave a four-year college or institution without completion (Braxton et al., 2004). Not surprisingly, empirical research on student dropout has been focused on early dropout, or dropout within the first two or three years of college, since most students, if they drop out, tend to do so at an early stage of their college career (Berkner et al., 2003).

Persistence and dropout can be viewed as the two sides of a coin. The empirical research on persistence and degree completion reviewed in an earlier section incorporates research on dropout, and sheds some light on college students who fail to persist and attain a bachelor's degree. The following section will present a more direct overview of factors impacting early dropouts in four-year colleges and universities. These factors largely fall into three categories: demographic variables, precollege academic variables, and in-college variables, such as college GPA, enrollment behavior, and financial

aid/financial need. It should be noted that researchers of early dropout may not necessarily differentiate between dropouts (without returning later), transfer-outs, and stop-outs as defined by Hoyt and Winn (2004). Presumably, a compact review of factors related to early dropout will compensate for the paucity of literature on late dropout and facilitate the discussion of the results in subsequent chapters.

2.4 Factors Related to Early Dropout

Gender

The impact of gender on early departure has not been consistent among prior empirical studies. Some researchers reported that males were more likely to depart than females, but only for certain minority groups or for certain periods of time (Hu & St. John, 2001; St. John, Hu, & Weber, 2001). Other researchers did not find any significant relationship between gender and departure (DesJardins, Ahlburg, & McCall, 1999; Ishitani and DesJardins, 2002; St. John, Hu, Simmons, Carter, & Weber, 2004). In Herzog's (2005) study, women were more likely to transfer within one year than men, though no gender difference existed in the probability of dropping out.

Age

Research has suggested that older students tend to drop out early (DesJardins et al., 1999; Hu & St. John, 2001). In the NCES 2003-04 Beginning Postsecondary Students (BPS) longitudinal study, 29% of the students starting at four-year institutions at the age of 19 were not enrolled at the initial institution in the third year, as compared with 50% of the students starting at an age between 20 and 23 (Berkner & Choy, 2008). Other studies (e.g., Herzog, 2005), however, failed to find a significant relationship between age and early dropout.

Ethnicity

Although previous studies have tended to agree on the disparity in dropout among different ethnic groups, especially that between African Americans and Whites, the conclusions become more uncertain when other variables are taken into account or controlled for (Hu & St. John, 2001; Pascarella, 1985). In the NCES 2003-04 BPS longitudinal study, 39% of the Black students starting at four-year institutions were no longer enrolled at their initial institution in the third year, as compared with 35% of the Hispanic students and 29% of the White students (Berkner & Choy, 2008). In the study

by Wohlgemuth et al. (2006-07), ethnic minorities had consistently lower retention rates over the first few years than non-minority students.

Parental education/family income/ socioeconomic status (SES)

In the NCES 2003-04 BPS longitudinal study, 41% of the students starting at four-year institutions whose parents' highest education was high school or less were no longer enrolled at their first institution in the third year, whereas the corresponding figure for those whose parents' highest education was bachelor's degree or higher was 25% (Berkner & Choy, 2008). Parental education was a significant predictor in some studies (e.g., DuBrock & Fenske, 2000; Ishitani & DesJardin, 2002; Straton, O'Toole, & Wetzell, 2007). Many studies (e.g., DuBrock & Fenske, 2000; Herzog, 2005; Ishitani & DesJardin, 2002; Leppel, 2002; Paulsen & St. John, 2002) explored the effect of the variable of family income and the reported effect tended to be significant. A few studies (e.g., Hu & St. John, 2001; St. John et al., 2004) revealed that the effect of family income varied across ethnic groups or years in college. As for the effect of socioeconomic status (SES), Cabrera et al. (1990) found that lower SES status was predictive of departure.

Residency

Some studies (e.g., DuBrock & Fenske, 2000; Herzog, 2005) showed that compared with in-state students, out-of-state students were twice likely to drop out in the first 2 year. Similarly, DesJardins et al. (2002) reported that in-state students and students from the surrounding states are less likely to stop out than students from the rest of the United States, especially early in their academic years. In Wohlgemuth et al.'s (2006-07) study, non-residents were less likely than residents to be retained across the first 4 years.

High school performance

High school GPA has been identified as a consistent predictor of early dropout in relevant literature. For instance, Stampen and Cabrera (1986, 1988) reported that lower high school GPA was positively related to dropout, especially for the first year in college. According to DuBrock and Fenske (2000), the significant effect of high school GPA on dropout extended to the fifth year in college.

SAT/ACT score

Some persistence studies (e.g., Ishitani & DesJardin, 2002; Wohlgemuth et al., 2006-07) indicated that lower SAT/ACT score was correlated with early dropout, while

others (e.g., DuBrock & Fenske, 2000) noted that SAT/ACT predicted long-term rather than short-term persistence. St. John, Hu, Simmons, et al. (2001) reported that the effect of SAT scores on persistence was no longer significant after controlling for college grades. In the 2003-04 BPS study, 44% of the students starting at four-year institutions whose SAT/ACT scores were in the lowest quartile were no longer enrolled at their first institution in the third year, as compared with 19% of the students whose SAT/ACT scores were in the highest quartile (Berkner & Choy, 2008).

College GPA

Early dropouts tend to have lower first-year or first-semester GPAs. In Mallette and Cabrera's (1991) study, the first-year GPA of the persisters at a large university was significantly higher than that of those who dropped out after their first year at the institution. DesJardins et al. (2002) reported that students with low GPAs were more likely to stop out in years 1 through 6. Ishitani and DesJardins (2002-03) found that first-year GPA predicted first-year, but not fourth-year departure. St. John, Hu, Simmons, et al. (2001) reported that college grades were better predictors of persistence than SAT scores, confirming college grades as a significant predictor of persistence. Straton et al. (2007) found that first-year GPA was predictive of attrition for full-time students, but not for part-time students. Based on their literature review, Pascarella and Terenzini (2005) concluded that college grade is the best single predictor of student persistence.

Academic major

St. John et al. (2004) reported that White freshmen majoring in social sciences or being undecided about their majors were more likely than their counterparts in other major fields to drop out of the state public university system during the first year. Conversely, students majoring in the sciences, mathematics, and engineering or business and health-related professions were found to have lower dropout rates (Fenske, Porter, & DuBrock, 2000; Leppel, 2001). In Herzog's (2005) study, selecting a math-intensive major decreased the dropout and transfer risk in the first year, though no significant effect was associated with either being undecided about a major in first semester or having a major within a particular academic college. However, Dubrock and Fenske (2000) found no significant difference between science, engineering and mathematics (SEM) majors and non-SEM majors in terms of early dropout probability.

Enrollment patterns

Findings from many studies (e.g., Bean & Metzner, 1985; St. John et al. 2004) have confirmed that part-time students are more likely to drop out than full-time students. In the NCES 2003-04 BPS longitudinal study, 27% of the students starting at four-year institutions who were in the category of always full-time were not enrolled in their first institution in the third year, compared with 65% of the students who were in the category of always part-time (Berkner & Choy, 2008).

First-semester or first-year credit hours enrolled

Some studies have explored the effect of course load rather than enrollment patterns. In these studies (e.g., DeBrock & Fenske, 2000; Herzog, 2005), first-semester hours enrolled tend to be a significant predictor of early dropout.

Academic and social integration

According to the review of Pascarella and Terenzini (2005), numerous studies have found the significant effect of various forms and measures of academic and social integration on year-to-year persistence, suggesting that students with lower levels of academic and social integration tend to drop out. However, it is not clear whether the effects on persistence are direct or indirect and what the exact relationship between academic and social integration is.

Financial aid, financial need, or employment

The literature review by Pascarella & Terenzini (2005) suggested that different types of financial aid exert different impacts on students' dropout behavior but that it is uncertain which type has the strongest impact. Most recent research on financial aid has focused on the impact of the amount of certain types of aid, the time varying effect of aid, and the differential effects of aid by income and racial groups (DesJardins et al., 1999, 2002; DuBrock & Fenske, 2000; Hu & St. John 2001; Ishitani and DesJardins, 2002; Perna, 2000; St. John & Starkey, 1995). For example, it was found that for African Americans, aid recipients of any type of aid package were less likely to drop out than non-aid recipients (Hu & St. John, 2001). Hu (2000) reported that the effects of financial aid packages on attrition varied across classes of students (i.e., freshmen, sophomores, juniors, and seniors). As for employment, there has been strong support in the literature

that full-time work, especially when it is off-campus, is positively related to dropout (Astin, 1993; Pascarella & Terenzini, 2005; Tinto, 1993).

Retention studies are concerned not only with factors that predict dropout, but also with student reported reasons for dropout. Students in the NCES 2003-04 BPS Study reported during interviews their reasons for leaving their institution or transferring after their first year in college (Berkner & Choy, 2008). Students in four-year institutions most frequently reported personal reasons (73.9%) for leaving their institution. Financial reasons came next (39.8%), followed by family responsibilities (24.4%), dissatisfaction with program/school/campus (18.9%), and academic problems (14.5%). In addition, student in four-year institutions most frequently reported personal reasons (53.6%) for transferring from their original institution, dissatisfaction with program/school/campus was next (30.7%), followed by other reasons (27.6%), pursuing bachelor's degree (25.1%), scheduling problems (21.6%), and financial reasons (19.6%).

A brief summary of the research on the factors related to early dropout is in order. First, high-school GPA, college GPA, enrollment behavior (e.g., part-time versus full-time, or credit hours enrolled), and academic and social integration are, in general, consistent factors related to early dropout. Second, the effects of demographic variables, such as gender and ethnicity, are less consistent, varying across different studies. Furthermore, the complexity and variety of studies on the effects of financial aid make it difficult to draw any overarching conclusions.

2.5 Research on Late Dropout

Little research has been specifically focused on late dropout, or dropout from the original institution after four years. However, a few studies have provided some pieces of information about late dropouts. For example, in the NCES 1995-96 BPS longitudinal study, about 2% of all beginning baccalaureate students at four-year institutions left postsecondary education directly from their original institutions in the fifth and sixth years. The study also showed that transfer-out in the fifth or sixth year of college was a rare phenomenon (Berkner et al., 2003).

DesJardins and Pontiff's (1999) study on tracking institutional leavers is relevant to late dropouts (and extenders). Their sample was comprised of 2,077 "leavers" who had left a large public research university within eight years of matriculation, and 2,945

“stayers” who remained enrolled or had graduated within eight years from the institution. About 60% of the leavers left the institution within two years of matriculation with an average GPA below 2.0. About one quarter departed after being enrolled for at least four years, and 13.5% of all leavers dropped out in year 5 or year 6 with an average GPA of about 2.4. Only about 10% of those who left in year 5 or year 6 were enrolled in another higher education institution within the state the very next fall after their departure from the institution under study. DesJardins and Pontiff’s study suggested that late dropouts tend to have higher cumulative GPAs than early dropouts, and that most of them do not drop out for the sake of transferring to another institution. Their study did not employ any inferential statistical methods, and nor did it deal with any characteristics of the late leavers other than academic performance.

2.6 Research on Extended Enrollment

Students who stay in college for extended period of time (called extenders by Volkwein & Lorang, 1996) have received little attention from researchers, even when they have attracted increasing public attention over the past two decades. Berkner et al. (2003) reported that 6.8% of the students in the NCES 1995-1996 BPS longitudinal study who began at four-year institutions seeking a bachelor’s degree were still enrolled at the first institution without a degree by the end of the sixth year. Among those 1995-96 beginning students at four-year institutions with a bachelor’s degree goal, 8.1% of the males were still enrolled at the original institution by the end of the sixth year compared with 5.7% of the females. The percentages of Hispanic, Black and White students still enrolled were 10.8%, 8.9%, and 5.8%, respectively.

In terms of attendance intensity at the first institution, those who were still enrolled were more likely to belong in the categories of mixed or always part-time than of always full-time. Their high school GPAs were more likely to be in the category of *B’s or less* than of *mostly A’s*. Their SAT combined scores were more likely to be in the category of low quartile (i.e., 400-700) than of high quartile (1030-1600). Furthermore, their first-year GPAs were more likely to be in the category of less than 2.25 than of over 3.25. Astin (1993) mentioned that the input characteristics of the students still enrolled after four years in his national sample resembled those of students who dropped out rather than those who completed their degrees in four years.

Volkwein and Lorang's (1996) research is one of the few published studies that have centered on the characteristics of those who enroll for more than four years. Their study found that an apparent enrollment behavior of the extenders (defined as those who did not graduate or did not intend to graduate in four years) was that they completed fewer than 15 credit hours for multiple semesters. These extenders did so because they wanted to protect a high GPA and have more time to enjoy college life. Moreover, they needed more time for work to meet financial needs and for family responsibilities. These extenders also had greater financial need and possessed a higher GPA than those who graduated in time.

The strength of Volkwein and Lorang's (1996) study is that it not only explored variables predicting delayed graduation or extended stay, but also solicited from the extenders their perceived reasons for their behavior, thus revealing multiple characteristics of the extenders. On the other hand, the study has a couple of methodological weaknesses. First, they used 3 different samples of students, with the size of the largest sample being 229. The largest sample consisted of not actual extenders or timely completers, but of juniors and seniors who self-reported whether they would be extenders or timely completers. Second, the results of their logistic regression modeling might be biased since the observation/predictor ratio for the model is only about 6.3 : 1 (Sample size = 190, Number of predictors = 30), lower than the 10 : 1 benchmark recommended by Peng, So, Stage and St. John (2002). It should also be pointed out that the definition of extenders in Volkwein and Lorang's study is different from that in the current study. Their extenders were students who graduated or stayed after the fourth year, instead of students who stayed beyond the sixth year.

2.7 Factors Related to Time to Degree/Degree Completion

The few studies that have been conducted on issues related to time-to-degree largely fall within the theoretical framework of the student retention and persistence models mentioned above (Belcheir, 2000; California State Postsecondary Education Commission, 1988; DesJardins et al., 2002; Ishitani, 2006; Knight & Arnold, 2000; Knight 2002, 2004; Oklahoma State Regents for Higher Education, 1996), though some of these studies are more practically oriented without reference to any retention and persistence models. These studies, in general, explore what factors predict time-to-degree,

and focus more on time-to-degree than on students per se. They do not seem to be interested in systematically investigating the characteristics of particular student groups.

The following section presents a review of literature on factors associated with time-to-degree. The focus on factors associated with time-to-degree is partly based on the assumption that factors positively correlated with timely degree completion are most likely factors negatively related to late dropout and extended stay in college.

Gender

Females were more likely than males to complete their degree in four or six years (Berkner et al., 2003; Lam, 1999; NCES, 1996; Wohlgemuth et al., 2006-07). In Fenske et al.'s (2000) study, females majoring in Science, Engineering and Math (SEM) were twice as likely to complete their degree programs as their male peers. Ishitani (2006) revealed that first-generation female students were 56% more likely to graduate within four years than male students.

Age

Students who entered postsecondary education at age 18 or younger were more than twice (51% versus 19%) as likely as those who entered between the ages of 20 and 29 to have reported completing a bachelor's degree within five years (NCES, 1996; 2003). In studies that used multivariate analysis (e.g., Wohlgemuth et al., 2006-07), age did not tend to be a significant predictor.

Ethnicity

Cuccaro-Alamin (1997) reported that Asian/Pacific Islander and White 1980 high school sophomores were more likely than their Black, Hispanic, or Native American peers to have completed a bachelor's degree by 1992. Similarly, Berkner et al. (2003) found that White, and Asian/Pacific Islander beginners seeking a bachelor's degree at a four-year institution were more likely to have completed the degree within six years (67-71% versus 46-47%). White and Asian students majoring in SEM were twice as likely to complete their degree in four years as underrepresented minorities (Fenske et al., 2000). Findings by DesJardins et al. (2002) revealed that Latino students took longer to complete than White students (13.73 versus 13 terms). However, the study by Lam (1999) indicated that being a student of color (Black, Hispanic, and Native American) was predictive of quicker graduation.

Parental education, socioeconomic status (SES), or family income

Lower level of parental education has recently been reported as a significant predictor of longer time to degree (Ishitani, 2006; NCES, 2003). Being a first-generation student reduced the odds of graduating in four or five years by 51% and 32%, respectively. First-generation Black students were 58% less likely to graduate within four years than their non-Black counterparts, while Hispanic students were less likely than White students to graduate in four or five years (Ishitani, 2006).

Cuccaro-Alamin (1997) reported that 1980 high school sophomores with high SES backgrounds were much more likely than their low or middle SES peers to have completed at least a bachelor's degree by 1992. NCES (1996) indicated that as SES increased, so did the likelihood of earning a bachelor's degree within five years. Likewise, higher family income of dependent students increased the likelihood of graduation with a bachelor's degree within six years (Berkner et al., 2003).

Residency Status

DesJardins et al. (2002) reported no significant differences in timely graduation in terms of home location of the students. Likewise, Wohlgemuth et al. (2006-07) found no significant difference in four-, five- and six-year graduation rates between residents and nonresidents. Lam (1999), however, revealed that out-of-state students took less time to graduate.

High school GPA, high school class rank, number of Advanced Placement (AP) tests taken

High school GPA and the number of AP tests taken were associated with degree completion in four and six years (Berkner et al., 2003). Students with the highest high school class rank were most likely to graduate in any of the four-, five-, and six-year periods (Ishitani, 2006). Conversely, lower high school GPA was predictive of longer time-to-degree (Knight 1994, 2002; Knight & Arnold, 2000). High school GPA was the single strongest predictor of four-year graduation in Astin's (1993) study.

SAT/ACT score

Research has generally agreed on the positive relationship between SAT test score and rates of graduation in four and six years. In other words, students with higher SAT or

ACT scores graduated more quickly (Astin, 1993; Berkner et al., 2003; Knight, 1994, 2002; Knight & Arnold, 2000).

College GPA (first-semester GPA, first-year GPA, cumulative GPA at graduation)

Large, nationally representative studies and numerous single-institution studies have consistently lent support to the statement that college grade is the single best predictor of degree completion (Pascarella & Terenzini, 2005). Higher GPAs were associated with shorter time to degree completion for students in public institutions (NECS, 2003). Belcheir (2000) revealed that first semester GPA was important in predicting graduation for freshmen. A higher freshman GPA was correlated with quicker graduation (Adelman, 1999), or increased the probability of timely graduation (DesJardins et al., 2002). Knight (1994) and Lam (1999) indicated that students with higher cumulative GPAs at graduation graduated more quickly. Knight and Arnold (2000), however, reported that higher cumulative GPAs at graduation were associated with longer time-to-degree.

Major or change of major

It has been generally agreed among researchers who are concerned with the effects of academic majors on persistence that compared with their peers in the social sciences, humanities, or education, students majoring in the sciences, mathematics, and engineering (SEM), and business and health-related professions are more likely to obtain baccalaureate degrees, but that they tend to take longer to do so (Fenske et al., 2000; Pascarella & Terenzini, 2005). In Fenske et al.'s study, the departure rate for all SEM majors was lower than non-SEM majors in the fourth and fifth years, but SEM students took longer to graduate than non-SEM majors. In a study on factors affecting time-to-degree for graduates in a state university system (Florida Department of Education, 2004), three of the top five majors with the longest time-to-degree were in the field of engineering. Studies by different researchers produced the same finding that changing majors fewer times was predictive of more rapid degree completion (Adelman, 2006; Knight & Arnold, 2000; Lam, 1999; Oklahoma State Regents for Higher Education, 1996).

Enrollment patterns

Full-time attendance and continuous enrollment have been reported to be positively associated with degree completion and time-to-degree. Berkner et al. (2003) reported that among bachelor degree seekers who were always enrolled full time and continuously enrolled, 72% to 74% had graduated at some four-year institution within six years. In contrast, among those who had a break of more than four months, only 20% had graduated.

Cuccaro-Alamin (1997) found that bachelor's degree seekers who first enrolled full-time were more likely to earn the degree within five years than those who enrolled on a half-time basis (52% versus 13%), and that the latter were more likely to have no degree or no longer be enrolled for a bachelor's degree five years after their initial enrollments. He also concluded that noncontinuous enrollment was related to longer time-to-degree. Other researchers reported similar findings regarding the effects of full-time or part-time enrollment (Adelman, 2006; Belcheir, 2000; Knight & Arnold, 2000; Lam, 1999) and continuous enrollment (Adelman, 1999; Belcheir 2000; Ishitani, 2006).

Credit hours per semester or classes per term

Previous research has indicated that fewer average credit hours per semester were correlated with longer time to degree (Knight, 1994, 2002, 2004; Knight & Arnold, 2000; Volkwein & Lorang, 1996). Students who were initially enrolled for more classes per term completed their degree more quickly (Duby & Schartman, 1997). Hall (1999) reported that extender students took fewer classes per term. Adelman (2006) reported that fewer than 20 credits by the end of the first calendar year considerably delayed degree completion.

Total credit hours earned, enrolled or attempted

Students with fewer total credit hours earned or fewer courses dropped or repeated at graduation graduated more quickly (Knight, 1994, 2002, 2004; Knight & Arnold, 2000). Adelman (1999) confirmed that more total credit hours earned lengthened time-to-degree.

Another variable within this category is total credits attempted. One study (Florida Department of Education, 2004) identified total credits attempted as one of the two factors that affect time-to-degree in a state university system (the other factor is average course load attempted by students). An important relevant term is *excess hours*,

that is, credits taken by students that are not required for their degree. A major source of excess hours is courses that students withdraw from, fail, or repeat in order to receive a better grade. Excess hours earned from these courses accounted for 50% of the total excess hours in a state university system (Florida Department of Education, 2004).

Academic and social integration

Academic and social integration can be represented by a variety of variables. However, it has not been a consistently explored factor in time to degree research. Some studies included housing status as a proxy for social integration. For instance, living on campus was a positive predictor of four-year graduation in Astin's (1993) study.

Financial aid, financial need, or employment

A number of studies focused on the economics of higher education (e.g., Leslie & Brinkman, 1988; Paulsen & St. John, 2002; St. John, Paulsen, & Starkey, 1996) have made the case that economic circumstances and financial aid can have a significant impact on student persistence. These studies have explored the effects on student persistence of a variety of variables, including grants, scholarships, loans, and work-study provided by the institution/ state government/federal government, family support, personal savings, on-campus and off-campus employment, as well as combinations of amounts, forms and sources of financial resources.

Research findings regarding the impact of financial aid on degree completion are inconclusive. Using data from NCES 1990 Beginning Postsecondary Students Longitudinal Study Second Follow-up (BPS: 90/94), Cuccaro-Alamin (1997) found that beginning baccalaureate students who received financial aid (both grants and loans) in 1989-90 were more likely to earn their degree within five years than those who did not receive aid. Lam (1999) reported that higher percent of loan dollars in relation to the total aid received was predictive of less time to graduation. Knight and Arnold (2000), however, indicated that loan recipients took more time to complete their degree. Ishitani (2006) also reported that those received first-year loan were 20% less likely to obtain their degree in four years. In Wohlgemuth et al.'s (2006-07) study, loan amount was a significant predictor of five- and six-year graduation rates.

Evidence from the literature has suggested that work/study is positively related to degree completion (Pascarella & Terenzini, 2005). Desjardins et al. (2002) revealed that

work study facilitated degree completion, although other forms of financial aid like loans and merit aid did not have a direct impact on chance of graduation. Their result was confirmed by Ishitani (2006), who found that work-study students were 81% more likely to graduate within four years than those who did not hold a work-study job in the first year of college. In Wohlgemuth et al.'s (2006-07) study, work/study amount, like gift amount, was a significant predictor of four-, five- and six-year graduation.

As for the effects of employment, Pascarella & Terenzini (2005) concluded that the more hours students work, the less likely they are to complete their degree program, but that on-campus employment has positive net effects on timely degree completion. For instance, bachelor's degree seekers who worked 20 or more hours per week during their first year of college were less likely than those who did not work or who worked less than 20 hours to obtain their degree within five years (Cuccaro-Alamin, 1997). Some researchers (e.g., Lam, 1999; Knight and Arnold, 2000) reported that the impact of campus-based employment on time-to-degree was negative. Receiving grants was related to more time to degree in one study (Volkwein & Lorang, 1996), but less time to degree in another (Knight & Arnold, 2000).

Instead of exploring what factors predict time-to-degree, a limited number of studies have been focused on understanding what the self-reported reasons are for extended time to degree. For instance, in a survey of students conducted by the California State Postsecondary Education Commission (1988), two thirds of the students cited taking extra courses out of interest as having a major influence on time-to-degree, whereas 60% indicated changing majors and having to work as important factors in graduating in more than four years. Other reported reasons for extended time to degree included reduced course load, the need for better advising, financial need, and having difficulty getting major requirements when needed.

In summary, factors explored in time-to-degree studies usually include student demographic variables like gender, precollege academic variables like high school GPA, and in-college variables like college GPA, enrollment behavior variables, academic major and financial aid. Student enrollment pattern variables, average credit hours enrolled per semester, major, high school GPA, SAT/ACT score, and college GPA tend to have significant effects on time-to-degree. In addition, some demographic variables, ethnicity

and gender in particular, tend to be significant predictors. The effects of financial aid are more complicated and less conclusive, though researchers tend to agree that work-study was positively related to degree completion.

2.8 Methods Used in Research on Student Retention and Time to Degree

Studies of student departure have traditionally used logistic regression or structural equation modeling to explore what factors affect student departure. In recent years, event history modeling or survival analysis, a relatively new technique designed to study longitudinal processes, has been increasingly used (DesJardins et al., 2002; Ishitani & DesJardins, 2002; Ishitani, 2003, 2006; Johnson, 2006). Ishitani and Desjardins argued that compared with logistic regression, event history modeling is more appropriate for studying student attrition and retention. Using cross-sectional techniques like logistic regression fails to provide information about the timing of student departure, which is a longitudinal process. Different types of events, such as graduation or dropout, may be affected by different factors. Event history modeling allows the researcher to investigate how factors differentially influence departure over time by incorporating variables whose effect and values can change over time, such as financial aid. It also allows the modeling of related events like graduation and dropout, and the study of multiple years of dropout behavior in one single model. However, event history modeling is sophisticated and findings from studies using this technique can be rather difficult to understand (Ishitani, 2008), thus compromising the policy and practical implications of the studies. Recent years have also witnessed the use of multinomial regression in retention and persistence research. Using this technique, Herzog (2005), and Allen, Robbins, Casillas, and Oh (2008) modeled second- and third-year enrollment status (Stayed, Dropped Out, or Transferred), respectively.

Previous research focused on the length of time-to-degree has generally employed two techniques: linear regression modeling (e.g., Knight, 2004; Lam 1999), and logistic regression modeling (e.g., Adelman, 1999; Belcheir 2000). Institutional researchers on time-to-degree may have to select a technique based on practical concerns. One institutional researcher, who had initially conducted research on time-to-degree using the technique of path analysis, shifted to the less sophisticated method of multiple regression in his later studies because of the suspicion of policy makers at his institution over the

path analysis method (Knight, 2004). Ishitani (2006) argued that, compared with linear regression modeling, logistic regression modeling is more relevant to policy makers, who have the tendency to treat graduation as an event at a fixed time, such as four-year graduation. In Ishitani's study, degree completion was defined as dichotomous values (i.e., graduated or not graduated) at discrete time points of four, five, and six years after initial enrollment.

2.9 Theoretical Framework and Research Model

This study is an attempt to integrate two lines of research: research on retention and persistence, and research on time-to-degree. It is designed to follow the practical approach of time-to-degree research within the framework of Tinto's (1975, 1987, 1993), Bean's (1980, 1982, 1985), and Cabrera et al.'s (1993) student retention models. Student retention models propose that student persistence behavior is an effect of the following factors: student background variables, student intent to persist, goal commitment, institutional commitment, social integration, academic integration, college GPA and environmental variables. Based on relevant literature on retention and time-to-degree, factors on time-to-degree can be grouped into the following categories: 1) student demographic characteristics, which may include gender, age, ethnicity, residency status, and parental educational level; 2) precollege academic preparation variables, such as high school GPA, number of Advanced Placement (AP) tests taken, and performance in standardized college entrance tests such as SAT; 3) college experience variables, such as college GPA, academic major, academic and social integration, and enrollment behavior variables; and 4) financial need and financial aid (employment).

Since this study is particularly concerned about factors affecting the behavior of non-graduation within six years and practical implications of this study for policy makers and institutional administrators, regression modeling is preferred over event history modeling or structural equation modeling. However, there are limitations as to how regression modeling can deal with time-varying factors (e.g., college GPA) whose values and effects may vary over time. For example, including both first-year and fourth-year GPAs as two independent variables in the same regression equation may be problematic because it may lead to the problem of multicollinearity and thus violate some assumptions of regression modeling. For the sake of soundly modeling with regression

the behavior of non-graduation within six years, it is important to include in a regression equation only one rather than two or more variables of a time-varying factor like college GPA.

Specifically, four potential college GPA variables can serve as a predictor of six-year non-graduation behavior: first-, second-, third- and fourth-year GPAs. If, statistically, only one of the variables should be included in a regression equation, it seems that first-year GPA should be selected over the other three variables since prior literature has indicated that it is an important variable in predicting retention and time-to-degree completion. However, the effect of college GPA on retention may vary over time, stronger in the first year than in subsequent years (DesJardins et al., 1999; Ishitani and DesJardins, 2002). More importantly, since fourth-year GPA is a predictor variable more proximate in time to the behavior of late dropout and extended stay, it may be a more relevant and stronger predictor than first-year GPA for the current study. The point here is that considering the purpose and research questions of this study, and the constraints of regression modeling, fourth-year college experience variables are preferred over first-year variables for some time-varying factors.

Similarly, the variables of fourth-year financial aid status and fourth-year credit hours attempted can be justified as more relevant predictors. As tuition and living expenses rise, freshman-only scholarships are no longer available, and family financial circumstances change, students' ability to finance college may be more of a problem in later years of their college careers than at the beginning, so that more students register for fewer credit hours in order to work for pay. Research has suggested that students tend to take fewer credits per semester as time goes on. For instance, in Fall 2003, 94% of freshmen in a state university system were taking 12 or more hours, whereas only 64% of seniors were doing so (Florida Department of Education, 2004). It is reasonable to assume that these circumstances will have an impact on the behaviors of late dropout and extended stay, and that fourth-year credit hours attempted and fourth-year financial aid status can be good indicators of students' time commitment and financial circumstances in late years, and significant predictors of late dropout and extended stay.

A time-varying factor such as college GPA can also be represented by a variable that reflects its average or aggregate value over a longer time such as cumulative GPA at

the time of graduation. Time-to-degree research has reported the significant effects on time-to-degree completion of cumulative GPA and total credit hours earned at the time of graduation (Adelman, 1996; Knight 1994, 2002, 2004; Knight & Arnold, 2000; Lam 1999). It is logical to hypothesize that cumulative GPA and total credit hours earned at the end of the fourth year might be significant predictors of late dropout and extended stay. Of course, there is a difference between fourth-year GPA and cumulative GPA at the end of fourth year, and it may not be statistically sound to include both of them in the same regression equation.

Additionally, it is necessary to include in this study some college experience variables that can reflect the average enrollment pattern of a student over the first 3 years, since research has reported that enrollment pattern variables are consistent and significant predictors of early dropout, extended persistence and time to degree. Specifically, three indicators of enrollment pattern are considered as relevant to this study: continuity of enrollment, intensity of attendance, and transfer experience over the first 3 years. Transfer experience is considered as a relevant variable because in an informal pilot study I found that a good number of FTFT students who were still enrolled in the seventh year at a large state university had had the experience of transferring to a community college or another state university. It suggested that transfer experience might be a significant predictor of extended stay at the initial institution. In fact, there has been a growing trend of students swirling in and out of different institutions, generally associated with community colleges (Herzog, 2005). In Adelman's (2006) study of a nationally representative sample of 1992 high school graduates, more than 73% of those who started at a four-year institution, and who obtained a bachelor's degree from their initial institution, also enrolled at another institution. Unfortunately, transfer experience variables are rarely included in time-to-degree studies that use institutional data file, since data for such variables are normally not available at the institutional level.

The average enrollment pattern over the first 3 years, together with some fourth-year variables, can highlight how a student persists and changes over the first 4 years, reflect, to certain extent, his intent to persist, goal commitment, and institutional commitment, and have a considerable impact on whether the student will graduate within six years or not. Undoubtedly, understanding how students persist and change over the

first 4 years will contribute to a better understanding of why some students do not graduate within six years.

Based on previous literature and assumptions about factors influencing late dropout and extended stay, this study proposes an exploratory six-year graduation prediction model for students who stay at least for four years at their initial institution. The prediction model states that whether students graduate within six years or not is determined by four sets of factors, namely, demographic characteristics, precollege academic preparation, college experience over the first 4 years, and financial need and aid. Students who do not graduate within six years are composed of students who drop out after four years and students who extend enrollment beyond six years.

CHAPTER 3

METHODS

This chapter begins with an introduction of the overall direction of the methods used in this study, followed by a description of the data source and of the variables in the study. Next, statistical model and data analysis procedure are presented. Some limitations of this study are discussed at the end of the chapter.

3.1 Overall Direction of the Research

The specific purpose of the study was to identify the demographic, precollege academic preparation, college experience, and financial aid characteristics of first-time full-time (FTFT) students who begin at a four-year institution seeking a bachelor's degree, stay at the institution for at least four years, but do not graduate within six years, and to explore what factors predict their behavior of late dropout or extended enrollment. To serve this purpose adequately, the study took a quantitative approach, and employed a correlational research design.

3.1.1 Student Outcome Groups

As the title and research questions of this study suggest, the current research is concerned with three student outcome groups in this study: late dropouts, extenders, and their combination: students who do not graduate within six years. The group of students who graduate within six years serves as the comparison group. These four groups were defined as follows:

1) FTFT students who drop out after year 4 of their initial enrollment at the same institution. This outcome group is referred to as *the late dropout group*, and students in this group as *late dropouts*. By definition, students in this group do not graduate within six years AND are not enrolled in year 7 or year 8. This study disregarded the slim chance that these students will reenroll after year 8 and thus do not make a distinction between late dropout and late stopout. Thus, dropouts are broadly defined here and in this study; it includes dropouts, stop-outs, opt-outs, and transfer-outs as defined by Hoyt and Winn (2004).

2) FTFT students who are still enrolled in year 7 or year 8 of their initial enrollment at the same institution. This student group is referred to as *the extended enrollment group*, and students in this group as *extenders*.

3) FTFT students who do not graduate within six years. They consist of all students in Groups 1) and 2) above. It is worthwhile to mention that this group excludes students who drop out from their initial institution over the first 4 years.

4) FTFT students who graduate within six years. They are composed of students who graduate in year 4, year 5 or year 6. It should be noted that this group excludes students who graduate **before** the fourth year. This student group is referred to as *the (six-year) graduation group*, and students in this group as *graduates*.

3.1.2 Settings and Research Population

The population of this study was all FTFT students who seek a bachelor's degree and who are retained in the fourth year at a public university in the Southeastern United States (the University will hereafter be referred to as Southeast University). In Fall 2008, the total enrollment at Southeast University was around 12,000, 40% of which were male. In terms of race and ethnicity, about 70% of the students were White, 25% African American, and 5% in other ethnic categories. More than 80% of the enrolled students were undergraduates.

3.1.3 Intended Sample

Due to concerns of practical constraints in the data collection process, a convenience sampling strategy was used. The intended sample was comprised of three cohorts of new freshmen who entered Southeast University as FTFT students seeking a Bachelor's degree AND who were retained in the fourth year. The three cohorts were Fall 1999, Fall 2000, and Fall 2001. This means, for instance, that for Cohort Fall 1999, any FTFT student seeking a Bachelor's degree who was enrolled between Fall 2002 and Summer 2003 was included in the sample. Fall 2002 or any later cohorts were not included in the sample, because Fall 2001 was the latest cohort for which year 8 enrollment data were available by the expected time of data request. According to the director of institutional research at Southeast University, no major changes occurred in state and institutional academic and financial aid policies across the three entering

cohorts. Table 1 below provides a chronological description of the three cohorts and outcome groups in the intended sample.

Table 1: A Chronological Description of the Three Cohorts & Outcome Groups

Year in College	Fall 1999 Cohort	Fall 2000 Cohort	Fall 2001 Cohort	Student Outcome Groups
Year 1	Fall 99-Summer 00	Fall 00-Summer	Fall 01-Summer 02	NA
Year 2	Fall 00-Summer 01	Fall 01-Summer	Fall 02-Summer 03	NA
Year 3	Fall 01-Summer 02	Fall 02-Summer	Fall 03-Summer 04	NA
Year 4	Fall 02-Summer 03	Fall 03-Summer	Fall 04-Summer 05	Sample; Graduation
Year 5	Fall 03-Summer 04	Fall 04-Summer	Fall 05-Summer 06	Graduation; Late dropout
Year 6	Fall 04-Summer 05	Fall 05-Summer	Fall 06-Summer 07	
Year 7	Fall 05-Summer 06	Fall 06-Summer	Fall 07-Summer 08	Extended enrollment
Year 8	Fall 06-Summer 07	Fall 07-Summer	Fall 08-Summer 09	

3.2 Data Source

3.2.1 Data

All data came from Southeast University. First, requested student data were assembled by the director of institutional research at Southeast University. The data file contained the following columns (variables) for each student in the expected sample: student ID number, student name, gender, ethnicity, birth date, residency status, high school GPA, SAT Math score, SAT Verbal score, ACT Math, ACT English, year of graduation from the university, housing status year 1, entering major, fourth-year major, credit hours attempted for each relevant semester, credits earned for each relevant semester, semester GPA, cumulative GPA by the end of each semester, and financial aid package for year 4 (including awards for the following aid types: federal grant, federal loan, state grant, state loan, state merit aid, state scholarship other, private scholarship, athletic scholarship, and federal work/study, if any).

The raw data file did not readily provide the data for some variables used in this study. In this case, variables needed were derived manually from the raw data file using Microsoft Excel functions. For instance, the data for the dependent variable of graduation

within six years were derived by integrating existing data from the column of year of graduation, and the columns concerning credit hours attempted in year 7 and year 8.

In the process of data use, regulations from Florida State University and Southeast University regarding human subjects research and confidential data were followed. After signing a confidentiality protocol with Southeast University, the researcher accessed, processed, and analyzed the data file on a designated computer at the university under the supervision of the director of institutional research. The researcher left Southeast University only with aggregate output tables generated from the data file using the SPSS (Version 16) software or Microsoft Excel 2007.

3.2.2 Final Sample

After preliminary data cleaning and transformation, 2,030* students in the data file met the definition of intended sample. Forty of these students were found to have data missing on at least one of the following variables: high school GPA, SAT Math score, and SAT Verbal score. The 40 students were mostly out-of-state (including international) students, accounting for less than 2% of the intended sample. They were excluded from subsequent data analysis. Consequently, the final sample was 1,990 students without any missing data, including 580 students from the Fall 1999 cohort, 660 students from the Fall 2000 cohort, and 790 students from the Fall 2001 cohort.

3.3 Variables in the Study

The outcome variable for both Research Question 1 and 2 is graduation within six years from the initial institution. For Research Question 1, the outcome has two categories: graduation within six years and non-graduation within six years. The two categories correspond, respectively, to Group 4 and Group 3 as defined in Section 3.1 of this chapter. A student in the former category is one who was enrolled in year 4 and graduated by the end of year 6, while a student in the latter category is one who was enrolled in year 4 BUT did not graduate by the end of year 6. For the purpose of data analysis, graduation within six years was coded as 1, and non-graduation within six years as 0, with the latter being the reference group.

*Following relevant federal protocols, this and all other sample size numbers in Chapters 3, 4 and Appendix A were rounded to the nearest ten.

For Research Question 2, the dependent variable graduation within six years has three categories: graduation within six years, late dropout (or dropout after year 4), and extended enrollment (or continued enrollment after year 6). These three categories correspond, respectively, to Group 4, Group 1, and Group 2 as defined in Section 3.1 of this chapter. A student in the category of late dropout is one who was enrolled in year 4, did not graduate within six years, and was not enrolled in year 7 or 8. A student in the category of extended enrollment is one who was enrolled in year 4, did not graduate within six years, and was still enrolled in year 7 or 8 for a bachelor's degree. The three categories of graduation within six years, late dropout and extended enrollment were coded as 3, 1, and 2, respectively, with graduation being the reference category.

Recall that the research model proposed in Chapter 2 specifies that graduation within six years is predicted by four categories of factors: demographic characteristics, pre-college academic preparation, four-year college experience, and financial need and aid. Each category can include a range of variables. Considering the data available to this study, the following independent variables were included for both research questions:

- 1) Demographic characteristics: gender, ethnicity, entering age, and residency status;
- 2) Precollege academic preparation: high school GPA, SAT Math score, and SAT Verbal score;
- 3) 4-year college experience: housing status year 1, terms enrolled over the first 3 years, attendance pattern over the first 3 years, major field change over the first 4 years, fourth-year major field, fourth-year credit load, and four-year cumulative GPA; AND
- 4) Financial aid: financial aid status year 4 in alternative approaches (see detail below).

These independent variables are defined or explained as follows:

Gender is a dichotomous variable with female being the reference group.

Ethnicity indicates whether a student came from any of the 3 following ethnical backgrounds: White, Black, and Other. Hispanic, Asian, American Indian, and other ethnicities were combined into the Other category since students from each of them accounted for less than 5% of the sample and classifying each as a separate category would not be statistically meaningful. White was coded as the reference category.

Age is a continuous variable.

Residency status indicates whether a student was an in-state or out-of-state resident at the time of initial enrollment. Out-of-state served as the reference.

High school GPA is a categorical variable with 4 levels: 0-2.50, 2.51-3.00, 3.01-3.50, and 3.51-4.00, with 0-2.50 as the reference.

SAT Math score, or standardized test score from Scholastic Aptitude Test (SAT) Math, serves as a precollege academic variable representing a student's quantitative ability. The data file also provided ACT Math scores for many students. However, since all students who had ACT Math scores also had SAT Math scores, no efforts were made to convert ACT Math scores to the SAT scale. This is a continuous variable with possible values ranging from 200-800.

SAT Verbal score, or standardized test score from Scholastic Aptitude Test (SAT) Verbal, serves as a pre-college variable representing a student's English ability. The data file also provided ACT English scores for many students. However, since all students who had ACT English scores also had SAT Math scores, no efforts were made to convert ACT English scores to the SAT scale. This is a continuous variable with possible values ranging from 200-800.

Housing status year 1 is a dichotomous variable indicating whether a student lived on campus or off campus during the first year, with living off campus as the reference.

Term enrolled first 3 years is a continuous variable indicating how many Fall or Spring semesters a student was enrolled for during his first 3 years at Southeast University.

Attendance pattern first 3 years indicates whether or not a student was always enrolled full time over the first 3 years. A student was defined as always enrolled full time if the student attempted at least 12 credit hours per semester for all of the Fall and Spring semesters enrolled over the first 3 years. Otherwise, the student was defined as enrolled in a mixed pattern or not always full time. This variable is dichotomous with mixed pattern being the reference.

Major field change is a dichotomous variable indicating whether a student's fourth-year major field changed or not compared with his initial major field. The two levels of this variable are major field changed and major field not changed, with the latter being the reference category.

Fourth-year major field represents a student's major field in year 4. A major field may include one or more academic majors. Seven categories of major fields were specified: art, arts, business, education, nursing, science, and undecided, with science being the reference group.

Fourth-year credit load represents total credit hours attempted by a student in year 4, including credits attempted in the summer semester. This variable includes two categories: 24 credits or more, and less than 24 credits, with the latter as the reference group.

Four-year cumulative college GPA refers to a student's cumulative GPA over the first 4 years at Southeast University. This variable was classified into four levels: 0-2.50, 2.51-3.00, 3.01-3.50, and 3.51-4.00, with 0-2.50 being the reference.

Financial aid (year 4)

The impact of financial aid can be conceptualized through different theoretical models, and the financial aid variable be specified in various ways (Pascarella & Terenzini, 2005; St. John et al., 2000; St. John, Hu, & Weber, 2001). Considering the nature of the financial aid data available to this study, the financial aid variable was specified in four alternative ways in this study: aid package, aid amount for each aid type, receiving aid (Yes=1 and No=0), and aggregate aid amount. In the aid package approach, aid was classified in to six categories: grant and loan, loan only, merit only, merit and loan, other aid packages, and no aid, with no aid as the reference category. In the aid amount approach, the effect of the amount of each aid type (including loan, grant, merit aid, work study, and other) was examined. In the receiving aid Yes/No approach, the aid variable was divided into two categories: receiving aid, and not receiving aid, with the latter being the reference category. Finally, in the aggregate aid amount approach, the impact of the aggregate amount of all aid types was considered. Corresponding to the four financial aid specification approaches are four regression models for both Research Questions 1 and 2, which are described in Section 3.4.

3.4 Statistical Model

Two types of multivariate analyses were conducted in this study. For Research Question 1, binary logistic regression modeling was employed, and for Research Question 2, multinomial logistic regression modeling was adopted.

Binary logistic regression modeling provides estimates of the magnitude and significance of the relationship between independent variables and a categorical dependent variable. To illustrate, for the simple case of one predictor X and one dichotomous outcome variable Y, the logistic regression model can be specified as:

$$\ln(P/[1-P]) = \log(\text{odds}) = \text{logit} = \alpha + \beta x$$

$$\text{Hence, Probability (Y=outcome of interest | X=x)} = P = e^{\alpha + \beta x} / 1 + e^{\alpha + \beta x}$$

where P is the probability of the outcome of interest under variable Y, α is the intercept, and β is the slope parameter. By extension, a complex logistic model with K predictors it takes the form of: $\ln(P/[1-P]) = \text{logit} = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k$.

Viewed as a generalization of the binary logistic regression, multinomial logistic regression is used when the outcome variable is nominal with more than two levels (Cohen, Cohen, West, & Aiken, 2003; Hosmer & Lemeshow, 2000; Tate, 2008). The dependent or outcome variable for Research Question 2 is nominal with three levels: six-year graduation, late dropout, and extended enrollment. The rationale of the multinomial logistic regression can be briefly illustrated with this particular outcome variable. The intention is to distinguish these G=3 outcome levels/groups on the basis of K predictors: x_1, x_2, \dots, x_k . The first step is to choose a group as a reference group, in this study the graduation group. Then, the data for all three groups are entered into one multinomial logistic regression analysis. G-1 logistic regression functions, all with the same K predictors, are computed for the G groups. In this case, two logit functions are computed, with one logit function contrasting the late dropout group with the graduation group, the other function contrasting the extended enrollment group with the graduation group. There is a different logit for each of the G-1 groups that is determined with a distinct set of coefficients:

$$\text{logit}_g = \alpha_g + \beta_{g1} x_1 + \beta_{gk} x_k + \dots + \beta_{gK} x_K, g=1, \dots, G-1$$

where β_{gk} is the coefficient for the g^{th} group and k^{th} predictor variable. The logit functions are combined into one overall multinomial regression equation that includes a total of (K + 1) (G-1) coefficients.

3.5 Data Analysis

Data analysis was performed using the SPSS Version 16 software. Descriptive analyses were conducted to understand the general characteristics of the sampled students

in the study. Next, cross-tabulations for each research question were run to demonstrate six-year graduation patterns by various categorical independent variables. Cross-tabulations also provide information regarding the significance of the association between each independent categorical variable and the outcome variable of six-year graduation. Cross-tabulations were not conducted for continuous independent variables. Instead, Pearson correlations were run to show whether significant correlation exists between each continuous independent variable and the dependent variable of graduation.

3.5.1 Data Analysis for Research Question 1

Binary logistic regression analyses were carried out to address Research Question 1. The dependent or outcome variable for Research Question 1 is categorical with two levels: graduation within six years and non-graduation within six years, while the predictor scales are mixed (which means a possible mix of interval, dichotomous and nominal predictor variables). Therefore, the use of the logistic regression procedure is justified (Hosmer & Lemeshow, 2000; Peng et al., 2002; Tate, 2008).

Binary logistic regression analyses were conducted following three major analysis steps. The first step was preliminary analysis, and the second step was the testing of the overall relationship with the likelihood ratio test using the test statistic G^2 . In the third step, the unique effect of each independent variable was described.

Preliminary analysis included regression diagnostics for individual cases and assessment of violations of assumptions. The focus of case analysis was on the identification of any outlier observations and observations with excessive influence on the results of the study. Pearson residual (ZRESID in SPSS) was used to identify outliers, Analog of Cook's D to identify cases with high global influence, and DFBETAS to identify cases with high influence on specific regression coefficients. Following the suggestions by Cohen et al. (2003), the cutoffs for the three diagnostics were ± 3.0 , 1.0, and $\pm 2/\sqrt{n}$, respectively. All three diagnostic indices were saved when the binary logistic regression on Model 1 (the aid package model in which the financial aid factor was specified in the aid package approach) was run. The SPSS output showed that a total of 40 cases had an absolute value of ZRESID equal to or larger than 3.0. The values of Analog of Cook's D and DFBETAS were inspected and no apparent influential cases were discovered. The binary logistic regression on Model 1 was rerun excluding the 40

outliers. A p -value of 0.001 from the Hosmer & Lemeshow test suggested a poor fit of the model with the data. Given the result in light of Cohen et al.'s warning that diagnostics in logistic regression are less straightforward than in OLS regression and one must be more cautious in deleting cases based on diagnostic indices, no remedial actions were taken on the outliers.

Logistic regression assumes that residuals are independent, and that independent variables are measured exactly. Multicollinearity is a major issue that needs to be addressed. Several methods of detecting multicollinearity exist: observing the correlations between independent variables, using tolerance levels, inspecting variance inflation factors (VIF), or examining condition indices and variance proportions (Cohen et al., 2003; Mertler & Vannatta, 2002). For the current study, all of the above methods were used to identify any indications of multicollinearity. For the purpose of seeking evidence of serious multicollinearity involving a particular independent variable, some commonly used relevant cutoff points were referenced: 0.1 for tolerance, 10 for VIF, and 30 for condition index (Cohen et al., 2003). No independent variable was identified as having an obvious problem of multicollinearity.

In addition, it is assumed that the combination of the logistic function and specified equation for the logit reflects the true functional form of the relationship between the probability of the outcome being equal to one (i.e., six-year graduation) and the independent variables. The Hosmer-Lemeshow test, a preferred test of the goodness of model fit, did not indicate a violation of the assumption.

Furthermore, logistic regression also assumes a very large sample size. The final sample size for Research Question 1 was 1,990. The number of independent variables, design variables included, was no more than 30 for the four binary logistic regression models. It means that the observation/predictor ratio in this study was considerably higher than the conservative ratio of 10:1 as recommended by most multivariate statisticians for categorical data modeling (Peng et al., 2002).

The second step of binary logistic regression analyses was the testing of the overall relationship with the likelihood ratio test using the test statistic G^2 . In this study, direct modeling was employed to derive a model in binary regression. All independent variables were entered into the statistical program simultaneously. The full set of

statistical outputs for all predictors was generated. The test of the overall relationship is the likelihood test statistic G^2 , which is the difference between the null model and full model $-2 \log$ -likelihood statistics. The measure is distributed as X^2 with k degrees of freedom, where k is the number of predictors or the difference in degrees of freedom of the null deviance versus the model deviance. If the p -value for the likelihood ratio test is smaller than 0.05, the conclusion will be that the overall relationship is statistically significant. Results for this test are reported in Chapter 4, along with statistics for several indicators of model quality like the Cox & Snell index, the Nagelkerke index, and percent of cases correctly predicted.

The final step of binary logistic regression analyses was the description of the unique effect of each independent variable. For each independent variable, estimate of coefficient β , standard error, Wald test, point and interval estimates of $\text{Exp}(\beta)$ (i.e., odds ratio) were reported. The effect of each significant independent variable was interpreted in terms of odds ratio. An odds ratio greater than 1 corresponds to a positive β coefficient; an odds ratio between 0 and 1 corresponds to a negative β coefficient. When an odds ratio is greater than 1, a positive relation between the independent and dependent variables is implied, whereas when it is smaller than 1, a negative relation is assumed. For a continuous independent variable X_i , the traditional interpretation is: for a unit change in X , the odds are expected to change by a factor of $\text{Exp}(\beta)$, controlling for all other independent variables. The interpretation of the effect of a categorical independent variable customarily involves a pairwise comparison of the categories of the variable. For instance, a hypothetical interpretation for the effect of ethnicity, where the odds ratio for the Black versus White contrast is 2.2, can be: “The odds of graduating in six years for Black students are 2.2 times the odds for White students, controlling for the effects of other independent variables”.

Understanding the odds ratio may be more challenging when the relationship between the independent and dependent variable is negative, i.e., when the coefficient β is negative and thus the odds ratio is less than 1. For example, if the odds ratio for the Black versus White contrast is 0.2 with White being the reference group, the interpretation that the odds of graduating for Black students are 0.2 times the odds for White students is not very straightforward. In this situation, it is useful to calculate the

inverse odds ratio and interpret the effect in terms of inverse odds ratio (Desjardins, 2001). The inverse odds ratio in our current case is calculated as equal to $1/0.2 = 5$. The corresponding interpretation is: “The odds of graduating for White students are five times the odds for Black students”. The caveat is that, with the use of inverse odds ratio, the reference group in the interpretation is changed. The inverse odds ratio can be used in a similar fashion when the independent variable is continuous.

As is described earlier in this chapter, the financial aid factor is specified in four alternative ways in this study: aid package, aid amount for each aid type, receiving aid Yes/ No, and aggregate aid amount. To examine the impact of the financial aid factor as it is specified in each approach as well as the impacts of other predicting variables, four corresponding logistic regression models were implemented. Differing only in how the financial aid factor was represented, the four models encompassed the same independent variables in the categories of demographic characteristics, pre-college academic preparation, and college experience. Specifically, Model 1, in which the financial aid factor was specified in the aid package approach, was the aid package model. Similarly, Model 2 was the aid amount model, Model 3, the receiving aid Yes/No model, and Model 4, the aggregate aid amount model. For Model 2, in order to examine the effect of the amount of each aid type on aid recipients, a separate regression was run for aid recipients only in addition to a regression run for all students in the sample. The same was also done for Model 4. It should be noted that reporting and discussion of results in this study are primarily based on Model 1 (i.e., the aid package model). In some cases, results from Model 2 regarding the impact of financial aid are also reported and discussed. Results from Models 3 and 4 are attached in Appendix A.

3.5.2 Data Analysis for Research Question 2

For Research Question 2, a multinomial regression analysis was conducted. Tate (2008) noted that multinomial regression procedure can be applied when the outcome scale is nominal and the predictor scales are mixed (which means a possible mix of interval, dichotomous, and nominal predictor variables). Given that in the current case the outcome variable of graduation within six years is nominal (categorical) with three levels (i.e., graduation within six years, late dropout, and extended enrollment), and that the predictor scales are mixed (e.g., the variable gender is dichotomous, major field is

nominal, and entering age is interval), multinomial regression technique is deemed appropriate for the analysis. It is customary to specify a reference group for the outcome variable in multinomial regression. Since the intention of Research Question 2 was to examine the difference between the late dropout group and the graduation group and the difference between the extended enrollment group and the graduation group, the graduation group was specified as the reference group, and the three groups were coded correspondingly.

Regression diagnostics for individual cases and assessment of violations of assumptions were not systematically conducted for the multinomial logistic regressions. The decision was based on three considerations. First, due to the limitations of available statistical softwares, assessment of model fit and diagnostics for the multinomial logistic regression model are more complicated and cumbersome than for the binary regression model (Hosmer and Lemeshow, 2000). For example, the SPSS Version 16 software does not compute any diagnostic statistics for outliers in multinomial regression. The researcher will have to run multiple binary logistic regressions and use diagnostic data generated from these regressions to identify outliers. Even if some outliers are found, the researcher will have to carry out further analysis to determine whether some or all outliers will be excluded from the final model. Second, the assumptions associated with multinomial regression are identical to those for logistic regression. Third, the multinomial logistic regression modeling for Research Question 2 used the same data set for the same sample as the binary logistic regression modeling for Research Question 1. In the binary regression modeling for Research Question 1, no obvious violations of assumptions were detected. Although some outliers were identified after the binary logistic regression Model 1 was run, a new regression, with the outliers being excluded from the procedure, failed to produce a better model. It is reasonable to assume that all these hold true for the multinomial regression modeling.

Multinomial logistic regression in SPSS provides two overall model fit tests: the Pearson test and the deviance test. Like the Hosmer-Lemeshow goodness of fit test in binary logistic regression, a finding of non-significance for the two tests represents good model fit. Results showed that neither of the tests was significant at the 0.05 level, suggesting an adequate fit of the model with the data.

As in binary logistic regression, direct modeling was employed to derive a model in multinomial logistic regression. All independent variables were entered into the statistical program simultaneously, and a full set of statistical output for all predictors was generated. Test of overall relationship with the likelihood ratio test using the test statistic G^2 in multinomial regression is quite similar to that in binary regression. In multinomial regression, there are two tests of the unique effect for each independent variable: a test of global unique effect of each variable for all of the logits, and a test of unique effect of each variable on each specified outcome contrast using the p-value for the Wald test. The results of these tests and the effects of independent variables are reported in Chapter 4, along with statistics for several indicators of model quality like pseudo R^2 and percent of cases correctly predicted.

3.6 Limitations

This study has several limitations that may compromise its results and conclusions. First, some factors considered as important in persistence and time-to-degree research, such as family income, goal and institutional commitment, and academic and social integration, could not be examined in the current study due to the unavailability of relevant data. Exclusion of these variables from the study renders it impossible to compare the late dropouts and extenders with graduates or early dropouts in terms of the effects of the aforementioned factors. Statistically, exclusion of relevant variables from a logistic or multinomial regression equation could result in biased coefficients for the independent variables included in the study. For this reason, cautions should be exercised in interpreting the effects of the independent variables investigated in the study.

Second, for reasons listed in an earlier section, this study did not conduct systematic and exhaustive diagnostic analysis for individual cases and assessment of violations of assumptions in the multinomial logistic regression modeling. It cannot be determined whether and how much the results for Research Question 2 would have been different had systematic diagnostics been performed, although there are indications that the results would not have differed considerably.

Third, any results, findings and conclusions from this proposed study may have limited generalizability beyond the university from which the research sample was drawn. It is likely that this sample is representative of the population of late dropouts and

extenders at the institution under study, and thus the conclusions can be applied within the university. Presumably, the conclusions can also be generalized to other public universities in the United States similar to Southeast University in terms of size, student composition, and distribution of major fields. However, it will be precarious to generalize the results to all four-year public institutions. Since for single institutional research on retention and six-year graduation rates, institutional characteristics such as institutional type and control are not included as research variables, the characteristics of the institution under study must be taken into account if any attempt is made to generalize the results beyond the institution.

A further limitation is the lack of a survey of the late dropouts and extenders in the sample inquiring about their reasons for late dropout and extended stay. On the one hand, results from such a survey could corroborate the validity of the proposed prediction model of graduation within six years. On the other hand, such results could add to the implications of this study for institutional policies and practices. For example, if the results from both the prediction model and the survey indicated that majoring in a particular field was a significant factor of dropping out after year 4, the institution might further analyze how majoring in this field resulted in an above-average rate of late dropout and, if desirable, take informed measures to cope with the issue. Of course, one should not hold very high expectations for the results from a potential survey of late dropouts or extenders, since surveys of these student groups are prone to low response rates.

CHAPTER 4

RESULTS

This chapter presents the statistical results from data analysis. First, descriptive statistics are provided. For categorical variables, the number and percentage of students in each category are reported. For continuous variables, mean and standard error are provided. Second, cross-tabulation results, including results of tests of bivariate correlations between independent variables and the dependent variable, are presented. It should be pointed out that descriptive and cross-tabulation analyses on financial aid were primarily based on Model 1 of the four binary/multinomial logistic models (refer to Page 42 for the detail of the four models). Next, results from binary logistic regressions and multinomial logistic regressions are reported in succession. Afterwards, the results are discussed in reference to previous literature. The final section of this chapter summarizes the major findings of this study.

4.1 Descriptive Analysis

Since the sample is the same for Research Question 1 and Research Questions 2, the descriptive statistics, except those for the outcome variable, are identical for both research questions. To avoid redundancy, the descriptive statistics for the two questions are presented together in this section and in Table 2. The following subsections report the descriptive statistics in order of the four groups of independent variables: demographic characteristics, precollege academic preparation, four-year college experience, and financial aid.

4.1.1 Demographic Characteristics

Table 2 shows that in terms of gender, females were the majority, accounting for 62.7% of the 1,990 sampled students in this study. The proportion of males was 37.3%, approximately 25% lower than that of females. The average entering age of the students was 18.4 years. The proportions of Whites, African Americans, and students of other racial/ethnic background were 72.3%, 23.8%, and 4%, respectively. Obviously, White students were the dominant ethnic group in size. The residency of the students was predominantly in-state. Only 3.4% of the students came from other states and foreign countries.

Table 2: Descriptive Statistics for the Students in the Sample (N=1,990)

VARIABLE	N	PERCENTAGE	MEAN	S. D.
GENDER				
Male	740	37.30%		
Female @	1,250	62.70%		
ENTERING AGE				
Age (Years)	1,990		18.38	0.60
ETHNICITY				
African American	470	23.80%		
Other	80	4.00%		
White @	1,440	72.30%		
RESIDENCY STATUS				
Out of state	70	3.40%		
In state @	1,920	96.60%		
HIGH SCHOOL GPA				
3.51-4.00	420	21.10%		
3.01-3.50	680	34.20%		
2.51-3.00	630	31.90%		
0.00-2.50 @	250	12.80%		
SAT MATH				
SAT Math	1,990		498.09	67.23
SAT VERBAL				
SAT Verbal	1,990		509.90	64.40
HOUSING STATUS (YEAR 1)				
On campus	1,220	61.50%		
Off campus @	770	38.50%		
TERM ENROLLED FIRST 3 YEARS				
Term enrolled first 3 years			5.71	0.81
ATTENDANCE PATTERN FIRST 3 YEARS				
Always full-time	860	43.50%		
Mixed @	1,120	56.50%		
MAJOR FIELD CHANGE				
Changed	1,040	52.30%		
Not changed @	950	47.70%		
4TH-YEAR MAJOR FIELD				
Art	330	16.40%		
Arts	330	16.40%		
Business	380	18.90%		
Education	580	29.20%		
Nursing	100	5.00%		
Undecided	60	3.10%		
Science	220	11.10%		
4TH-YEAR CREDIT LOAD				
24 credits or more	1,450	73.20%		
Less than 24 credits @	530	26.80%		
4-YEAR CUMULATIVE GPA				
3.51-4.00	300	15.00%		
3.01-3.50	580	29.40%		
2.51-3.00	570	28.40%		
0.00-2.50 @	540	27.20%		

(Table 2 - continued)

VARIABLE	N	PERCENTAGE	MEAN	S. D.
FINANCIAL AID (YEAR 4)				
Model 1: Aid Package				
Grant & loan	180	9.00%		
Loan only	340	17.10%		
Merit aid only	390	19.60%		
Merit aid & loan	240	12.20%		
Other aid packages	400	20.00%		
No aid @	440	22.10%		
Model 2: Aid Amount for Each Type				
Total loan (1,000\$)	1,990		3.01	3.77
Total grant (1,000\$)	1,990		0.68	1.42
Total work/study (1,000\$)	1,990		0.09	0.47
Total merit aid (1,000\$)	1,990		1.71	2.04
Total other (1,000\$)	1,990		0.16	0.78
GRADUATION WITHIN 6 YEARS				
(Outcome for Research Question 1)				
Graduation within 6 years	1,480	74.27%		
No graduation @	510	25.73%		
GRADUATION WITHIN 6 YEARS				
(Outcome for Research Question 2)				
Dropout after Year 4	310	15.41%		
Extended enrollment	210	10.32%		
Graduation within 6 years @	1,480	74.27%		

Note: 1) @ indicates reference category for the sets of design variables and for the outcome variable in the binary and multinomial logistic regression models; 2) Following relevant federal protocols, all numbers in the “N” column were rounded to the nearest 10.

4.1.2 Precollege Academic Preparation

Over 21% of the students achieved a high school cumulative GPA between 3.51 and 4.00. Those whose high school GPA fell into the categories of 3.01-3.50 and 2.51-3.00 accounted for 34.2% and 31.9%, respectively. The remaining 12.8% of the students earned a high school GPA of 2.50 or below. The average SAT Math score for the sample was 498, with a standard deviation of 67, whereas the average SAT Verbal score was 510, with a standard deviation of 64.

4.1.3 College Experience

The majority (i.e., 61.5%) of the students in the sample lived on campus during their first year at Southeast University; the remaining 38.5% lived off campus. As far as the enrollment pattern over the first 3 years is concerned, the average fall and spring semesters enrolled per student was 5.7 out of a maximum of 6. If, in the very rare case, a

student matriculated for only one semester during the first 3 years, it necessarily means that the student stopped out after his or her first semester at Southeast University, and did not return until the fourth year. Furthermore, 43.5% of the students were always enrolled full-time over the first 3 years, while the other 56.5% attended the university in a mixed pattern.

More than half (i.e., 52.3%) of the students switched their major fields over the first 4 years. The remaining 47.4% stuck to their initial major fields. Of the seven fourth-year major fields, education was the most popular, pursued by 29.2% of the students. The proportions of the students majoring in other fields were, in descending order, 18.9% (business), 16.4% (art), 16.4% (arts), 11.1% (science), 5.0% (nursing), and 3.1% (undecided). It is interesting to see that a small proportion of students were still undecided about their majors by the end of year 4. Most (i.e., 73.2%) of the students took 24 or more credit hours in the fourth year; the remaining 26.8% carried a load of less than 24 credits. In terms of academic performance in college, 15% of the students achieved a four-year college GPA in the top category of 3.51-4.00. Students with a GPA in the categories of 3.01-3.50 and 2.51-3.00 accounted for 29.4% and 28.4% of the total, respectively. The remaining 27.2% earned a GPA in the bottom category of 0.00-2.50.

4.1.4 Financial Aid

Model 1 (i.e., the aid package model) classified student aid status into six categories: grant and loan, loan only, merit aid only, merit aid and loan, other aid packages, and no aid. As can be observed in Table 2, students without any aid constituted the largest group, accounting for 22.1% of the total, followed by the other aid packages group (20%), merit aid only group (19.6%), loan only group (17.1%), and merit aid and loan group (12.2%). Students in the grant and loan group represented 9% of the sample.

Model 2 (i.e., the aid amount model) included amounts for five aid types as financial aid variables. The average amount of loan per student in the sample was 3,010 dollars. The average amounts of grant, work/study, and merit aid were 680, 90, and 1,710 dollars, respectively. Lastly, the average amount of other aid was 160 dollars.

4.1.5 Graduation within Six Years

The outcome variable for both research questions in this study is graduation within six years. For Research Question 1, the dependent variable has two categories:

graduation and non-graduation. There were 1,480 students in the graduation group, accounting for 74.3% of the sample. The remaining 510 students, or 25.7%, constituted the non-graduation group. The outcome variable for Research Question 2 has three categories: graduation within six years, late dropout, and extended enrollment. Still, the graduation group comprised 1,480 students, accounting for 74.3% of the sample. The late dropout group and the extended enrollment group had 310 and 210 students, representing 15.4% and 10.3% of the total, respectively.

4.2 Cross-tabulations of Graduation Patterns for Research Question 1

Table 3 shows the results of cross-tabulations of the outcome variable graduation within six years and independent variables for Research Question 1. The percentages of students in the graduation and the non-graduation group by category of each categorical predicting variable are reported. The results of corresponding Pearson Chi-square significance tests of associations between the outcome variable and predicting variables were presented, too. Although cross-tabulations cannot be appropriately conducted for continuous independent variables, these variables are also listed in the table, together with the results of tests of correlations between these variables and the outcome variable. It should be noted that the chi-square test of bivariate correlation examines the association between an independent variable and the dependent variable without controlling for the effects of other variables.

4.2.1 Demographic Characteristics

The percentages of graduation within six years were significantly different between male and female students. The percentage of graduation for females was 79.2%, approximately 13% higher than that for males. The correlation between entering age and graduation was not significant at the 0.05 level. As for ethnicity, African Americans had a likelihood of graduation about 8% lower than Whites. The correlation between ethnicity and graduation was significant at the 0.001 level. However, residency status did not have a significant correlation with graduation.

4.2.2 Precollege Academic Preparation

The cross-tabulation results show that students in a higher high school GPA category tended to have a higher probability of graduation within six years in college.

Table 3:
Cross-tabulations of 6-year Graduation and Predicting Variables for Research Question 1

VARIABLE	% OF GRADUATION	% OF NON-GRADUATION	X²
GENDER			***
Male	65.9%	34.1%	
Female @	79.2%	20.8%	
ENTERING AGE			
Age (Years)			
ETHNICITY			***
African American	68.0%	32.0%	
Other	73.4%	26.6%	
White @	76.4%	23.6%	
RESIDENCY STATUS			
Out of state	79.1%	20.9%	
In state	74.1%	25.9%	
HIGH SCHOOL GPA			***
3.51-4.00	86.2%	13.8%	
3.01-3.50	80.4%	19.6%	
2.51-3.00	65.7%	34.3%	
0.00-2.50 @	59.4%	40.6%	
SAT MATH			
SAT Math			
SAT VERBAL			**
SAT Verbal			
HOUSING STATUS (YEAR 1)			*
On campus	75.8%	24.2%	
Off campus @	71.8%	28.2%	
TERMS ENROLLED FIRST 3 YEARS			**
Terms enrolled first 3 years			
ATTENDANCE PATTERN FIRST 3 YEARS			***
Always full-time	88.4%	11.6%	
Mixed @	63.4%	36.6%	
MAJOR FIELD CHANGE			
Changed	74.2%	25.8%	
Not changed @	74.4%	25.6%	
4TH-YEAR MAJOR FIELD			***
Art	80.9%	19.1%	
Arts	72.0%	28.0%	
Business	78.7%	21.3%	
Education	82.9%	17.1%	
Nursing	66.0%	34.0%	
Undecided	16.4%	83.6%	
Science @	57.3%	42.7%	
4TH-YEAR CREDIT LOAD			***
24 credits or more	88.2%	11.8%	
Less than 24 credits @	36.2%	63.8%	

(Table 3 – continued)

VARIABLE	% OF GRADUATION	% OF NON-GRADUATION	X ²
4-YEAR CUMULATIVE GPA			***
3.51-4.00	96.0%	4.0%	
3.01-3.50	89.2%	10.8%	
2.51-3.00	77.7%	22.3%	
0.00-2.50 @	42.6%	57.4%	
FINANCIAL AID (YEAR 4)			***
Grant & loan	64.0%	36.0%	
Loan only	69.1%	30.9%	
Merit aid only	88.5%	11.5%	
Merit aid & loan	89.7%	10.3%	
Other aid packages	85.1%	14.9%	
No aid @	51.4%	48.6%	

Note: 1) *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level; 2) @ indicates reference category for the sets of design variables in the binary and multinomial logistic regression models.

For instance, 86.2% of the students in the 3.51-4.00 GPA category graduated within six years, while only 59.4% from the 0.00-2.50 category did so. Differences in the proportion of graduation by high school GPA categories were significant at the 0.001 level. The correlation between SAT Math and graduation was not significant, whereas the correlation between SAT Verbal and graduation was.

4.2.3 College Experience

Students living on campus in their first year were 4% more likely to graduate than their peers living off campus. The difference between the two groups was significant at the 0.05 level. The number of terms enrolled during the first 3 years was also correlated with graduation. Furthermore, a significant 25% difference in the probability of graduation existed between students attending the university always full-time for the first 3 years and those attending in a mixed pattern.

Whether the students changed their major fields over the first 4 years was not significantly correlated with their graduation likelihood. However, what major fields students pursued in the fourth year had a significant correlation with graduation. For instance, 80.9% of the students in the major field of art graduated, as compared with 57.3% of the students in the major field of science. As for fourth-year credit load, the proportion of students taking 24 or more credits who eventually graduated was 88.2%,

52% higher than that of students taking fewer than 24 credits. The difference between the two groups was significant at the 0.001 level. Lastly, the cross-tabulation results show that students in a higher four-year cumulative college GPA category tended to graduate within six years at a higher rate than those in a lower category. For instance, 96.0% of the students in the 3.51-4.00 GPA category graduated, as opposed to 42.6% in the 0.00-2.50 category. Proportions of graduation by cumulative college GPA categories were significantly different at the 0.001 level.

4.2.4 Financial aid

Financial aid was significantly correlated with graduation. Compared with students without any aid, students with any package were more likely to graduate. For instance, recipients of the merit aid and loan package were 38.3% more likely to graduate.

4.2.5 Summary

The cross-tabulations and significance tests of correlations provided information on graduation patterns by predicting variables in the four groups of student characteristics: demographic characteristics, pre-college academic preparation, college experience, and financial aid. The results demonstrated that most of the independent variables, except for entering age, residency status, SAT Math, and change of major field, significantly differentiated the outcome variable of graduation within six years. However, the results for these bivariate relationships should be interpreted with caution. In theory, graduation or non-graduation is supposed to be affected by a number of variables, and the relationship between the outcome variable and a particular predicting variable is confounded by other predicting variables. Bivariate analyses cannot address how a particular independent variable contributes to the outcome variable holding the effects of other variables constant. This limitation can be overcome by corresponding multivariate analyses such as binary or multinomial logistic regression modeling.

4.3 Cross-tabulations of Graduation Patterns for Research Question 2

Table 4 shows the results of cross-tabulations of graduation patterns for Research Question 2. The table reports the percentages of graduates, late dropouts, and extenders, respectively, for each category of a categorical predicting variable. The results of the Pearson Chi-square significance tests for the associations between graduation and categorical predicting variables are presented, too. Similar to Table 3 in Section 4.2,

Table 4:
Cross-tabulations of 6-year Graduation and Predicting Variables for Research Question 2

VARIABLE	% OF LATE DROPOUT	% OF EXTENDED ENROLLMENT	% OF GRADUATION	X ²
GENDER				***
Male	19.20%	14.90%	65.90%	
Female @	13.20%	7.60%	79.20%	
ENTERING AGE				
Age (Years)				
ETHNICITY				*
African American	18.90%	13.10%	68.00%	
Other	16.50%	10.10%	73.40%	
White @	14.20%	9.40%	76.40%	
RESIDENCY STATUS				
Out of state	10.40%	10.40%	79.10%	
In state	15.60%	10.30%	74.10%	
HIGH SCHOOL GPA				***
3.51-4.00	8.10%	5.70%	86.20%	
3.01-3.50	11.30%	8.20%	80.40%	
2.51-3.00	20.10%	14.20%	65.70%	
0.00-2.50 @	26.80%	13.80%	59.40%	
SAT MATH				
SAT math				
SAT VERBAL				**
SAT verbal				
HOUSING STATUS (YEAR 1)				**
On campus	15.60%	8.50%	75.80%	
Off campus @	15.00%	13.20%	71.80%	
TERMS ENROLLED FIRST 3 YEARS				**
Terms enrolled first 3 years				
ATTENDANCE PATTERN FIRST 3 YEARS				***
Always full-time	7.60%	3.90%	88.40%	
Mixed @	21.40%	15.20%	63.40%	
MAJOR FIELD CHANGE				
Changed	15.50%	10.30%	74.20%	
Not changed @	15.30%	10.30%	74.40%	
4TH-YEAR MAJOR FIELD				***
Art	10.80%	8.30%	80.90%	
Arts	17.50%	10.50%	72.00%	
Business	13.60%	7.70%	78.70%	
Education	9.20%	7.90%	82.90%	
Nursing	24.00%	10.00%	66.00%	
Undecided	41.00%	42.60%	16.40%	
Science	27.70%	15.00%	57.30%	
4TH-YEAR CREDIT LOAD				***
24 credits or more	5.90%	5.80%	88.20%	
Less than 24 credits @	41.30%	22.50%	36.20%	

(Table 4 – continued)

VARIABLE	% OF LATE DROPOUT	% OF EXTENDED ENROLLMENT	% OF GRADUATION	X ²
4-YEAR CUMULATIVE GPA				***
3.51-4.00	3.70%	0.30%	96.00%	
3.01-3.50	6.00%	4.80%	89.20%	
2.51-3.00	14.00%	8.30%	77.70%	
0.00-2.50 @	33.50%	23.90%	42.60%	
FINANCIAL AID (YEAR 4)				***
Grant & loan	21.30%	14.60%	64.00%	
Loan only	16.80%	14.10%	69.10%	
Merit aid only	7.70%	3.80%	88.50%	
Merit aid & loan	6.20%	4.10%	89.70%	
Other aid packages	8.80%	6.00%	85.10%	
No aid @	29.90%	18.70%	51.40%	

Note: 1) *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level; 2) @ indicates reference category for the sets of design variables in the binary and multinomial logistic regression models.

Table 4 also lists continuous independent variables and identifies whether a significant correlation existed between such a variable and the outcome variable. For Research Question 2, the interest is on whether the late dropout group or the extended enrollment group differs from the graduation group in terms of the predictors in the four categories of student characteristics. For this reason, reporting of the results in this section is focused on the overall relationship between each predictor and the outcome variable and the statistics regarding the late dropout group and the extended enrollment group.

4.3.1 Demographic Characteristics

The overall pattern of the outcome variable was significantly different between male and female students. Males were 6% more likely than females to drop out late, and 7.3% more likely to extend enrollment beyond year 6. The correlation between entering age and the outcome variable was not significant. As for ethnicity, African American students were 4.7% more likely to drop out late and 3.7% more likely to stay longer than White students. The relationship between ethnicity and the outcome variable was significant at the 0.05 level. However, the overall pattern of the outcome variable was not significantly different between in-state and out-of-state students.

4.3.2 Precollege Academic Preparation

The cross-tabulation results reveal that students in the three outcome groups differed significantly in terms of high school GPA. Students in a higher high school GPA category tended to have a lower probability of dropping out late or extending enrollment beyond year 6. For instance, the percentage of students in the 0.00-2.50 category who dropped out late was 26.8%, 18.7% higher than that of students in the 3.51-4.00 GPA category. The percentage of students in the 0.00-2.50 category who continued matriculating after year 6 was 13.8%, 8.1% higher than that of students in the 3.51-4.00 GPA category. The correlation between SAT Math score and the outcome variable was not significant, whereas the correlation between SAT Verbal score and the outcome variable was.

4.3.3 College Experience

Whether students lived on or off campus was significantly related to whether they graduated, dropped out or extend enrollment beyond year 6. The proportion of students in the category of living off campus who continued enrolling after year 6 was 13.2%, 4.7% higher than that of students in the category of living on campus. The number of terms enrolled during the first 3 years was correlated with the outcome variable at the 0.01 level. Furthermore, Proportions of students in the three outcome groups differed significantly by attendance pattern over the first 3 years. Students who attended in a mixed pattern were 13.8% more likely to drop out late and 11.3% more likely to extend enrollment beyond year 6 than students who attended always full time.

Whether the students changed their major fields over the first 4 years was not significantly correlated with their outcome status. However, what major fields the students pursued in the fourth year had a significant correlation with their outcome status at the 0.001 level. Forty-one percent (41%) of the undecided students and 27.7% of the students in the field of science dropped out after year 4, as opposed to 10.8% of the students in art and 9.2% of the students in education. In addition, 42.6% of the undecided students and 15% of the students in the field of science continued enrolling after year 6, compared with 7.9% of the students in education and 7.7% of the students in business. As for fourth-year credit load, the proportion of students taking fewer than 24 credits who eventually dropped out was 41.3%, 35.4% higher than that of students taking 24 credits or more. The proportion of students taking fewer than 24 credits who extended

enrollment beyond year 6 was 22.5%, 16.7% higher than that of students taking 24 credits or more. The relationship between fourth-year credit load and the outcome variable was significant at the 0.001 level. Lastly, four-year cumulative GPA had a significant correlation with the outcome variable at the 0.001 level. Students in a lower four-year cumulative college GPA category tended to drop out after year 4 or extend enrollment beyond year 6 at a higher rate than those in a higher GPA category. For instance, 33.5% of the students in the 0.00-2.50 GPA category dropped out late, compared with only 3.7% in the 3.51-4.00 category. Of the students in the 0.00-2.50 GPA category, 23.9% continued enrolling after year 6, compared with 0.3% of the students in the 3.51-4.00 category.

4.3.4 Financial Aid

The correlation between financial aid and the outcome variable was significant at the 0.001 level. Among the six categories of financial aid, students without any aid were most likely to drop out and extend enrollment. For instance, they were 23.7% more likely to drop out than students with merit and loan, and 14.9% more likely to extend enrollment than students with loan only.

4.3.5 Summary

The cross-tabulations and significance test of correlations for Research Question 2 provided information on the overall patterns of the outcome variable by predictors in the four categories of demographic characteristics, pre-college academic preparation, college experience, and financial aid. The results demonstrated that most of the independent variables were significantly correlated with the outcome variable of graduation within six years. Only entering age, residency status, SAT Math score, and change of major field did not have any significant relationship with the outcome variable. The analysis also illustrated how various student characteristics were related to dropout and extended enrollment. However, these results did not reveal how each predicting variable contributed to the outcome of late dropout or extended enrollment controlling for the effects of other variables.

4.4 Results from Binary Logistic Regression for Research Question 1

Binary logistic regressions were employed to investigate the global effect of independent variables on graduation and the individual effect of each independent

variable controlling for the effects of other independent variables. It may be helpful to repeat that four different binary regressions were run so that the effect of financial aid can be explored in multiple approaches. Model 1 was an aid package model in which financial aid was classified into 6 categories: grant and loan, loan only, merit only, merit and loan, other aid packages, and no aid, with no aid as the reference category. Model 2 was an aid amount model in which the total amount of each aid type (including loan, grant, merit aid, work study, and other) was included as a financial aid variable. For this model, an additional regression was run for aid recipients only to examine whether and how the amount of each aid type influences the chance of graduation for aid recipients. Model 3 was a receiving aid Yes/No model in which the financial aid variable had two categories: receiving aid and not receiving aid. Finally, Model 4 was an aggregate aid amount model in which the aggregate amount of all aid types was included as the financial aid variable. This chapter primarily reports results from Model 1 and briefly presents findings from Model 2. Results from Model 3 and Model 4 are attached in Appendix A.

The *p*-value of Hosmer and Lemeshow test, a test of the fit of the logistic model, was .49 ($\chi^2=7.40$, $df=8$), greater than .05, indicating that the model's estimates fitted the data at an acceptable level. The omnibus test of model coefficients was also significant with a *p*-value of .000 ($\chi^2=941.54$, $df=29$), suggesting that the research model with all predictors was significantly different from the baseline model and that at least one of the predictors was significantly related to the outcome variable. The classification table reveals that 93.4% of the students were correctly classified for the graduation group, and 63.0% for the non-graduation group. Overall, 85.6% of the students were correctly classified, a considerable improvement on the 74.3% correct classification with the baseline model. The values for the two Pseudo-R² measures of Cox & Snell Index and Nagelkerke Index were 0.378 and 0.555, respectively, also suggesting a satisfactory fit of the model. Table 5 presents the effects of independent variables on graduation within six years in Model 1.

4.4.1 Demographic Characteristics

Table 5 shows that the effects of gender and entering age were not significant when the effects of other variables were held constant. There were two contrasts for

Table 5: The Effects of Predicting Variables on 6-year Graduation in Model 1

VARIABLE	B	Std. Error	Wald	Sig.	Exp(B)			
					Estimate	95% Confidence Interval		
GENDER								
Male	-0.218	0.161	1.838	0.175	0.804	0.587	1.102	
ENTERING AGE								
Age (Years)	-0.034	0.110	0.095	0.758	0.967	0.780	1.199	
ETHNICITY								
African American	-0.327	0.185	3.141	0.076	0.721	0.502	1.035	
Other	0.455	0.378	1.447	0.229	1.576	0.751	3.305	
RESIDENCY STATUS								
Out of state	0.155	0.421	0.136	0.713	1.168	0.511	2.667	
HIGH SCHOOL GPA								
3.51-4.00	0.131	0.298	0.192	0.662	1.139	0.635	2.044	
3.01-3.50	-0.009	0.238	0.002	0.969	0.991	0.621	1.579	
2.51-3.00	-0.273	0.213	1.647	0.199	0.761	0.502	1.155	
SAT MATH								
SAT Math score (100 points)	-0.393	0.137	8.271	0.004	**	0.675	0.516	0.882
SAT VERBAL								
SAT Verbal score (100 points)	-0.065	0.138	0.224	0.636		0.937	0.715	1.227
HOUSING STATUS (YEAR 1)								
On campus	-0.014	0.160	0.007	0.933		0.987	0.720	1.351
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	0.559	0.084	44.554	0.000	***	1.748	1.484	2.060
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	0.730	0.166	19.239	0.000	***	2.075	1.497	2.875
MAJOR FIELD CHANGE								
Changed	-0.117	0.147	0.625	0.429		0.890	0.667	1.188
4TH-YEAR MAJOR FIELD								
Art	1.059	0.279	14.449	0.000	***	2.885	1.671	4.982
Arts	0.933	0.263	12.595	0.000	***	2.541	1.518	4.254
Business	1.353	0.254	28.300	0.000	***	3.869	2.350	6.369
Education	0.828	0.249	11.026	0.001	***	2.288	1.404	3.729
Nursing	-0.160	0.355	0.204	0.651		0.852	0.425	1.708
Undecided	-0.424	0.467	0.823	0.364		0.654	0.262	1.636
4TH-YEAR CREDIT LOAD								
24 credits or more	2.164	0.150	207.750	0.000	***	8.703	6.485	11.680
4-YEAR CUMULATIVE GPA								
3.51-4.00	3.305	0.432	58.488	0.000	***	27.240	11.679	63.537
3.01-3.50	2.271	0.279	66.477	0.000	***	9.686	5.612	16.720
2.51-3.00	1.282	0.179	51.265	0.000	***	3.604	2.537	5.119
FINANCIAL AID (YEAR 4)								
Grant & loan	0.029	0.259	0.012	0.912		1.029	0.620	1.708
Loan only	0.149	0.203	0.533	0.465		1.160	0.779	1.729
Merit aid only	-0.262	0.300	0.759	0.384		0.770	0.427	1.387
Merit aid & loan	-0.283	0.335	0.715	0.398		0.754	0.391	1.452
Other aid packages	-0.008	0.250	0.001	0.976		0.992	0.608	1.619

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level.

the ethnicity variable: African American vs. White, and Other vs. White. The impact of neither contrast was significant. The impact of residency status was not significant, either.

4.4.2 Precollege Academic Preparation

High school GPA had three contrasts involving the reference group of 0-2.50: 3.51-4.0 vs. 0-2.50, 3.01-3.5 vs. 0-2.50, and 2.51-3.00 vs. 0-2.50. None of the contrasts were statistically significant. SAT Math score had a significant and negative relationship with graduation at the 0.01 level. The odds ratio for SAT Math score was 0.675. In other words, an increase of one unit of SAT Math score equal to 100 points would increase the likelihood of non-graduation by about $1/0.675=1.48$ times. The effect of SAT Verbal score was not significant.

4.4.3 College Experience

The impacts of housing status year 1 and change of major field were not significant. Nevertheless, the number of terms enrolled during the first 3 years had a significant and positive impact on graduation at the 0.001 level. An increase of one term enrolled would increase the odds of graduation by approximately 1.7 times. In addition, the effect of attendance pattern over the first 3 years was also significant at the 0.001 level. The odds of graduation for students always attending full-time were 2.1 times the odds for those attending in a mixed pattern.

The effect of fourth-year major field was significant at the 0.001 level. The odds of graduation for students majoring in business, art, arts, and education were 3.9, 2.9, 2.5, and 2.3 times, respectively, the odds for students majoring in science. The effects were not significant for nursing students and undecided students. As for the effect of fourth-year credit load, the odds of graduation for students with a load of 24 credits or more were 8.7 times the odds of graduation for students with a load of less than 24 credits. Lastly, in terms of four-year cumulative college GPA, the effects of all three contrasts involving the reference group of 0-2.50 were significant. In particular, the odds of graduation for students with a cumulative GPA of 3.51-4.00 were 27 times the odds for students with a GPA of 0.00-2.50.

4.4.4 Financial Aid

There were five contrasts involving the reference category of no aid. None of the effects of these contrasts on the probability of graduation were significant.

Table 6: The Effects of Predicting Variables on 6-year Graduation in Model 2

VARIABLE	Entire Sample (N=1,990)			Aid Recipients Only (N=1,550)				
	B	Sig.	Exp(B)	B	Sig.	Exp(B)		
GENDER								
Male	-0.168	0.300	0.845	-0.069	0.720	0.934		
ENTERING AGE								
Age (Years)	-0.025	0.822	0.976	-0.096	0.480	0.908		
ETHNICITY								
African American	-0.289	0.122	0.749	-0.269	0.209	0.764		
Other	0.483	0.198	1.621	0.210	0.619	1.233		
RESIDENCY STATUS								
Out of state	0.198	0.637	1.218	-0.317	0.523	0.728		
HIGH SCHOOL GPA								
3.51-4.00	0.101	0.735	1.107	0.126	0.728	1.134		
3.01-3.50	-0.055	0.818	0.946	-0.081	0.786	0.922		
2.51-3.00	-0.315	0.141	0.730	-0.410	0.130	0.664		
SAT MATH								
SAT Math score (100 points)	-0.377	0.006	**	0.686	-0.383	0.018	*	0.682
SAT VERBAL								
SAT Verbal score (100 points)	-0.075	0.584		0.927	-0.211	0.199		0.810
HOUSING STATUS (YEAR 1)								
On campus	-0.054	0.740		0.948	-0.032	0.868		0.969
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	0.565	0.000	***	1.759	0.526	0.000	***	1.693
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	0.790	0.000	***	2.204	0.896	0.000	***	2.449
MAJOR FIELD CHANGE								
Changed	-0.105	0.480		0.901	-0.133	0.436		0.875
4TH-YEAR MAJOR FIELD								
Art	1.069	0.000	***	2.912	1.126	0.001	***	3.085
Arts	0.954	0.000	***	2.596	0.669	0.025	*	1.952
Business	1.349	0.000	***	3.853	1.212	0.000	***	3.359
Education	0.828	0.001	***	2.288	0.689	0.016	**	1.992
Nursing	-0.155	0.663		0.857	-0.219	0.578		0.803
Undecided	-0.412	0.376		0.662	-0.941	0.172		0.390
4TH-YEAR CREDIT LOAD								
24 credits or more	2.158	0.000	***	8.655	1.997	0.000	***	7.364
4-YEAR CUMULATIVE GPA								
3.51-4.00	3.176	0.000	***	23.949	3.226	0.000	***	25.176
3.01-3.50	2.112	0.000	***	8.263	2.200	0.000	***	9.027
2.51-3.00	1.246	0.000	***	3.477	1.251	0.000	***	3.494
FINANCIAL AID (YEAR 4)								
Total amount of loan (1,000\$)	0.025	0.190		1.026	0.038	0.125		1.039
Total amount of grant (1,000\$)	-0.018	0.741		0.982	-0.012	0.839		0.989
Total amount of work/study(1,000\$)	0.061	0.715		1.063	0.059	0.724		1.060
Total amount of merit aid (1,000\$)	-0.013	0.841		0.987	-0.014	0.840		0.986
Total amount of other aid (1,000\$)	-0.126	0.120		0.882	-0.118	0.163		0.888

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

4.4.5 Model 2 and the Effect of Financial Aid

Two separate binary logistic regressions were run for Model 2, one for the entire sample of 1,990 students, and the other for 1,550 aid recipients. For ease of comparisons, selected results for the two regressions are presented in Table 6. As Table 6 demonstrates, the effects of financial aid on graduation were essentially the same for the entire sample and for aid recipients only. None of the amounts of the five aid types had a significant impact on the likelihood of graduation. However, the effects of some independent variables other than financial aid were somewhat different for the entire sample and for aid recipients only. Specifically, the impact of SAT Math score was significant at the 0.01 level for the entire sample, whereas it was significant merely at the 0.05 level for aid recipients only. In addition, the effect of the major field of arts in comparison with science was significant at the 0.001 level for the entire sample, while it was significant only at the 0.05 level for aid recipients. The odds ratio was 2.6 for the entire sample, about 0.6 units higher than that for aid recipients only. Furthermore, the effect of the contrast of education vs. science was significant at the 0.001 level for the entire sample, while it was significant only at the 0.05 level for aid recipients. For the entire sample, the odds of graduation for education majors were 2.3 times those for science majors, while for aid recipients only, the corresponding odds ratio was 2.0.

4.5 Comparison of Results from Cross-tabulations and Binary Logistic Regression

Correlations from cross-tabulations and coefficients from logistic regression may differ in significance for some statistical reasons. Logistic coefficients are partial coefficients, controlling for the effects of other variables in the model, and reflect linear and nonlinear relationships (Cohen et al., 2003). In this sense, they are statistically and theoretically more rigorous than bivariate correlations. For this reason, in interpreting the effect of a predicting variable, a logistic coefficient or odds ratio is preferred over a correlation if there is a discrepancy between them. On the other hand, the existence of a discrepancy makes it necessary to interpret the effect of the logistic coefficient or odds ratio more cautiously.

A comparison of the significance of bivariate correlation (Table 3) and the significance of corresponding logistic coefficient (Table 5) for each predicting variable revealed that for the variables of terms enrolled over the first 3 years, attendance pattern

over the first 3 years, fourth-year major field, fourth-year credit load, and four-year cumulative college GPA, both bivariate correlation and logistic coefficient were significant. For gender, ethnicity, high school GPA, SAT Verbal score, housing status, and financial aid, bivariate correlation was significant, whereas logistic coefficient was not. On the other hand, the logistic coefficient of SAT Math score was significant, although this variable did not correlate significantly with graduation.

4.6 Results from Multinomial Logistic Regression for Research Question 2

Multinomial logistic regressions were run to explore whether and how students in the dropout and the extended enrollment group differed from students in the graduation group. For this purpose, the analysis was focused on two pairs of contrasts within the dependent variable: late dropout vs. graduation, and extended enrollment vs. graduation, and the effects of independent variables on each pair of contrasts were examined. Similar to the binary logistic regression models for Research Question 1, four alternative multinomial regression models (i.e., Model 1 to Model 4), were run, with the financial aid factor being specified in different ways while keeping all other predicting variables intact. This section primarily reports results from Model 1 and briefly presents findings from Model 2. Findings from Model 3 and Model 4 are attached in Appendix 1.

The likelihood ratio test of the overall model was significant with a p -value of .000 ($\chi^2=996.40$, $df=58$), indicating that the research model with all predictors was significantly different from the intercept-only model as a whole and that at least one predictor was significantly related to the dependent variable. According to the results from the test of the global unique effect of each predicting variable, the effects of the following variables were significant at the 0.05 level: gender, SAT Math score, housing status in the first year, terms enrolled over the first 3 years, attendance pattern over the first 3 years, fourth-year major field, fourth-year credit load, and four-year cumulative GPA. The overall classification accuracy of the model was 80.9% (54.9% for late dropout, 15.6% for extended enrollment, and 95.3% for graduation). As for the pseudo- R^2 measures, the values for the Cox & Snell and Nagelkerke indices were 0.395 and 0.510, respectively, suggesting a good fit of the model.

4.6.1 The Effects of Predicting Variables on the Outcome Contrast of Late Dropout versus Graduation

Table 7: The Effects of Predicting Variables on the Outcome Contrast of Late Dropout versus Graduation in Model 1

VARIABLE	B	Std. Error	Wald	Sig.	Exp(B)			
					Estimate	95% Confidence Interval		
GENDER								
Male	-0.007	0.185	0.001	0.971	0.993	0.691	1.427	
ENTERING AGE								
Age (Years)	-0.025	0.126	0.040	0.841	0.975	0.761	1.249	
ETHNICITY								
African American	0.254	0.210	1.457	0.227	1.289	0.854	1.946	
Other	-0.460	0.423	1.181	0.277	0.631	0.276	1.447	
RESIDENCY STATUS								
Out of state	-0.393	0.520	0.570	0.450	0.675	0.244	1.872	
HIGH SCHOOL GPA								
3.51-4.00	-0.511	0.343	2.219	0.136	0.600	0.306	1.175	
3.01-3.50	-0.274	0.270	1.032	0.310	0.760	0.448	1.290	
2.51-3.00	0.106	0.237	0.200	0.655	1.112	0.699	1.769	
SAT MATH								
SAT Math score (100 points)	0.417	0.157	7.032	0.008	**	1.517	1.115	2.064
SAT VERBAL								
SAT Verbal score (100 points)	0.102	0.158	0.419	0.517		1.108	0.812	1.511
HOUSING STATUS (YEAR 1)								
On campus	0.262	0.184	2.015	0.156		1.299	0.905	1.864
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	-0.526	0.091	33.085	0.000	***	0.591	0.494	0.707
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	-0.562	0.193	8.477	0.004	**	0.570	0.390	0.832
MAJOR FIELD CHANGE								
Changed	0.133	0.169	0.618	0.432		1.142	0.820	1.590
4TH-YEAR MAJOR FIELD								
Art	-1.324	0.320	17.177	0.000	***	0.266	0.142	0.498
Arts	-1.052	0.294	12.762	0.000	***	0.349	0.196	0.622
Business	-1.379	0.285	23.381	0.000	***	0.252	0.144	0.440
Education	-1.138	0.286	15.806	0.000	***	0.321	0.183	0.562
Nursing	0.209	0.394	0.283	0.595		1.233	0.570	2.667
Undecided	0.029	0.504	0.003	0.955		1.029	0.383	2.765
4TH-YEAR CREDIT LOAD								
24 credits or more	-2.469	0.174	200.693	0.000	***	0.085	0.060	0.119
4-YEAR CUMULATIVE GPA								
3.51-4.00	-2.796	0.473	34.916	0.000	***	0.061	0.024	0.154
3.01-3.50	-2.295	0.331	48.088	0.000	***	0.101	0.053	0.193
2.51-3.00	-1.161	0.208	31.165	0.000	***	0.313	0.208	0.471
FINANCIAL AID (YEAR 4)								
Grant & loan	-0.125	0.290	0.184	0.668		0.883	0.500	1.560
Loan only	-0.248	0.234	1.123	0.289		0.780	0.493	1.235
Merit aid only	0.322	0.346	0.866	0.352		1.379	0.701	2.716
Merit aid & loan	0.210	0.397	0.280	0.597		1.234	0.567	2.683
Other aid packages	-0.032	0.289	0.012	0.912		0.968	0.550	1.705

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Demographic characteristics. Table 7 illustrates that gender, entering age, and residency status were not significantly related to the odds of late dropout relative to graduation within six years. For the variable of ethnicity, neither of the effects of the two contrasts of African American vs. White, and Other vs. White were significant, controlling for the effects of other independent variables.

Pre-college academic preparation. The effects of high school GPA and SAT Verbal score were not significant. However, the effect of SAT Math score was significant and positive. The odds ratio for SAT Math score was 1.517. In other words, an increase of 100 points in SAT Math score would increase the odds of dropping out late rather than graduation by a factor of about 1.5.

College experience. The impacts of first-year housing status and change of major fields were not significant. The number of terms enrolled during the first 3 years had a significant and negative impact on late dropout at the 0.001 level. An increase of one term enrolled would increase the odds of graduation rather than late dropout by about 1.7 times when the effects of other predicting variables were held constant. In addition, the effect of attendance pattern over the first 3 years was significant and negative at the 0.01 level. Students attending the university in a mixed pattern had odds of late dropout rather than graduation 1.8 times as high as those attending always full-time.

Fourth-year major field was a significant variable at the 0.001 level. The odds of late dropout rather than graduation for students majoring in the field of science were 4.0, 3.8, 3.1, and 2.9 times the odds for students majoring in business, art, education, and arts, respectively. As for the significant effect of fourth-year credit load, the odds of late dropout for students with a load of less than 24 credits were 11.8 times the odds for students with a load of 24 or more credits. Lastly, in terms of four-year cumulative college GPA, the effects of all three contrasts involving the reference category of GPA 0-2.50 were significant at the 0.001 level. All of the effects were negative, which suggests that lower GPA was related to higher odds of late dropout. For instance, the odds of late dropout rather than graduation for students with a college GPA of 0.00-2.50 were 16.4 times the odds for students with a college GPA of 3.51-4.00.

Financial aid. There were five contrasts involving the reference category of no aid. None of the effects of the five contrasts on late dropout were significant.

Table 8: The Effects of Predicting Variables on the Outcome Contrast of Late Dropout versus Graduation in Model 2

VARIABLE	Entire Sample (N=1,990)			Aid Recipients Only (N=1,550)		
	B	Sig.	Exp(B)	B	Sig.	Exp(B)
GENDER						
Male	-0.094	0.615	0.910	-0.029	0.900	0.972
ENTERING AGE						
Age (Years)	-0.039	0.758	0.961	0.125	0.425	1.134
ETHNICITY						
African American	0.228	0.284	1.257	0.299	0.239	1.349
Other	-0.466	0.268	0.627	-0.262	0.592	0.770
RESIDENCY STATUS						
Out of state	-0.499	0.335	0.607	0.201	0.740	1.223
HIGH SCHOOL GPA						
3.51-4.00	-0.464	0.180	0.629	-0.291	0.503	0.747
3.01-3.50	-0.193	0.480	0.825	-0.074	0.837	0.929
2.51-3.00	0.178	0.458	1.194	0.464	0.147	1.591
SAT MATH						
SAT Math score (100 points)	0.380	0.016 *	1.462	0.356	0.061	1.428
SAT VERBAL						
SAT Verbal score (100 points)	0.118	0.456	1.125	0.344	0.076	1.410
HOUSING STATUS (YEAR 1)						
On campus	0.328	0.077	1.388	0.300	0.190	1.350
TERMS ENROLLED FIRST 3 YEARS						
Terms enrolled first 3 years	-0.543	0.000 ***	0.581	-0.471	0.000 ***	0.624
ATTENDANCE PATTERN FIRST 3 YEARS						
Always full-time	-0.671	0.001 ***	0.511	-0.805	0.001 ***	0.447
MAJOR FIELD CHANGE						
Changed	0.117	0.492	1.124	0.115	0.571	1.122
4TH-YEAR MAJOR FIELD						
Art	-1.348	0.000 ***	0.260	-1.506	0.000 ***	0.222
Arts	-1.089	0.000 ***	0.337	-0.953	0.004 **	0.385
Business	-1.377	0.000 ***	0.252	-1.492	0.000 ***	0.225
Education	-1.134	0.000 ***	0.322	-1.257	0.000 ***	0.285
Nursing	0.180	0.649	1.197	0.123	0.781	1.131
Undecided	-0.017	0.974	0.984	0.351	0.645	1.420
4TH-YEAR CREDIT LOAD						
24 credits or more	-2.479	0.000 ***	0.084	-2.298	0.000 ***	0.100
4-YEAR CUMULATIVE GPA						
3.51-4.00	-2.646	0.000 ***	0.071	-2.617	0.000 ***	0.073
3.01-3.50	-2.092	0.000 ***	0.123	-2.054	0.000 ***	0.128
2.51-3.00	-1.106	0.000 ***	0.331	-1.126	0.000 ***	0.324
FINANCIAL AID (YEAR 4)						
Total amount of loan (1,000\$)	-0.035	0.134	0.966	-0.045	0.142	0.956
Total amount of grant (1,000\$)	-0.014	0.833	0.986	-0.010	0.885	0.990
Total amount of work/study(1,000\$)	-0.306	0.243	0.736	-0.316	0.240	0.729
Total amount of merit aid (1,000\$)	0.016	0.834	1.016	0.001	0.987	1.001
Total amount of other aid (1,000\$)	0.223	0.009 **	1.250	0.203	0.026 *	1.225

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Model 2 and the effect of financial aid. Two separate regressions were run for Model 2, one for the entire sample of 1,990 students, and the other for 1,550 aid recipients. For ease of comparisons, selected results for the two regressions were presented in Table 8. The table reveals that the effects of financial aid on the contrast of late dropout vs. graduation within six years were somewhat different for the entire sample and for aid recipients only. Although the effect of total amount of other aid was significant for both the entire sample and aid recipients only, the effect was significant at the 0.01 level for the former, but at the 0.05 level for the latter. Specifically, an increase of \$1,000 in other aid, which included athletic and private scholarships, would increase the odds of dropout rather than graduation about 1.3 times for the entire sample and 1.2 times for aid recipients only. The effects of some independent variables other than financial aid were also different between the entire sample and aid recipients only. For example, the impact of SAT Math score was significant at the 0.05 level for the entire sample, but not significant for aid recipients only. A further difference was that the effect of the fourth-year major field of arts in reference to science was significant at the 0.001 level for the entire sample, but only at the 0.01 level for aid recipients. The odds ratio was about 0.39 for aid recipients only, 0.06 units smaller than that for the entire sample.

4.6.2 The Effects of Predicting Variables on the Outcome Contrast of Extended Enrollment versus Graduation

Demographic characteristics. Table 9 presents the effects of predicting variables on the outcome contrast of extended enrollment versus graduation. The table shows that male students were significantly different from female students in terms of the odds of extended enrollment rather than graduation. The odds of continued enrollment after year 6 for males were 1.6 times the odds for females controlling for the effects of other independent variables. None of the variables of entering age, ethnicity, and residency status had a significant impact on extended enrollment.

Precollege academic preparation. For high school GPA, none of the effects of the three contrasts involving the reference category of GPA 0-2.50 were significant when the effects of other variables were accounted for. The effect of SAT Verbal score was not significant, either. However, SAT Math score had a significant positive impact on extended enrollment. The odds ratio for SAT Math was 1.452. In other words, other

Table 9: The Effects of Predicting Variables on the Outcome Contrast of Extended Enrollment versus Graduation in Model 1

VARIABLE	B	Std. Error	Wald	Sig.	Exp(B)			
					Estimate	95% Confidence Interval		
GENDER								
Male	0.498	0.202	6.062	0.014	*	1.645	1.107	2.444
ENTERING AGE								
Age (Years)	0.138	0.138	1.004	0.316		1.148	0.876	1.506
ETHNICITY								
African American	0.434	0.232	3.506	0.061		1.544	0.980	2.433
Other	-0.448	0.479	0.877	0.349		0.639	0.250	1.632
RESIDENCY STATUS								
Out of state	0.075	0.510	0.022	0.882		1.078	0.397	2.931
HIGH SCHOOL GPA								
3.51-4.00	0.335	0.375	0.798	0.372		1.397	0.671	2.912
3.01-3.50	0.362	0.301	1.441	0.230		1.436	0.796	2.591
2.51-3.00	0.491	0.267	3.381	0.066		1.634	0.968	2.756
SAT MATH								
SAT Math score (100 points)	0.373	0.174	4.596	0.032	*	1.452	1.033	2.041
SAT VERBAL								
SAT Verbal score (100 points)	0.012	0.175	0.005	0.946		1.012	0.718	1.426
HOUSING STATUS (YEAR 1)								
On campus	-0.330	0.202	2.675	0.102		0.719	0.484	1.068
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	-0.621	0.097	41.052	0.000	***	0.537	0.444	0.650
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	-1.010	0.233	18.767	0.000	***	0.364	0.230	0.575
MAJOR FIELD CHANGE								
Changed	0.100	0.187	0.285	0.593		1.105	0.766	1.596
4TH-YEAR MAJOR FIELD								
Art	-0.687	0.351	3.833	0.050	*	0.503	0.253	1.001
Arts	-0.783	0.335	5.472	0.019	*	0.457	0.237	0.881
Business	-1.300	0.329	15.594	0.000	***	0.272	0.143	0.519
Education	-0.404	0.313	1.672	0.196		0.667	0.362	1.232
Nursing	0.018	0.472	0.001	0.969		1.018	0.403	2.570
Undecided	0.856	0.510	2.814	0.093		2.354	0.866	6.400
4TH-YEAR CREDIT LOAD								
24 credits or more	-1.694	0.196	74.775	0.000	***	0.184	0.125	0.270
4-YEAR CUMULATIVE GPA								
3.51-4.00	-5.102	1.109	21.156	0.000	***	0.006	0.001	0.053
3.01-3.50	-2.214	0.363	37.123	0.000	***	0.109	0.054	0.223
2.51-3.00	-1.459	0.232	39.532	0.000	***	0.232	0.147	0.366
FINANCIAL AID (YEAR 4)								
Grant & loan	0.097	0.318	0.092	0.761		1.101	0.591	2.054
Loan only	-0.061	0.250	0.059	0.808		0.941	0.576	1.537
Merit aid only	0.152	0.413	0.135	0.713		1.164	0.518	2.616
Merit aid & loan	0.347	0.455	0.581	0.446		1.415	0.580	3.452
Other aid packages	0.067	0.324	0.042	0.837		1.069	0.566	2.018

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

things being equal, an increase of 100 points in SAT Math score would increase the odds of extended enrollment by a factor of about 1.5.

College experience. First-year housing status and change of major fields did not exert a significant impact on the likelihood of extended enrollment when other variables are controlled for. In contrast, terms enrolled during the first 3 years had a significant yet negative effect on extended enrollment at the 0.001 level. An increase of one term enrolled over the first 3 years would increase the odds of graduation rather than extended enrollment by approximately 1.9 times. In addition, the effect of attendance pattern over the first 3 years was also significant and negative at the 0.001 level. Students with a mixed pattern of attendance had odds of extended enrollment about 2.9 times higher than those attending the university always full-time. For fourth-year major field, the coefficients of the three contrasts involving the reference group of science were significant and negative. Note that although the regression coefficient for the contrast of art vs. science was significant at the 0.05 level, the 95% confidence interval of $\text{Exp}(B)$ for this contrast includes the value of 1, which indicates that the regression coefficient for the contrast is not different from 0 and thus this contrast is not a useful predictor in the model. The odds of extended enrollment for science majors were 3.7 times that for business majors, and 2.2 times for arts majors. The effect of fourth-year credit load was significant and negative at the 0.001 level. The odds of extended enrollment for students with a load of fewer than 24 credits were 5.4 times the odds for students with a load of 24 credits or more. Lastly, in terms of four-year cumulative college GPA, the effects of all three contrasts involving the reference category of GPA 0.00-2.50 were significant at the 0.001 level, and lower GPA was related to higher odds of extended enrollment. In particular, the odds of extended enrollment rather than graduation for students with a GPA of 0.00-2.50 were, astoundingly, 167 times the odds for students with a GPA of 3.51-4.00.

Financial aid. There were five contrasts involving the reference category of no aid. None of the effects of the five contrasts on extended enrollment were significant.

Table 10: The Effects of Predicting Variables on the Outcome Contrast of Extended Enrollment versus Graduation in Model 2

VARIABLE	Entire Sample (N=1,990)			Aid Recipients Only (N=1,550)				
	B	Sig.	Exp(B)	B	Sig.	Exp(B)		
GENDER								
Male	0.488	0.016	*	1.629	0.188	0.462	1.206	
ENTERING AGE								
Age (Years)	0.138	0.312		1.148	0.053	0.784	1.054	
ETHNICITY								
African American	0.383	0.102		1.467	0.229	0.418	1.257	
Other	-0.475	0.319		0.622	-0.090	0.868	0.914	
RESIDENCY STATUS								
Out of state	0.071	0.889		1.074	0.358	0.594	1.430	
HIGH SCHOOL GPA								
3.51-4.00	0.333	0.374		1.395	0.033	0.946	1.033	
3.01-3.50	0.363	0.230		1.437	0.263	0.491	1.300	
2.51-3.00	0.506	0.059		1.659	0.341	0.326	1.407	
SAT MATH								
SAT Math score (100 points)	0.380	0.030	*	1.462	0.392	0.069	1.480	
SAT VERBAL								
SAT Verbal score (100 points)	0.007	0.967		1.007	0.005	0.984	1.005	
HOUSING STATUS (YEAR 1)								
On campus	-0.309	0.128		0.734	-0.308	0.222	0.735	
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	-0.611	0.000	***	0.543	-0.635	0.000	***	0.530
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	-0.981	0.000	***	0.375	-1.055	0.000	***	0.348
MAJOR FIELD CHANGE								
Changed	0.109	0.563		1.115	0.169	0.457	1.184	
4TH-YEAR MAJOR FIELD								
Art	-0.686	0.050	*	0.503	-0.401	0.399	0.669	
Arts	-0.796	0.018	*	0.451	-0.085	0.845	0.919	
Business	-1.313	0.000	***	0.269	-0.609	0.160	0.544	
Education	-0.428	0.171		0.651	0.224	0.587	1.251	
Nursing	0.019	0.967		1.020	0.462	0.427	1.588	
Undecided	0.851	0.094		2.343	1.757	0.025	*	5.793
4TH-YEAR CREDIT LOAD								
24 credits or more	-1.678	0.000	***	0.187	-1.500	0.000	***	0.223
4-YEAR CUMULATIVE GPA								
3.51-4.00	-5.042	0.000	***	0.006	-23.665	NA	NA	
3.01-3.50	-2.132	0.000	***	0.119	-2.414	0.000	***	0.089
2.51-3.00	-1.445	0.000	***	0.236	-1.420	0.000	***	0.242
FINANCIAL AID (YEAR 4)								
Total amount of loan (1,000\$)	-0.019	0.447		0.981	-0.037	0.246	0.963	
Total amount of grant (1,000\$)	0.070	0.302		1.072	0.047	0.516	1.048	
Total amount of work/study (1,000\$)	0.063	0.737		1.065	0.062	0.741	1.064	
Total amount of merit aid (1,000\$)	0.016	0.851		1.016	0.048	0.604	1.050	
Total amount of other aid (1,000\$)	-0.171	0.405		0.843	-0.146	0.470	0.864	

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Model 2 and the effect of financial aid. Selected results for the two multinomial logistic regressions for Model 2 regarding the contrast of extended enrollment versus graduation are presented in Table 10. As can be observed from the table, the effect of financial aid on extended enrollment was essentially the same for the entire sample and for aid recipients only. None of the amounts of the five aid types had a significant impact on the probability of extended enrollment. However, the effects of some independent variables other than financial aid were somewhat different for the entire sample and for aid recipients only. In particular, the effects of both gender and SAT Math score were significant at the 0.05 level for the entire sample, but non-significant for aid recipients only. In addition, four-year major field had different effects for the entire sample and for aid recipients only. The effects of art, arts, and business in comparison with science were significant for the entire sample, but not for aid recipients only. In contrast, the effect of undecided major was significant for aid recipients only, but not for the entire sample. The odds of extended enrollment for undecided students were about 5.8 times the odds for science majors.

4.7 Comparison of Results from Cross-tabulations and Multinomial Logistic Regression

Results from cross-tabulations of the outcome variable and predicting variables for Research Question 2 (Table 4) showed that most predicting variables were significantly correlated with the outcome variable at the 0.05, 0.01 or 0.001 level. These significant variables included gender, ethnicity, high school GPA, SAT Verbal, housing status in the first year, terms enrolled over the first 3 years, attendance pattern over the first 3 years, fourth-year major field, fourth-year credit load, four-year cumulative GPA, and financial aid. The results from the test of the global unique effect of each predicting variable in the multinomial logistic regression modeling revealed that the effects of the following variables were significant: gender, SAT Math score, housing status in the first year, terms enrolled over the first 3 years, attendance pattern over the first 3 years, fourth-year major field, fourth-year credit load, four-year college GPA, and financial aid. In both methods, gender, housing status in the first year, fourth-year major field, fourth-year credit load, four-year cumulative GPA, and financial aid were significant variables. High school GPA and SAT Verbal score were significant variables in the cross-tabulation, but

not in the multinomial modeling. In contrast, SAT Math score was a significant variable in the multinomial modeling, but not in the cross-tabulation.

This comparison is useful, but it tells only part of the story. Recall the focus of interest for Research Question 2 is on two outcome contrasts in the multinomial model, namely, late dropout vs. graduation, and extended enrollment vs. graduation. A variable significant in the test of the global unique effect may not have significant effects on either contrast. On the other hand, the effect of a particular predicting variable can be significant on one contrast, but not on the other. In order to understand the effect of a predicting variable on the outcome variable and address Research Question 2, it may be necessary to comprehensively consider its bivariate correlation with the outcome variable, its global unique effect in the multinomial model, and its unique effect on a particular outcome contrast, and primary attention should be given to the last element.

Results on the two outcome contrasts from the multinomial logistic regression showed that SAT Math score, terms enrolled over the first 3 years, attendance pattern over the first 3 years, fourth-year major field, fourth-year credit load, and four-year college GPA were significant predictors of late dropout, and that gender, SAT Math score, terms enrolled over the first 3 years, attendance pattern over the first 3 years, four-year major field, four-year credit load, and four-year cumulative GPA were significant predictors of extended enrollment. The effects of these significant predicting variables are discussed in relevant subsections of Section 4.8.

4.8 Discussion

4.8.1. Student Characteristics Associated with Graduation or Non-graduation within Six Years

This subsection presents a discussion regarding student characteristics associated with graduation or non-graduation within six years in light of relevant theories and existing research on persistence and time-to-degree. This discussion, together with relevant empirical results in previous sections of this chapter, will provide an adequate answer to Research Question 1.

Since dropout (at all stages) is much more prevalent than extended enrollment, non-graduation within six years is primarily attributed to dropout and secondarily to extended enrollment. Previous studies on time-to-degree generally include dropouts in

their research samples. Since the sample in this study does not include students who drop out within four years in college, it can be presumed that factors predicting non-graduation within six years in this study may be somewhat different from factors that have been found to affect (timely) degree completion.

The cross-tabulations of six-year graduation and predicting variables for Research Question 1 show that, among student demographic variables, gender and ethnicity are correlated with the outcome variable, while entering age and residency status are not. This result is consistent with the finding of existing research on time-to-degree that gender and ethnicity tend to be significant predictors. However, gender and ethnicity no longer have any direct influence on graduation within six years when other variables in the categories of precollege academic preparation, college experience, and financial aid, are controlled for in the binary logistic regression model. In other words, the net effects of gender and ethnicity are not significant. Considering that the sample in this study is comprised of students who were still enrolled in the fourth year, the finding that none of the student demographic background variables (i.e., gender, ethnicity, age and residency status) are significant predictors appears to lend some support to the sociological claim that social background has dissipating effects within higher education (Davies & Guppy, 1997). This result also resonates with Adelman's (2006) finding that among student demographic characteristics, only socioeconomic status, is significantly, yet modestly, related to degree completion.

Although high school GPA and SAT Verbal score are correlated with the outcome variable in the bivariate analysis, their net effects are not significant in the logistic regression modeling. In contrast, SAT Math has a significant impact on graduation in the regression model, though it does not have any significant correlation with the latter in the bivariate analysis. Time-to-degree research tends to report a positive relation between precollege academic preparation variables and time-to-degree attainment. However, it is not unusual for a study (e.g., Knight, 2004) to find that the relationship is significant in bivariate analysis, but not in regression analysis. In addition, persistence researchers (St. John, Hu, Simmons, & Musoba, 2001) have reported that SAT score does not have any significant impact on persistence when college grades and other college experience variables are included in the same regression model. Therefore, the findings of this study

regarding the impact of precollege academic variables on graduation within six years do not appear to deviate much from previous research. Nevertheless, it is important to note that this study, unlike most previous time-to-degree studies, treats SAT Verbal score and SAT Math score as two separate variables instead of combining them into a single variable of SAT composite score. The findings suggest that SAT Verbal score and SAT Math score can have different impacts on graduation within six years. This observation needs to be confirmed by further research.

The category of college experience in this study includes three enrollment behavior variables: terms enrolled over the first 3 years, attendance pattern over the first 3 years, and fourth-year credit load. The first measures whether a student is continuously enrolled for the first 3 years; the second reflects whether a student tends to matriculate full time or part time; and the third gauges how many credits a student attempts in the fourth year, and consequently whether the student is enrolled full time or part time in the fourth year. All of the three indicators are shown to have significant impacts on graduation, a finding that converges with previous literature on time-to-degree. Still, the significance of these enrollment behavior indicators may prompt one to raise a series of questions about what lies behind students' exhibited enrollment behaviors. For example, why do some students tend to enroll on a part-time basis? Why are some other students not enrolled for a particular year? And how are these part-time enrollment and stop-out practices related to these students' academic and financial statuses and perceptions? Answers to these questions would enable one to better understand the significant connection between enrollment behavior variables and the outcome variable.

Enrollment behavior indicators can reflect economic stratification of participation in that students from low-income families are more likely to attend college part time and work full time while attending college (Tinto, 2006-07). Students from low-income families are disproportionately academically underprepared, which may further influence their enrollment behaviors. Furthermore, students' enrollment patterns at a particular institution may also be affected by whether they are engaged in multi-institutional attendance, including simultaneous enrollment and "swirling", and whether they are temporarily transferred to another institution (Adelman, 2006; Herzog, 2005). All these observations provide cues, but not answers, to the aforementioned questions. From a

practical point of view, enrollment behavior variables can be regarded as indicators of behavior intentions and risk factors for attrition and non-graduation (Stratton et al., 2007). Institutions can use these indicators, together with college GPA, to identify students at risk of non-graduation and focus advising and intervention endeavors.

Since literature on degree completion has revealed the important link between academic majors and graduation, it is not a surprise that the effect of fourth-year major field is found to be significant in this study. However, students majoring in a science field, which includes biology, chemistry, mathematics, computer, and physical sciences in this study, have a considerably lower probability of graduation than their counterparts in art, arts, business and education. To illustrate the idea in straightforward descriptive statistics, only 57.3% of the science students in the sample graduated within six years compared with 80.9%, 72.0%, 78.7%, and 82.9% of the students in the four abovementioned major fields, respectively. This result diverges from the much-agreed finding that students majoring in sciences, mathematics, and engineering are more likely to earn bachelor's degrees than their counterparts in the social sciences, humanities, or education (Pascarella & Terenzini, 2005). The data of this study suggest that the lower likelihood of graduation on the part of science majors could be attributed primarily to the fact that they are far more likely to drop out after year 4 than their peers in the other four major fields. The difference in the probability of late dropout between science and other majors will be discussed in a later subsection.

Consistent with previous literature, this study finds that college GPA is an important factor in predicting graduation within six years. It is apparent that students in a higher GPA category are more likely to graduate than their counterparts in a lower GPA category. Additionally, based on the very high odds ratios of the three college GPA contrasts (refer to Table 5), one has reason to believe that college GPA is a highly influential variable in this study and that it may confound the effects of other predicting variables in the study. One way to confirm this belief is to drop college GPA from the full binary logistic regression model with all predictors, rerun the regression, and observe the changes in the effects of other predictors between the full model and the model excluding college GPA. Table 11 presents the comparison of the effects of predicting variables

Table 11: A Comparison of the Effects of Predicting Variables between the Full Model and the Model Excluding 4-year Cumulative GPA in Binary Logistic Regression Model 1

VARIABLE	Full Model			Model with 4-year GPA Dropped		
	B	Sig.	Exp(B)	B	Sig.	Exp(B)
GENDER						
Male	-0.218	0.175	0.804	-0.258	0.094	0.772
ENTERING AGE						
Age (Years)	-0.034	0.758	0.967	0.022	0.844	1.023
ETHNICITY						
African American	-0.327	0.076	0.721	-0.575	0.001 ***	0.563
Other	0.455	0.229	1.576	0.347	0.322	1.415
RESIDENCY						
Out of state	0.155	0.713	1.168	0.316	0.415	1.372
HIGH SCHOOL GPA						
3.51-4.00	0.131	0.662	1.139	0.825	0.003 **	2.282
3.01-3.50	-0.009	0.969	0.991	0.404	0.070	1.498
2.51-3.00	-0.273	0.199	0.761	-0.050	0.808	0.952
SAT MATH						
SAT Math score (100 points)	-0.393	0.004 **	0.675	-0.307	0.019 *	0.736
SAT VERBAL						
SAT Verbal score (100 points)	-0.065	0.636	0.937	0.029	0.824	1.030
HOUSING STATUS (YEAR 1)						
On campus	-0.014	0.933	0.987	-0.179	0.239	0.836
TERMS ENROLLED FIRST 3 YEARS						
Terms enrolled first 3 years	0.559	0.000 ***	1.748	0.561	0.000 ***	1.753
ATTENDANCE PATTERN FIRST 3 YEARS						
Always full-time	0.730	0.000 ***	2.075	0.966	0.000 ***	2.627
MAJOR FIELD CHANGE						
Changed	-0.117	0.429	0.890	-0.131	0.354	0.877
4TH-YEAR MAJOR FIELD						
Art	1.059	0.000 ***	2.885	0.945	0.000 ***	2.572
Arts	0.933	0.000 ***	2.541	0.868	0.001 ***	2.382
Business	1.353	0.000 ***	3.869	1.214	0.000 ***	3.366
Education	0.828	0.001 ***	2.288	0.869	0.000 ***	2.385
Nursing	-0.160	0.651	0.852	-0.044	0.899	0.957
Undecided	-0.424	0.364	0.654	-0.786	0.082	0.456
4TH-YEAR CREDIT LOAD						
24 credits or more	2.164	0.000 ***	8.703	2.225	0.000 ***	9.256
4-YEAR CUMULATIVE GPA						
3.51-4.00	3.305	0.000 ***	27.240			
3.01-3.50	2.271	0.000 ***	9.686			
2.51-3.00	1.282	0.000 ***	3.604			
FINANCIAL AID (YEAR 4)						
Grant & loan	0.029	0.912	1.029	0.148	0.548	1.160
Loan only	0.149	0.465	1.160	0.198	0.306	1.219
Merit aid only	-0.262	0.384	0.770	1.111	0.000 ***	3.037
Merit aid & loan	-0.283	0.398	0.754	1.029	0.000 ***	2.798
Other aid packages	-0.008	0.976	0.992	0.795	0.000 ***	2.214

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

other than four-year GPA between the full model and the model excluding four-year GPA in the binary logistic regression Model 1. The table shows that the model excluding college GPA exhibits the following changes as compared with the full model: 1) The effect of the contrast of African American vs. White becomes significant; 2) The effect of the contrast of high school GPA category 3.51-4.00 vs. 0-2.50 becomes significant; and 3) The effects of three financial aid contrasts, namely, merit & loan vs. no aid, merit only vs. no aid, and other aid packages vs. no aid, become significant. These changes suggest that the effects of these contrasts on graduation are confounded by college GPA and that their impacts are indirect, mediated by the effect of college GPA.

The substantial importance of academic performance, together with the non-significance of demographic variables, is in line with the findings of the “Wisconsin Social Psychological Model of Status Attainment”(Sewell & Hauser, 1980) that most of the effects of the socioeconomic background variables on educational attainment (e.g., college graduation), are indirect, mediated through their influences on other predictors and that differences in educational attainment tend to reflect differences in individual intellectual abilities and academic performance rather than socioeconomic background per se. The congruence between the finding of this study and the Wisconsin model is much easier to interpret if one believes that social background has dissipating effects within higher education, and realizes that the sampled students in this study all survived the early stages of their college career.

Previous research findings regarding the impact of financial aid on degree completion are inconclusive. To make the issue more complicated, scholars differ in their views as to how the impact of financial aid on persistence changes across the student career in college (Hu, 2000; Hu & St. John, 2001; Leslie & Brinkman, 1988; Murdock, 1989; Murdock, Nix-Mayer & Tsui, 1995). This study does not find financial aid to be a significant predictor of six-year graduation. This finding, however, must be interpreted with caution. First, this study is unable to control for the effect of family income since adequate data for family income was not available. Family income is a regular variable in financial aid study, and control for family income enables the researcher to more accurately examine the direct effect of financial aid (St. John et al., 2000). Second, the non-significance of the effect of financial aid does not necessarily mean that financial aid

is not important for the students in this study. As is suggested by researchers on the effect of financial aid on persistence (e.g., St. John et al., 1994; St. John, Hu, & Weber, 2001), neutral coefficients of financial aid variables indicate that the amounts of financial aid are adequate for aid recipients to persist or graduate. The non-significance of the effect of financial aid in this study may indicate that students who receive aid are not disadvantaged by their financial need in terms of the probability of graduation within six years compared with their peers without aid.

The results from the aid amount model (Model 2) are worth mentioning. First, the general patterns of significance for predicting variables other than financial aid are essentially the same between the aid amount model and the aid package model. For instance, the effect of terms enrolled over the first 3 years is significant in both models. This indicates that alternative approaches to the specification of financial aid in the regression model do not considerably affect the model. However, it should be acknowledged that if family income had been included as a predictor in the model, its impact might have changed when financial aid was specified differently. Second, the impact of financial aid is not significant in both models. The statistical neutrality of the coefficients of all aid-amount variables can be interpreted as an indication of the adequacy of the amounts of different aid types for aid recipients. The two versions of the aid amount model, namely, the version for all students, and the version for aid recipients only, provides another lens to viewing the impact of financial aid amounts. The two versions do not differ in the significance of aid amounts. However, they differ in the significance of other variables when financial aid amounts are held constant. SAT Math score and the fourth-year major field contrasts of arts vs. science, and education vs. science exhibit lower significance levels for aid recipients only than for all students. This suggests that even if financial aid does not have any significant direct impact on graduation for the whole sample, it may have some special effect on the likelihood of graduation for aid recipients only.

Merit aid has not been included in many time-to-degree or degree completion studies. In DesJardins et al.'s (2002) study, the relationship between merit aid and graduation is not significant, though merit aid increases the probability of graduation indirectly by decreasing the chances that students would stop out. The effect of merit aid

in this current study is not significant. Statistical analysis indicates that merit aid and four-year college GPA is significantly correlated ($p=.001$). Nevertheless, this does not mean that if GPA is a significant predictor, the effect of merit aid will necessarily be significant. As is mentioned earlier, when the variable of college GPA is dropped from the full model, three contrasts within the financial aid variable, namely, merit aid only vs. no aid, merit aid and loan vs. no aid, and other aid packages vs. no aid, become significant. It should be added that other aid packages include, though not limited to, the various combinations of merit aid and other aid types. Similarly, when four-year college GPA is dropped from the full binary logistic regression model (Model 2), the effect of the total amount of merit aid becomes significant. These analyses reveal that the effect of merit aid on degree completion is indirect, mediated by the effect of college GPA.

Merit aid in this study is a large-scale state-funded scholarship in the state where the institution under study is located. Since this study does not include all variables considered important in examining the effect of financial aid, it is limited in its capacity to accurately demonstrate the effect of financial aid on graduation within six years and the presumably complex interaction between merit aid and other aid types. Because the effect of financial aid on graduation has important public policy implications, further study is warranted to examine the effect of financial aid, particularly merit aid, on six-year degree completion.

4.8.2. Student Characteristics Associated with Late Dropout and Extended Enrollment

This subsection discusses student characteristics associated with late dropout and extended enrollment in light of relevant theories and extant research on retention and time-to-degree. This discussion, together with relevant empirical results in previous sections of this chapter, will provide an appropriate answer to Research Question 2. The first part of the discussion is focused on student characteristics associated with late dropout, and the second part on student characteristics related to extended enrollment.

Tinto (1986, 1993) calls for adding a time-variable dimension to the interactional model of student departure. Based on Van Gennep's theory on the rites of passage to adulthood, Tinto envisions three stages of the college career: separation, transition to college, and incorporation into college. He suggests that students may face different

challenges at different stages, and argues for the necessity of studying departure at differing points in the student career. It seems to be logical to extend Tinto's suggestion by assuming that factors influencing late dropout may be different from factors that existing research has found to impact early dropout. Since little research has been conducted on late dropout (i.e., dropout after year 4), this subsection discusses the results primarily in light of previous literature on early dropout, with the acknowledgment that it may be awkward to compare late dropouts in this study with early dropouts examined in previous literature. Methodologically, it would be more appropriate to compare late dropouts with early dropouts from the same entering cohorts at the same institutions.

Researchers do not agree on the effect of SAT score on persistence. They generally report two findings: 1) Lower SAT score is correlated with higher probability of early dropout, and 2) SAT score has no effect on early dropout. This study reveals that higher SAT Math score is related to higher probability of late dropout. An ad hoc ANOVA analysis suggests that this can be attributed, at least in part, to the facts that students whose major fields were science or undecided in the fourth-year have higher than average SAT Math scores, and that they had significantly higher chances of dropping out late than their counterparts majoring in other fields.

It is evident from the results that the enrollment behavior of students who drop out late is quite different from those who graduate within six years. Late dropouts tend to matriculate for significantly fewer terms over the first 3 years. In addition, when they are enrolled, they are more likely than graduates to take fewer than 12 credits per term, no matter it is during the first 3 years or in the fourth year. These results are consistent with the finding of persistence research that part-time enrollment and fewer attempted semester credits are predictive of early dropout.

DesJardins and Pontiff's (1999) study suggests that late dropouts tend to have higher cumulative GPAs than early dropouts. While not being in a position to confirm or disapprove their finding, the current study does find that late dropouts have significant lower four-year college GPAs than students who graduate within six years. Given that college GPA and SAT Math score are two different variables, this result does not seem to be in conflict with the finding that higher SAT Math score contributes to late dropout.

The impact of college GPA on late dropout is substantial. On the one hand, college GPA has a highly significant direct impact on the likelihood of late dropout. On the other hand, when college GPA is dropped from the multinomial logistic regression model, the following changes occur as compared with the full model: 1) the ethnicity contrast of African American vs. White becomes significant ($p=.019$); 2) the impact of housing status becomes significant ($p=.017$); 3) the contrasts of high school GPA category 3.51-4.00 vs. 0-2.50, and 3.01-3.50 vs. 0-2.5 become significant ($p=.000$, and $.008$, respectively); and 3) three contrasts within the financial aid variable, namely., merit & loan vs. no aid, merit only vs. no aid, and other aid packages vs. no aid, become significant ($p=.000$, $.001$, and $.001$, respectively). These changes suggest that the impacts of several predicting variables or contrasts on graduation are indirect, mediated by the effect of college GPA.

According to relevant literature (e.g., Pascarella & Terenzini, 2005), students majoring in the sciences, mathematics, and engineering or business and health-related fields are generally found to have lower dropout rates. This study, in contrast, shows that science students have a higher likelihood of dropping out late than art, arts, business and education students. The results also suggest students majoring in nursing, which is a health-related field, have a similar or even higher likelihood of late dropout than science students. These deviations from prior research may reflect the distinct characteristics of the science or nursing students at the institution under study. It is also possible that these deviations are an artifact of the sample used in this study, which does not include students who drop out before the fourth year.

The aid amount model shows that the total amount of other aid has a significant and positive impact on late dropout. It is a surprise to see that other aid, including private scholarship and athletic scholarship, is related to late dropout in light of the finding from prior research that scholarships are positively related to degree completion in most single-institution studies (Pascarella & Terenzini, 2005). In the current study, no effort is made to differentiate between the effects of the two types of scholarships since the proportion of recipients of each scholarship to the entire sample is quite small.

Considering that these scholarships represent awards for year 4, one might ask whether they are still available after year 4, and whether unavailability of these

scholarships after year 4 contributes to scholarship recipients' decisions to drop out. It has been reported that traditional labor market opportunities unrelated to sports are significant predictors of the persistence of athletes and that professional opportunities influence the graduation rates of athletes (Debrock, Hendricks, & Koenker, 1996). This may suggest that recipients of athletic scholarships in this study might drop out late to take advantage of labor market opportunities.

The remaining part of this subsection provides a discussion of student characteristics associated with extended enrollment. The result that males are more likely than females to extend enrollment beyond year 6 is consistent with the literature that males are less likely to complete their degree in four or six years. Some researchers (e.g., Wohlgenuth et al., 2006-07) hypothesize that males' tendency to stay longer is attributed to their higher probability of stop-out than females'. Although this study cannot lend support to this hypothesis, evidence from this study indicates that male's propensity to extend enrollment is not related to their academic performance in college.

Students with higher SAT Math scores are more likely to stay beyond year 6 than their counterparts with lower SAT Math scores. Part of the explanation may be that students whose major fields are science or undecided in the fourth year have higher than average SAT Math scores, and that they have significantly higher chances of extending enrollment than students in other fields.

It is evident from the results that the enrollment behavior of extenders is quite different from that of graduates. Students in the extended enrollment group tended to be enrolled for significantly fewer terms over the first 3 years. In the fourth year, they were more likely than the graduates to take fewer than 12 credits per term. These results parallel Volkwein and Lorang's (1996) finding that extenders (defined as those who did not graduate or did not intend to graduate in four years) tend to complete fewer than 15 credit hours for multiple semesters.

In this study, science majors are more likely than arts and business majors to extend enrollment beyond year 6. This result does not diverge from the research finding that science majors tend to take longer time to complete their degree than majors of social sciences and humanities. However, the difference in the likelihood of extended enrollment between science and education majors is not significant, a finding that does

not agree with relevant literature. The results also indicate that students who were undecided about their majors by the end of year 4 have an even higher likelihood of extended enrollment than science majors. There is little wonder that undecided students tend to stay longer than their peers with a declared major. Rather, one would wonder why these students are still undecided about their majors by the end of year 4.

This study shows that academic performance is a powerful variable in predicting extended enrollment. Four-year cumulative college GPA has a negative impact on extended enrollment. Put it another way, students in the bottom GPA category are more likely to extend enrollment beyond year 6 than students in the three higher GPA categories. The extenders in Volkwein and Lorang's (1996) study possess higher GPA than those who graduate in time. Their result is not matched by the current study. When the variable of college GPA is dropped from the multinomial logistic regression model, the following changes occur as compared with the full model: 1) The effect of the ethnicity contrast of African American vs. White becomes significant ($p=.002$); 2) The effect of the contrast of art vs. science is no longer significant, but the effect of the contrast of undecided vs. science become significant ($p=.011$); and 3) Three financial aid contrasts, namely, merit and loan vs. no aid, merit only vs. no aid, and other aid packages vs. no aid, become significant predictors ($p=.000$, $.014$, and $.013$, respectively). This suggests that the impact of these contrasts on graduation is indirect, mediated by the effect of college GPA.

4.9 Summary

To summarize the findings of this study, a more simplified yet straightforward answer to Research Questions 1 and 2 is now provided. First, SAT Math score, terms enrolled over the first 3 years, attendance pattern over the first 3 years, fourth-year major field, fourth-year credit load, and four-year college GPA are significant predictors of graduation or non-graduation within six years. The effect of financial aid, especially state merit aid, is indirect, mediated by the substantial impact of four-year college GPA.

Next, students with a higher SAT Math score are more likely their counterparts with a lower score to drop out late rather than graduate within six years, controlling for the effects of other variables. Students who are enrolled for fewer terms over the first 3 years, who do not always enroll full time over the first 3 years, or who take fewer than

12 hours per term in the fourth year are more likely to drop out late than their corresponding peers. Students who have a fourth-year major field of science are more likely to drop out late than those who major in art, arts, business, or education in the fourth year. Students whose four-year college GPA is in the lowest category are more likely to drop out than their counterparts in higher categories. Lastly, students who receive larger amount of private and athletic scholarships are more likely to drop out after four years.

Furthermore, male students are more likely than female students to extend enrollment beyond year 6 rather than graduate within six years. Students with a higher SAT Math score are more likely to continue enrolling after year 6 than their peers with a lower SAT Math score. Students who are enrolled for fewer terms over the first 3 years, who do not always register full time over the first 3 years, or who take fewer than 12 credits per term in the fourth year are more likely to stay longer than their corresponding counterparts. Students who major in a science field in the fourth year are more likely than their peers who major in arts and business to extend enrollment beyond year 6. Lastly, students whose four-year college GPA is in the lowest category are more likely than their counterparts in higher categories to continue enrolling beyond six years.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

In the final chapter of this study, several conclusions are drawn on the basis of the findings from the study. Implications for public and institutional policy and for relevant future research are discussed.

5.1 Conclusions

Five major conclusions can be drawn from this study with regard to the impacts of the predicting variables examined in the study on the three outcomes of six-year graduation, late dropout and extended enrollment. First, enrollment behavior variables, college major field, and college GPA have powerful impacts on graduation within six years, late dropout and extended enrollment for students who are enrolled at least for four years in college. These powerful variables demonstrate the importance of college experience factors in student retention and timely degree completion. Terms enrolled over the first 3 years, attendance pattern over the first 3 years, fourth-year major field, fourth-year credit load, and four-year cumulative GPA are all highly significant predictors of graduation within six years. In addition, almost all these variables exert strong impacts on the probabilities of late dropout and extended enrollment.

Second, student demographic characteristics and financial aid do not have significant direct impacts on graduation within six years. Student demographic characteristics in this study include gender, entering age, ethnicity, and residency status. Although the study shows that the effect of ethnicity on six-year graduation is indirect, mediated through the effect of four-year college GPA, demographic characteristics, in general, do not seem to affect the chance of graduating within six years for students who are enrolled for at least four years. The direct impact of financial aid remains non-significant in different models where it is specified in different approaches. The study also shows that the effects of some financial aid types on six-year degree completion are indirect, mediated through the effect of four-year college GPA. The non-significance of the impact of financial aid should be interpreted with caution, since family income, which is supposed to influence the significance of the effect of financial aid, is not included in the regression model.

Third, students with a higher SAT Math score are more likely to drop out late or extend enrollment than their peers with a lower SAT Math score. This pattern may be accounted for by the phenomena that students whose fourth-year major fields are science or undecided have higher than average SAT Math scores, and that they have significantly higher chances of dropping out late and extending enrollment than their counterparts majoring in other fields. The impact of SAT Verbal score is not significant.

Fourth, students who major in a science field in the fourth year are more likely than their peers who major in arts or business to drop out late and extend enrollment beyond year 6. This pattern, which deviates from previous research, may reflect the distinct characteristics of the science students in the institution under study. Alternatively, it may suggest that the pattern of retention for science students relative to students in arts or business differ across different stages of students' college career. A study of early dropouts for the same cohorts at the same institution would confirm or dismiss this assumption.

Lastly, receiving a higher amount of athletic and private scholarships in the fourth year is associated with a higher likelihood of dropping out late. Further conclusions regarding the impact of the scholarships cannot be drawn since this study does not deal with the two scholarships separately. A clear understanding of the interesting relationship between receiving a higher amount of athletic and private scholarship aid and late dropout would involve understanding the characteristics of two distinct groups: athletes on athletic scholarship, and recipients of private scholarship.

5.2 Implications for Public and Institutional Policy

5.2.1 Major Field and Retention/Graduation

This study finds that major field is a powerful predictor of graduation within six years, late dropout and extended enrollment. Students whose major field is science or undecided in the fourth-year are more liable to drop out late or to extend enrollment beyond year 6. These findings suggest that institutions, including the university under study and other colleges in a similar situation, can take focused measures to cope with the below-average retention and graduation rates in a couple of academic major fields. First, a specific research project should be conducted on science students to investigate factors that result in their below-average retention and graduation rates by analyzing why

students drop out late or extend enrollment beyond six years and what the differences lie between those who graduate within six years and those who do not. It would be most helpful to understand whether students drop out because of their taking advantage of changing labor market conditions, their dissatisfaction with their academic programs, or their poor academic performance.

Toward this end, it would be beneficial for institutions to conduct surveys or interviews of dropouts and extenders in the field of science. Students' accounts or perceptions offer an insider's view. This approach enables the researcher to examine dropout and extended stay from a "contextual perspective" (Hermanowicz, 2003). Put it another way, different from the typical quantitative retention study examining what personal factors affect non-graduation, this approach makes it possible to uncover what cultural and structural arrangements of institutions and academic departments inadvertently contribute to late dropout or extended enrollment. This approach also makes it possible for the researcher to tap the meanings that the students under study assign to their behavior, and reveals the process of their behavior. It goes without saying that students' accounts and perceptions will enable the institution to comprehensively understand the phenomenon of below-average retention and graduation rates of science students.

Relevant departments in the field of science can then take various measures based on the results of the project to enhance student retention and timely degree completion. Results from this study also indicate that institutional administrators may need to facilitate and strengthen communications and collaborations between enrollment managers and academic departments involved to identify, monitor and provide assistance to at-risk students.

Institutions may also need to reassess their current academic policy for undecided students. According to the 2000-01 and 2008-09 undergraduate catalogues of the university under study, all students with a declared major are advised by a faculty member from that major department, while undecided students, classified as Liberal Arts Students, are advised by an advising center serving such students. However, the university does not seem to have any regulation concerning the deadline for the

declaration of a major*. On the one hand, it is laudable to encourage students to explore their interests and switch their majors within the first 2 or 3 years in college. On the other hand, it may also be advisable, at least for the sake of promoting timely graduation, to require undecided students to declare a major before a deadline like the end of the third year. In any case, institutions and advisors of undecided students need to strike a balance between allowing undecided students adequate time to explore their interests and urging them to declare a major within a reasonable time frame. In reassessing a current policy or formulating a new policy targeted to undecided students, it is always judicious to first investigate and understand why some students fail to declare a major by the end of the third or even fourth year.

5.2.2 The Importance of Academic Integration and Faculty Involvement

Like most other studies on time-to-degree, this study confirms the substantial importance of adequate academic achievement in promoting graduation within six years and signifies the urgent need to improve student academic performance. Although this study does not include any academic integration variables, the essentiality of academic performance, together with the significance of enrollment behavior variables and major field, points to the importance of academic integration and classroom experience, and consequently faculty involvement in enhancing student retention and graduation.

First, academic performance results from student learning that maximally occurs through academic integration and classroom experience. As Bean (2005) puts it, “courses are the most important vector by which a faculty interacts with students to promote their education” (p. 225). Second, this study indicates that institutions need to carefully frame the role of their faculties and student and academic affairs professionals in enhancing student retention and graduation, especially when it is shown that academic performance is the most influential factor on retention and graduation and that students from some academic fields fare significantly poorer than their peers from other fields in terms of retention and graduation rates. Furthermore, the significant impacts of enrollment behavior variables may also suggest the importance of frequent and quality academic

*According to the director of institutional research at Southeast University, undecided students at this university approaching their junior year are advised to select a major.

integration and student-faculty interaction.

Enhancement of faculty involvement is embodied in more effective classroom practices, more frequent quality student-faculty interaction, and the creation of more opportunities for student academic integration. Effective classroom practices (like learning communities and active learning) and frequent and quality student-faculty interactions enhance student learning and retention (Braxton & McClendon, 2001; Pascarella & Terenzini, 2005; Tinto, 1997; Zhao & Kuh, 2004). What is equally important is good faculty teaching skills. In addition to their unequivocal impact on student academic achievement, good teaching skills can improve student retention through their positive effect on social integration, subsequent institutional commitment, and intent to reenroll (Braxton, Bray, & Berger, 2000). Enhancing faculty involvement in student learning and motivation in promoting student retention and degree completion may be the best approach to improving student academic performance and degree completion.

The study also suggests that significant gains in six-year graduation can be achieved by focusing on academic remediation, particularly for students from some minority ethnic or gender groups. In this study it is shown that the effect of the contrast of African American vs. White on graduation is mediated through four-year college GPA. This effect, together with the results of cross-tabulations of six-year graduation and predicting variables for Research Question 1, implies that African American students are less likely than White students to graduate within six years at the institution under study where students are predominately White and that this smaller likelihood can be largely attributed to their poorer academic performance. It might be that non-graduation is also related to the effect of the interaction between ethnicity and academic major field. For the purpose of effective and efficient academic remediation, it might be worthwhile to target minority students in a couple of specific major fields and focus on their common areas of academic weakness. Focused interventions may be warranted also because if a student has a below-average four-year cumulative GPA, he is more likely to be experiencing problems with major courses than general education courses. If this is indeed the case, faculty in the student's major field can be expected to play a crucial role in focused academic intervention.

5.3 Implications for Future Research

5.3.1 Late Dropout and Extended Enrollment

Late dropout has rarely been studied. Nevertheless, the phenomenon that late dropout is not as prevalent as early dropout does not justify the ignorance of late dropout in higher education research. Students may face different challenges at different stages, and factors that impact student departure may vary over differing points in the student career (Tinto, 1986, 1993). Tinto argues that as students progress over the course of their college career, their concerns tend to shift from the establishment of social connections toward greater and higher-quality academic involvement. Consequently, with time going on, their persistence increasingly depends on their educational concerns and academic experiences.

This study explores the characteristic of late dropouts as compared with students who graduate within six years, and interprets the results in light of previous literature on early dropout. It would be theoretically and methodologically sound to investigate the similarities and differences between early dropouts, late dropouts and graduates from the same cohorts at the same institutions in terms of demographic background, precollege academic preparation, college experience, and financial need and financial aid. Such an investigation would contribute to the theory and research on student departure since it takes into account the longitudinal nature of student withdrawal. The researcher can ask various theoretical and empirical questions: Are students at a later stage of their career necessarily incorporated into their college community? Are these students more likely than students early in their college career to drop out for reasons related to regular external forces like families and work settings, or contingent external events like changes in the labor market?

This study assumes that late dropouts and extenders are two different types of student groups with distinct characteristics. The comparison of the two groups is not the focus of this study, though results from this study indicate that the two groups are similar in some aspects yet different in other areas. Future research could systematically investigate the similarities and differences between the two groups. For instance, two meaningful and interesting questions to ask would be: 1) Are late dropouts more similar

to extenders, or more similar to early dropouts? 2) Do late dropouts and extenders have a stronger commitment toward the institution than early dropouts do?

5.3.2 The Interaction among Standardized Entrance Test Score, College Academic Performance in College, and Major Field

In this study, SAT Math score, four-year cumulative college GPA, and major field have powerful impacts on timely degree completion. Considering that these three variables represent student academic ability/preparation, academic performance, and academic interest, respectively, it is logical to hypothesize that they interact with each other, and that their interactions impact student persistence status. For instance, the impact of SAT score or four-year college GPA on graduation within six years may vary by major field. Such interactions are not systematically examined in this study.

Adding interaction terms into the binary and multinomial logistic regression models may provide the opportunity to gain a more profound insight into the relationship between these elements and graduation. Such an addition is consistent with the recommendation of Hosmer and Lemeshow (2000) that when the researcher believes that the model includes the essential variables, he should examine the variables in the model more closely and consider adding to the model interaction terms among the variables.

Additionally, it is advisable to implement hierarchical logistic regression to control for the effects of covariates or to test the effects of certain predictors independent of the influence of others. Such a modeling would enable the researcher to distinguish between the direct and indirect effects of particular predicting variables. Furthermore, it might be worthwhile to study the interaction of major field with demographic variables like ethnicity since persistence research has shown that the influence of college major field on persistence differs by ethnicity (St. John et al., 2004).

5.3.3 Inclusion of More Theoretically Important Variables

A major limitation of this study is the lack of some theoretically important variables such as social integration, degree and institutional commitment, environmental factors (employment), and family income. Adding one or more of these variables would lead to more reliable and convincing findings. For research using a national data base, it is normally easier to obtain a complete list of predicting variables. However, obtaining an adequate number of predicting variables can be a huge challenge for research based on

institution data files. Despite this challenge, at many institutions, it should be possible to collect and merge data files from several different sources like institutional research office, the registrar's office, financial aid office, and the division of student affairs. From the perspective of institutional research, a promising approach to investigating persistence and six-year graduation is to combine institutional student record data with National Survey of Student Engagement (NSSE) data. For instance, an institutional researcher can use students who participated in the NSSE senior survey as a research sample and merge the NSSE data with student record data for all students in this sample. This merged sample file would enable the researcher to include a rich variety of independent variables, examine and reveal what social, economic, psychological and cultural factors impact students' persistence status in the later years of their college career.

Although student retention is among the most extensively studied areas in higher education, as Tinto (2006-07) puts it, "there is still much we do not know and have yet to explore" (p. 2). Graduation within six years is one of the major practical concerns of higher education policy makers and administrators. This study is exploratory in nature in that it simultaneously addresses the issues of student retention and six-year graduation, and investigates the two lesser studied student groups of late dropouts and extenders. It is expected that this exploratory study will spur more insightful research and more informed public policies and institutional practices concerning student retention and graduation within six years in the near future.

APPENDIX A
SUPPLEMENTAL ANALYSIS OF THE DATA

Table 12: The Effects of Predicting Variables on 6-Year Graduation in Binary Logistic Regression Model 3

VARIABLE	B	Std. Error	Wald	Sig.	Exp(B)			
					Estimate	95% Confidence Interval		
GENDER								
Male	-0.202	0.160	1.594	0.207	0.817	0.598	1.118	
ENTERING AGE								
Age (Years)	-0.026	0.109	0.058	0.809	0.974	0.786	1.206	
ETHNICITY								
African American	-0.319	0.178	3.224	0.073	0.727	0.513	1.030	
Other	0.471	0.374	1.583	0.208	1.601	0.769	3.334	
RESIDENCY								
Out of state	0.209	0.416	0.253	0.615	1.232	0.546	2.783	
HIGH SCHOOL GPA								
3.51-4.00	0.137	0.298	0.210	0.646	1.146	0.639	2.055	
3.01-3.50	-0.010	0.237	0.002	0.966	0.990	0.622	1.577	
2.51-3.00	-0.263	0.212	1.534	0.215	0.769	0.508	1.165	
SAT MATH								
SAT Math score (100 points)	-0.400	0.137	8.574	0.003	**	0.670	0.513	0.876
SAT VERBAL								
SAT Verbal score (100 points)	-0.065	0.137	0.222	0.637		0.937	0.716	1.227
HOUSING STATUS (YEAR 1)								
On campus	-0.019	0.159	0.014	0.907		0.982	0.718	1.341
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	0.549	0.083	43.701	0.000	***	1.732	1.472	2.039
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	0.730	0.166	19.326	0.000	***	2.075	1.499	2.873
MAJOR FIELD CHANGE								
Changed	-0.118	0.147	0.640	0.424		0.889	0.666	1.186
4TH-YEAR MAJOR FIELD								
Art	1.064	0.278	14.654	0.000	***	2.899	1.681	4.999
Arts	0.939	0.263	12.776	0.000	***	2.556	1.528	4.277
Business	1.349	0.254	28.173	0.000	***	3.854	2.342	6.343
Education	0.839	0.249	11.386	0.001	***	2.314	1.421	3.767
Nursing	-0.180	0.355	0.256	0.613		0.836	0.416	1.676
Undecided	-0.442	0.467	0.898	0.343		0.643	0.258	1.604
4TH-YEAR CREDIT LOAD								
24 credits or more	2.169	0.150	210.484	0.000	***	8.753	6.529	11.734
4-YEAR CUMULATIVE GPA								
3.51-4.00	3.069	0.396	60.169	0.000	***	21.529	9.913	46.757
3.01-3.50	2.046	0.226	81.994	0.000	***	7.740	4.970	12.054
2.51-3.00	1.244	0.176	49.696	0.000	***	3.470	2.455	4.904
FINANCIAL AID (YEAR 4)								
Receiving Aid: Yes	0.037	0.174	0.044	0.833		1.037	0.738	1.458

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level.

Table 13: The Effects of Predicting Variables on 6-Year Graduation in Binary Logistic Regression Model 4

VARIABLE	Entire Sample (N=1,990)			Aid Recipients Only (N=1,550)				
	B	Sig.	Exp(B)	B	Sig.	Exp(B)		
GENDER								
Male	-0.193	0.228	0.824	-0.098	0.604	0.906		
ENTERING AGE								
Age (Years)	-0.032	0.769	0.968	-0.106	0.437	0.899		
ETHNICITY								
African American	-0.341	0.057	0.711	-0.341	0.093	0.711		
Other	0.468	0.211	1.597	0.187	0.653	1.206		
RESIDENCY								
Out of state	0.213	0.607	1.238	-0.282	0.567	0.754		
HIGH SCHOOL GPA								
3.51-4.00	0.124	0.679	1.131	0.166	0.643	1.181		
3.01-3.50	-0.020	0.933	0.980	-0.024	0.934	0.976		
2.51-3.00	-0.273	0.199	0.761	-0.344	0.198	0.709		
SAT MATH								
SAT Math score (100 points)	-0.397	0.004	**	0.672	-0.413	0.010	**	0.661
SAT VERBAL								
SAT Verbal score (100 points)	-0.061	0.657		0.941	-0.186	0.254		0.830
HOUSING STATUS (YEAR 1)								
On campus	-0.034	0.831		0.966	-0.010	0.960		0.990
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	0.549	0.000	***	1.731	0.507	0.000	***	1.660
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	0.727	0.000	***	2.070	0.820	0.000	***	2.270
MAJOR FIELD CHANGE								
Changed	-0.119	0.418		0.888	-0.160	0.346		0.852
4TH-YEAR MAJOR FIELD								
Art	1.061	0.000	***	2.890	1.121	0.001	***	3.068
Arts	0.928	0.000	***	2.529	0.640	0.031	*	1.896
Business	1.345	0.000	***	3.837	1.206	0.000	***	3.341
Education	0.831	0.001	***	2.295	0.688	0.016	*	1.991
Nursing	-0.176	0.620		0.839	-0.245	0.533		0.783
Undecided	-0.444	0.340		0.642	-1.028	0.136		0.358
4TH-YEAR CREDIT LOAD								
24 credits or more	2.149	0.000	***	8.576	1.981	0.000	***	7.249
4-YEAR CUMULATIVE GPA								
3.51-4.00	3.064	0.000	***	21.409	3.051	0.000	***	21.141
3.01-3.50	2.029	0.000	***	7.606	2.060	0.000	***	7.846
2.51-3.00	1.241	0.000	***	3.460	1.227	0.000	***	3.412
FINANCIAL AID (YEAR 4)								
Total aid amount (1,000\$)	0.014	0.410		1.014	0.026	0.258		1.026

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Table 14: The Effects of Predicting Variables on the Outcome Contrast of Late dropout versus Graduation in Multinomial Logistic Regression Model 3

VARIABLE	B	Std. Error	Wald	Sig.	Exp(B)			
					Estimate	95% Confidence Interval		
GENDER								
Male	-0.022	0.184	0.014	0.906	0.979	0.683	1.403	
ENTERING AGE								
Age (Years)	-0.036	0.125	0.084	0.772	0.964	0.755	1.232	
ETHNICITY								
African American	0.244	0.203	1.443	0.230	1.276	0.857	1.898	
Other	-0.470	0.419	1.259	0.262	0.625	0.275	1.420	
RESIDENCY								
Out of state	-0.458	0.513	0.797	0.372	0.633	0.231	1.729	
HIGH SCHOOL GPA								
3.51-4.00	-0.511	0.343	2.226	0.136	0.600	0.307	1.174	
3.01-3.50	-0.267	0.269	0.984	0.321	0.766	0.452	1.298	
2.51-3.00	0.093	0.236	0.155	0.694	1.097	0.691	1.743	
SAT MATH								
SAT Math score (100)	0.422	0.157	7.241	0.007	**	1.525	1.121	2.074
SAT VERBAL								
SAT Verbal score (100)	0.102	0.158	0.419	0.513		1.108	0.812	1.511
HOUSING STATUS (YEAR 1)								
On campus	0.263	0.183	2.065	0.151		1.300	0.909	1.861
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	-0.517	0.091	32.392	0.000	***	0.596	0.499	0.713
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	-0.566	0.193	8.608	0.003	**	0.568	0.389	0.829
MAJOR FIELD CHANGE								
Changed	0.134	0.168	0.633	0.426		1.143	0.822	1.591
4TH-YEAR MAJOR FIELD								
Art	-1.330	0.319	17.407	0.000	***	0.265	0.142	0.494
Arts	-1.056	0.294	12.907	0.000	***	0.348	0.195	0.619
Business	-1.372	0.285	23.159	0.000	***	0.254	0.145	0.444
Education	-1.146	0.285	16.150	0.000	***	0.318	0.182	0.556
Nursing	0.229	0.394	0.339	0.561		1.258	0.581	2.723
Undecided	0.056	0.504	0.012	0.912		1.057	0.394	2.838
4TH-YEAR CREDIT LOAD								
24 credits or more	-2.474	0.173	203.332	0.000	***	0.084	0.060	0.118
4-YEAR CUMULATIVE GPA								
3.51-4.00	-2.477	0.427	33.666	0.000	***	0.084	0.036	0.194
3.01-3.50	-2.003	0.270	55.176	0.000	***	0.135	0.080	0.229
2.51-3.00	-1.110	0.204	29.557	0.000	***	0.330	0.221	0.492
FINANCIAL AID (YEAR 4)								
Receiving aid: Yes	-0.111	0.195	0.322	0.571		0.895	0.611	1.312

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Table 15: The Effects of Predicting Variables on the Outcome Contrast of Extended Enrollment vs. Graduation in Multinomial Logistic Regression Model 3

VARIABLE	B	Std. Error	Wald	Sig.		Exp(B)		
						Estimate	95% Confidence Interval	
GENDER								
Male	0.480	0.200	5.741	0.017	*	1.616	1.091	2.392
ENTERING AGE								
Age (Years)	0.137	0.137	0.997	0.318		1.147	0.876	1.502
ETHNICITY								
African American	0.435	0.225	3.761	0.052		1.546	0.995	2.400
Other	-0.456	0.475	0.922	0.337		0.634	0.250	1.608
RESIDENCY								
Out of state	0.030	0.506	0.003	0.953		1.030	0.382	2.779
HIGH SCHOOL GPA								
3.51-4.00	0.327	0.374	0.764	0.382		1.387	0.666	2.890
3.01-3.50	0.360	0.301	1.438	0.231		1.434	0.795	2.585
2.51-3.00	0.482	0.266	3.283	0.070		1.620	0.961	2.728
SAT MATH								
SAT Math score (100)	0.379	0.174	4.777	0.029	*	1.461	1.040	2.053
SAT VERBAL								
SAT Verbal score (100)	0.011	0.175	0.004	0.952		1.011	0.718	1.423
HOUSING STATUS (YEAR 1)								
On campus	-0.320	0.200	2.545	0.111		0.726	0.490	1.076
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	-0.613	0.096	40.387	0.000	***	0.542	0.448	0.654
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	-1.009	0.232	18.862	0.000	***	0.365	0.231	0.575
MAJOR FIELD CHANGE								
Changed	0.099	0.187	0.280	0.597		1.104	0.765	1.593
4TH-YEAR MAJOR FIELD								
Art	-0.690	0.350	3.888	0.049	*	0.502	0.253	0.996
Arts	-0.782	0.335	5.455	0.020	*	0.458	0.238	0.882
Business	-1.295	0.329	15.485	0.000	***	0.274	0.144	0.522
Education	-0.413	0.312	1.761	0.185		0.661	0.359	1.218
Nursing	0.042	0.472	0.008	0.930		1.043	0.414	2.628
Undecided	0.870	0.510	2.912	0.088		2.386	0.879	6.477
4TH-YEAR CREDIT LOAD								
24 credits or more	-1.698	0.195	75.968	0.000	***	0.183	0.125	0.268
4-YEAR CUMULATIVE GPA								
3.51-4.00	-4.971	1.087	20.909	0.000	***	0.007	0.001	0.058
3.01-3.50	-2.073	0.290	50.970	0.000	***	0.126	0.071	0.222
2.51-3.00	-1.436	0.229	39.469	0.000	***	0.238	0.152	0.372
FINANCIAL AID (YEAR 4)								
Receiving aid: Yes	0.040	0.215	0.035	0.851		1.041	0.683	1.586

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Table 16: The Effects of Predicting Variables on the Outcome Contrast of Late Dropout versus. Graduation in Multinomial Logistic Regression Model 4

VARIABLE	Entire Sample (N=1,990)			Aid Recipients Only (N=1,550)				
	B	Sig.	Exp(B)	B	Sig.	Exp(B)		
GENDER								
Male	-0.039	0.833	0.962	0.040	0.859	1.041		
ENTERING AGE								
Age (Years)	-0.027	0.829	0.973	0.133	0.395	1.142		
ETHNICITY								
African American	0.273	0.181	1.314	0.357	0.138	1.429		
Other	-0.474	0.257	0.622	-0.266	0.584	0.767		
RESIDENCY								
Out of state	-0.467	0.362	0.627	0.220	0.713	1.246		
HIGH SCHOOL GPA								
3.51-4.00	-0.498	0.147	0.608	-0.355	0.407	0.701		
3.01-3.50	-0.254	0.346	0.776	-0.177	0.616	0.838		
2.51-3.00	0.109	0.646	1.115	0.357	0.254	1.429		
SAT MATH								
SAT Math score (100 points)	0.422	0.007	**	1.525	0.421	0.025	*	1.523
SAT VERBAL								
SAT Verbal score (100 points)	0.098	0.534		1.103	0.303	0.117		1.353
HOUSING STATUS (YEAR 1)								
On campus	0.288	0.118		1.333	0.257	0.258		1.292
TERMS ENROLLED FIRST 3 YEARS								
Terms enrolled first 3 years	-0.517	0.000	***	0.596	-0.433	0.000	***	0.648
ATTENDANCE PATTERN FIRST 3 YEARS								
Always full-time	-0.562	0.004	**	0.570	-0.669	0.003	**	0.512
MAJOR FIELD CHANGE								
Changed	0.137	0.416		1.147	0.158	0.433		1.171
4TH-YEAR MAJOR FIELD								
Art	-1.327	0.000	***	0.265	-1.484	0.000	***	0.227
Arts	-1.044	0.000	***	0.352	-0.899	0.006	**	0.407
Business	-1.368	0.000	***	0.255	-1.478	0.000	***	0.228
Education	-1.136	0.000	***	0.321	-1.253	0.000	***	0.286
Nursing	0.223	0.571		1.250	0.187	0.671		1.206
Undecided	0.056	0.911		1.057	0.535	0.482		1.708
4TH-YEAR CREDIT LOAD								
24 credits or more	-2.445	0.000	***	0.087	-2.247	0.000	***	0.106
4-YEAR CUMULATIVE GPA								
3.51-4.00	-2.488	0.000	***	0.083	-2.461	0.000	***	0.085
3.01-3.50	-1.993	0.000	***	0.136	-1.949	0.000	***	0.142
2.51-3.00	-1.110	0.000	***	0.329	-1.120	0.000		0.326
FINANCIAL AID (YEAR 4)								
Total aid amount (1,000\$)	-0.025	0.208		0.976	-0.034	0.225		0.967

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

Table 17: The Effects of Predicting Variables on the Outcome Contrast of Extended Enrollment versus Graduation in Multinomial Logistic Regression Model 4

VARIABLE	Entire Sample (N=1,990)			Aid Recipients Only (N=1,550)		
	B	Sig.	Exp(B)	B	Sig.	Exp(B)
GENDER						
Male	0.480	0.017 *	1.616	0.158	0.533	1.171
ENTERING AGE						
Age (Years)	0.140	0.309	1.150	0.045	0.816	1.046
ETHNICITY						
African American	0.449	0.047 *	1.566	0.312	0.242	1.367
Other	-0.447	0.346	0.640	-0.065	0.903	0.937
RESIDENCY						
Out of state	0.026	0.959	1.026	0.301	0.650	1.351
HIGH SCHOOL GPA						
3.51-4.00	0.337	0.368	1.401	0.050	0.917	1.052
3.01-3.50	0.366	0.224	1.442	0.271	0.475	1.311
2.51-3.00	0.489	0.066	1.630	0.313	0.363	1.368
SAT MATH						
SAT Math score (100 points)	0.376	0.030 *	1.456	0.383	0.072	1.467
SAT VERBAL						
SAT Verbal score (100 points)	0.010	0.956	1.010	0.011	0.960	1.011
HOUSING STATUS (YEAR 1)						
On campus	-0.315	0.118	0.730	-0.321	0.200	0.726
TERMS ENROLLED FIRST 3 YEARS						
Terms enrolled first 3 years	-0.613	0.000 ***	0.542	-0.634	0.000 ***	0.530
ATTENDANCE PATTERN FIRST 3 YEARS						
Always full-time	-1.008	0.000 ***	0.365	-1.089	0.000 ***	0.337
MAJOR FIELD CHANGE						
Changed	0.100	0.594	1.105	0.160	0.479	1.173
4TH-YEAR MAJOR FIELD						
Art	-0.688	0.049 *	0.503	-0.409	0.389	0.664
Arts	-0.776	0.021 *	0.460	-0.081	0.850	0.922
Business	-1.293	0.000 ***	0.275	-0.590	0.172	0.554
Education	-0.411	0.188	0.663	0.236	0.566	1.266
Nursing	0.033	0.945	1.033	0.451	0.437	1.570
Undecided	0.863	0.089	2.370	1.770	0.024 *	5.870
4TH-YEAR CREDIT LOAD						
24 credits or more	-1.689	0.000 ***	0.185	-1.518	0.000 ***	0.219
4-YEAR CUMULATIVE GPA						
3.51-4.00	-4.958	0.000 ***	0.007	-23.364	NA	NA
3.01-3.50	-2.050	0.000 ***	0.129	-2.169	0.000 ***	0.114
2.51-3.00	-1.429	0.000 ***	0.239	-1.365	0.000 ***	0.255
FINANCIAL AID (YEAR 4)						
Total aid amount (1,000\$)	-0.002	0.933	0.998	-0.019	0.518	0.981

Note: *Significant at the .05 level; **Significant at the .01 level; ***Significant at the .001 level

APPENDIX B
HUMAN SUBJECTS COMMITTEE APPROVAL

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 4/30/2009

To: Yanli Ma

Address: 318 Pennell Circle Apt. 5 Tallahassee FL 32310
Dept.: EDUCATIONAL LEADERSHIP

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Not graduating in six years: Characteristics of first-time-in-college students who drop out late and who stay long

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on 04/08/2009. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 4/7/2010 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by

the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Shouping Hu, Advisor
HSC No. 2008.2047

APPENDIX C

CATEGORIES OF MAJOR FIELDS AND ACADEMIC PROGRAMS WITHIN EACH CATEGORY

The categorization of major fields in this study was based on the academic majors available to the three undergraduate cohorts of Fall 1999, Fall 2000, and Fall 2001 at Southeast University. The following is a list of the categories of major fields and corresponding academic majors. The list of majors corresponding to each major field is not exhaustive.

Art (Art, Art Education, Speech Communication, Music, Music Performance, Music Education)

Arts (English, History, French, French Education, Spanish, Spanish Education, Philosophy, Political Science, Sociology & Anthropology, Criminal Justice)

Business (Accounting, Finance, Management, Economics)

Education (Early Childhood, Health & Physical Education, Middle Grades Education, Secondary Education, Psychology, Speech/Language Pathology, Business Education)

Nursing (Nursing)

Undecided

Science (Biology, Chemistry, Mathematics, Computer Science, Computer Information System, Physics, Astronomy)

APPENDIX D

RELEVANT ACADEMIC INFORMATION AT THE INSTITUTION UNDER STUDY

According to Southeast University's 2000-2001 Undergraduate Catalogue, degree candidates are required to complete at least 120 semester hours of academic work with a cumulative GPA of 2.00 or better from all work attempted at the university. Additionally, minimum cumulative GPA is required of a student's stage of progress, which is determined by the number of semester hours attempted, including those transferred from other institutions. For instance, a student attempting 60-89 semester hours is required to maintain a cumulative GPA of 1.90 while a student attempting 90 and more hours is required to maintain a GPA of 2.00. A student whose GPA falls below the specified minimum is subject to academic probation and even suspension.

This study did not attempt to examine how academic probation and suspension affect a student's chance of graduation. Although all students in the sample were enrolled in the fourth year, they were not at the same stage of academic progress. Presumably, in the fourth year, most of the students were attempting 90 or more hours, some 60-89 hours, and the remaining 59 hours or below. Thus, students with a cumulative GPA of below 2.00 by the end of the fourth year were not necessarily on or subject to academic suspension. This study shows that 42.6% of the students with a GPA of 0-2.50 by the end of the fourth year graduated, 33.5% dropped out and 23.9% were still enrolled after six years. An additional descriptive analysis conducted specifically on students with a cumulative GPA of below 2.00 by the end of the fourth year (N=140) in the sample of this study reveals that 8.3% of them graduated within six years, 59.0% dropped out, and 32.6% were still enrolled after six years. It is apparent that students with a cumulative GPA of below 2.00 by the end of the fourth year were considerably less likely to graduate within six years.

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BIOGRAPHICAL SKETCH

Yanli Ma grew up in a family which values honesty, kindness, diligence and optimism. He received his bachelor's degree in English Literature from Beijing Foreign Studies University, China. After college, he held full-time positions in international affairs, international business and college teaching. He came to Florida State University (FSU) for a Ph.D. in Higher Education after obtaining a Master's in Linguistics from the University of Georgia. While attending graduate school at FSU, Yanli has worked as research assistant and intern at Tallahassee Community College, Florida A&M University, and FSU. His work is focused on institutional research and assessment. His current academic research and interest relate to college student experience, persistence, and success.

Aspiring to a career in higher education, Yanli hopes to contribute his share to the advancement and globalization of higher education as well as the improvement and diversification of student college experiences. His dream pastime is represented by an old Chinese saying: *Read ten thousand volumes of books and walk ten thousand miles*. He enjoyed his travels to a number of places including Rome, Paris, Chicago, and Suzhou. For fun and for fitness, he participates in several sports like volleyball, tennis, badminton, and table tennis.