BEYOND IPEDS: A LONGITUDINAL STUDY OF COLLEGE COMPLETION AT GEORGIA SOUTHERN UNIVERSITY

by

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(Under the Direction of Robert Toutkoushian)

ABSTRACT

Persistence in higher education, particularly the college completion rates at colleges and universities, is the focus of a variety of national and state initiatives. Many states, soon to include Georgia, include performance in the form of credential completion in state funding formulas for higher education funding. The National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System, or IPEDS, is often used as a source for measuring completion rates. However, IPEDS does not include in their completion data the students who begin at one institution then complete at another. This study considers and applies existing literature on theoretical models, empirical studies and logistic regression models to create a quantitative model for analysis. Student-level data gathered by *The Office of Strategic Research and Analysis* at Georgia Southern University (GSU) from the *USG by the Numbers (USG123)* database and the *National Student Clearinghouse* is used to follow a cohort of students at GSU from their matriculation into higher education Fall Semester 2005 until Spring Semester 2014.

The purpose of the study is to track a cohort of students to (1) confirm that the actual rate of completion is higher than reported in IPEDS and (2) identify predictor variables regarding the likelihood of a student entering GSU as a first time, full time freshman to complete a degree in four, five or six years; to complete a higher education credential at a different institution within six years; or not to complete a higher education credential within six years. Binomial and multinomial logistic regression are used in analysis of data regarding a cohort of students (*N=3057*) and which demographic, prior achievement and residency and citizenship variables might predict student success. In identifying these predictors, conclusions may be drawn following analysis of the data that will inform decisions on which students are most at risk of attrition and the recommended focus and timing of intervention strategies.

INDEX WORDS: Georgia Southern University, college completion, persistence, IPEDS, student success, HOPE Scholarship

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DEDICATION

My dissertation is dedicated to all of the breast cancer survivors and their caregivers who manage to do something extraordinary despite their illness: Survive and Thrive. There is no limit to what we can achieve.

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CHAPTER 1

INTRODUCTION

In recent years many states in the United States have implemented performance-funding models in higher education. The funding model, in part, rewards institutions with a high level of persistence toward completion of a bachelor's degree. Research suggests that college completion has a positive influence on earnings and provides other personal and social benefits to completers, their spouses and children (Murphy & Welch, 1993). There are also costs to higher education institutions and society as a whole associated with students who fail to persist in college (DesJardins, Ahlburg & McCall, 1999; Pascarella and Terenzini, 1991).

While total enrollment in Georgia public colleges exceeded 375,000 students in 2011, only 24 percent of those Bachelor's degree-seeking students in 2010 graduated within four years, 100% of normal time to degree. Only 51.6% of Georgia's Bachelor's degree-seeking students at public institutions graduated within six years or 150% of normal time to degree (The Chronicle of Higher Education, 2014). Complete College America predicts that by 2020, 61% of jobs in Georgia will require a certificate, associates or bachelor's degree (CCA, 2011). As of 2012, only 37% of adults ages 25 to 64 in the state held an associate's degree or higher (NCHEMS, 2012).

The National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System, or IPEDS, is often used as a source for measuring completion rates. However, IPEDS does not include in their completion data the students who begin at one institution then complete at another. The IPEDS statistics on completion rates, and those used in performance-based funding models may be problematic. Students who begin as full-time

students at an institution and complete at the same institution are consistently measured as completers. However, students who attend part-time, students who transfer and graduate from a different institution than the one where they began their coursework and students who take more than six years to graduate are among those who are not counted in the completion rates in data from IPEDS . This method of measuring completion has the potential to financially punish colleges and universities that have a high transfer rate prior to graduation. For example, a less selective institution that attracts students who wish to complete their core curriculum then transfer to the state's flagship university will not receive credit if those students graduate after transfer. In fact, when looking at raw data, those students may be considered as dropouts or non-graduates. An institution that does not take transfer students into consideration may be less likely to implement effective retention programs (Hoyt & Winn, 2004). The addition of data from The National Student Clearinghouse (NSC) has the potential to improve the accuracy of completion rates because it is possible to find out where a student transferred and if they did or did not complete a credential somewhere other than their initial institution (Porter, 2000).

Another challenge to college completion initiatives beyond accurately measuring transfer student graduation is identifying commonalities among those who leave a particular institution. Are the factors that influence a student to transfer similar or different from the factors that influence a student to drop out of school completely? Are there institutional characteristics that affect a student's decision to remain enrolled until graduation versus transferring or dropping out of school? While attitudinal variables such as goodness of fit at an institution are likely to be factors in the decision-making process of a college student, are there measurable variables that can be used to identify students most at risk of transfer?

The institution chosen for this study is Georgia Southern University (GSU), a public four-year, non-research intensive institution of higher education in Georgia. One reason to study students at GSU is to identify variables likely to predict if the students will remain at the institution of matriculation and graduate in four years, remain and graduate in five years, remain and graduate in six years, transfer and complete a credential at a two-year institution, transfer and complete a bachelor's degree or higher at a four-year institution, or drop out of higher education without earning any level of credential. A credential is defined as a diploma, certificate, associate's degree or bachelor's degree. If strong predictors for any of these behaviors are evident, the institution has valuable information which they can use to focus their efforts to retain and graduate a higher percentage of students.

GSU, located in Statesboro, Georgia, was chosen as the study institution in part because, while it is not a research institution, the beginning cohort for 2005 was comprised of more students than two of the three research institutions in the state. The University of Georgia (UGA) was the only public institution in the state of Georgia whose beginning cohort was larger than that of GSU (Table 1). The four-year and five-year graduation rates at GSU were markedly lower than UGA and Georgia Institute of Technology (GT), but higher than Georgia State University (GaSt); and the six-year rate was only slightly lower than that of Georgia State, but still much lower than that of UGA and GT (Table 2). In 2005, two institutions were categorized as Regional Universities in the USG: GSU and Valdosta State University (VSU). The cohort chosen for this study had a slightly higher graduation rate at all three points of measure than that of VSU. The institutions categorized as State Universities and State Colleges tended to have graduation rates much lower than that of the Regional and Research sectors.

Table 3 illustrates the Selectivity and Admissions Yield trend across the three years following the matriculation of this cohort (2006-2009). Data for the 2005 cohort was unavailable. GT and UGA were the most selective out of the five research and regional institutions followed by VSU; and GSU was only slightly more selective than GaSt. These figures indicate that at GSU, 55% of those who applied to attend the university were accepted. The high Admissions Yield for GSU, ranging from 69% to 83% indicates a higher percentage of those who were accepted chose to enroll for fall semester at GSU than that of VSU, GT, UGA and GaSt students accepted to those institutions. It is not possible to determine given the data in this study, but the cause for the higher yield rates at GSU might be explained by students who applied to a more selective school but were not admitted, therefore using GSU as a "backup plan" or students who knew they were unlikely to be admitted to a more selective institution and chose GSU with the intention of transferring at a later date. The more selective institutions may have a lower yield because the students who apply are highly qualified and have also applied and been accepted to other colleges as their first choice. Whether the admitted students intend to finish a bachelor's degree at GSU or intend to complete core classes at GSU then transfer to another institution is not discernable based on the data. Further research on transfer students and transfer rates from more selective schools would increase the potential of identifying these predictors. GSU, then, is the focus of this study based on the similarities and differences to not only the other institutions in its sector, but to that of the universities in the research sector of the University System of Georgia.

The content of this study is divided into five chapters. The first chapter provides background on the personal and societal effects of a having an educated population, the structure of Georgia's higher education system and the GSU campus plan for college completion. Also

included in the first chapter are considerations relevant to the research topic and the study's research questions. The second discusses previous literature and research on the topic including theoretical models, regression models and a description of the dependent and independent variables of the research. The third chapter explains the methods used in the study. The fourth chapter outlines the findings and implications of the current data and research on the completion efforts at GSU. Finally, chapter five includes discussion of the results of the study, notes study limitations, and suggests possible retention strategies for GSU to implement based on the findings of the study.

Finally, the current literature on college persistence and completion focuses almost exclusively on the graduation rates of the first-time, full-time freshmen who enter an institution and complete a bachelor's degree *at that same institution*. This study extends the research, using the National Student Clearinghouse, to determine if students who begin at GSU and transfer to another institution are successful in earning a higher education credential. If, in fact, transfer students complete a degree at a different institution than the one where they entered, the graduation rates reported for performance funding and college completion initiatives reported data are understated and may serve to penalize GSU.

Background

Studies on college persistence and completion abound. The topic is one of the most studied in higher education. Regardless of whether a study focuses on attitudinal, demographic, or performance variables, some combination of the three, or takes a completely different angle, an assumption exists that persistence toward a higher education credential is important. Becker's work on human capital theory, first published in 1964 and now in its third edition, explains that a student's decision to pursue and persist in attaining a higher education credential is based

primarily on a cost/benefit analysis weighing the financial and opportunity costs of remaining enrolled versus leaving school (Becker, 2009; DesJardins, 2002a). The value to the individual of the education and accompanying credential must be such that the student is motivated to persist (Brock, et al; 1996). Without this motivation, all other variables become irrelevant. The variables of focus in this study as predictors of persistence build on the foundation that all influences, when summed, lead to a student believing in the *value* of completing a program in higher education.

An educated workforce is believed to be an advantage to the economic health of a state. State policy on higher education has the potential to enhance the availability of human capital (Titus, 2006). States with a more educated workforce have a higher median income and are more likely to attract high-paying employers. The benefit to the state economy in the long run comes in the form of more tax revenue from workers who earn a higher wage (Berger and Fisher, 2013). The U.S. Census Bureau's 2012 data exhibit the financial benefit over time of earning a higher education credential. Mean earnings data in 2009 for persons 18 and over is sorted by highest degree earned. Individuals with a high school diploma as highest degree earned had a median income of $30,627. Earning an associate's degree increased that mean to $39,771, an increase of approximately 30%. A bachelor's degree further increased earnings to $56,665, 85% higher than those with a high school diploma. It is interesting to note that even those with some college but no degree made a median income of a little over $1600 more than those high school graduates with no college (U.S. Census Bureau, 2012). The table includes data broken down by age group, gender, race and ethnicity. Males of all races earned more at every degree level than women. White males and females earned more than their black and Hispanic counterparts.

These last statistics provide a topic for a completely different study outside the scope of this study.

Complete College America (CCA) was established in 2009 to encourage states to set goals for increased college completion. CCA provides grants, policy reports, recommendations and state data on college completion with funding from the Lumina Foundation for Education, the Bill and Melinda Gates Foundation, the Ford Foundation, Carnegie Corporation of New York, the W.K. Kellogg Foundation, and USA Funds. CCA, these foundations, and other organizations have collected data and proposed recommendations on how to improve college degree attainment in the United States.

Thirty-four states in the United States, including Georgia, and the District of Columbia have joined the nonprofit CCA's *Alliance of States*. These states made a public commitment to implement policy with the goal of increasing college completion. The commitment includes setting state and campus-level goals toward increasing completion of higher education degrees and certificates, creating state and campus-level plans and establishing policy at the state level, and using data analytics to gather information and provide accountability regarding student progress toward increased college completion.

The University System of Georgia (USG) and the Technical College System of Georgia (TCSG) launched the *Complete College Georgia* initiative in the spring of 2012. GSU, along with all other USG institutions, was required to submit to the USG by September 2012 a campus plan with measurable goals aimed at increasing the rate of college completion at its institution. GSU identified four goals on which to focus for a period of five years, assessing progress on each goal annually. *The Georgia Southern University Complete College Georgia Plan 2012* lists the four goals as:

Goal 1:

Maintain the forward progress achieved with the institution's first-year students, ensuring that strategies in place continue to be effective in first-year student retention and progression.

Goal 2:

Continue to assess strategies to guide an increase of the overall sophomore retention rate from 64/66% to 69%.

Goal 3:

Shorten time to degree by addressing inhibiting factors, getting students to enroll for full semester loads, and continuing to promote summer enrollment.

Goal 4:

Evaluate programming to support student success, inventory all efforts, and build upon Georgia Southern's culture where students are engaged at multiple levels through intentional delivery of in and out-of-class opportunities.

The report also describes and analyzes data relevant to each goal, and provides anecdotal information regarding current and future efforts aimed at increasing retention and completion at GSU. In 2013 the 34-member Complete College Georgia team at GSU provided a status report on the campus completion efforts to the University System Office. The report stated that GSU did not alter the original goals, implemented new programs such as a pilot of the Noel Levitz College Student Inventory in two of its colleges, and continued efforts to evaluate programs that most influence student success. Copies of the GSU Complete College Georgia plans are available on the GSU website at http://academics.georgiasouthern.edu/ccg/.

GSU, as an institution in the University System of Georgia, will receive state funding based on student performance beginning in 2016. In March 2014 Vice Chancellor of Fiscal Affairs John Brown presented information on the proposed move to a performance-based funding model in Georgia (Board of Regents of the University System of Georgia, 2014a). Topics considered in changing the funding model, according to Brown, included *Complete College Georgia*, a focus on quality, the missions of individual institutions, alignment of degree production to workforce development and simplicity of the funding formula. Brown included as advantages of the new model the direct link to outcomes which align with the goals of *Complete College Georgia.* Other advantages predicted were the benefit of measuring all student success rather than merely measuring the success of a cohort of first-time, full-time freshmen; an institutionally individualized approach to funding; and more opportunity for increased success thereby increased funding (Board of Regents, University System of Georgia, 2014b). The model is similar to that used in the state of Tennessee, one of many states in the United States currently using performance as a basis for funding in higher education (Appendix A). The move to performance-based funding creates an obvious need for accurate measures of completion at USG institutions including GSU.

Considerations

The first step in achieving the overarching goal of increased college completion and, more specifically, initiating change at the campus level is to analyze historical data. It is particularly valuable to identify at what point attrition is most likely to occur in a student's progress toward degree attainment and factors affecting the decision to remain enrolled or take a different path. Student-level data on a cohort who entered GSU in Fall Semester 2005 is used to identify college persistence patterns for the cohort. In particular, what variables may serve as

predictors of whether a student will remain at GSU until degree completion, will transfer and attain a certificate, associate's degree or bachelor's degree at a different institution, or fail to complete any of the aforementioned credentials by their sixth year? Are predictors consistent or do they differ over time? How can this information be used by GSU to appropriately direct its college completion efforts?

If completion rates are not accurately measured at higher institutions in Georgia, GSU could be penalized in the form of lower funding under a performance-based model, and lower perceived success in its CCG efforts. The results of this study may provide a starting point for further research on retention from year to year at the institution, the inclusion of consistencies or discrepancies regarding part-time and non-traditional students at GSU and the potential for a more accurate measure of completion.

This study combines the goals of previous studies on college persistence to provide a more extensive pool of statistics for use by those at GSU responsible for admissions, CCG efforts, student advisement, and other areas affecting, or affected by, student retention. Previous studies measure matriculation solely from the first to the second year of college (Herzog, 2005; Stratton, et al, 2008), some relating that data to eventual bachelor degree completion (Adelman, 1999). Data used in this study follows student behavior from the time that they enrolled at GSU Fall Semester, 2005 until Spring Semester 2014, regardless of outcome. Psychosocial and attitudinal characteristics have a valuable place in informing campuses regarding effective retention efforts (Bean, 1980; Terenzini and Pascarella, 1978; Tinto, 1975, 1993, 2012; Pascarella and Terenzini, 1991; Cabrera, et al, 1992; Robbins, et al, 2004), but may not be a realistic resource for all campuses. Qualitative data may be influenced by the questions or the survey itself and, when looking at behavior of individuals over a period of multiple semesters,

may be impossible to gather consistently. Progress was made in the quantitative analysis of factors affecting persistence of college students by researchers who added National Student Loan Clearinghouse data and the possibility of a student transferring out of the original institution of record as a dependent variable (Porter, 2000; Jones-White, et al, 2010). A series of articles by Allison and by DesJardins and various colleagues emphasized the value of time-varying regressors and longitudinal studies (Allison, 1984; DesJardins, et al, 1999; DesJardins, et al, 2002a; DesJardins, et al, 2002b). Finally, different methods of regression have been compared in recent years in an attempt to attain the most accurate predictors of student behavior (Peng, et al, 2002; Stratton, et al, 2008; Jones-White, et al, 2010).

It is helpful to recognize the variance in the timing of the cohort's students' decisions to remain enrolled at GSU until graduation versus an alternate decision. Students may have decided to "dropout," "stopout," transfer, or remain enrolled at GSU. In this study, a "credential" is a Diploma, Certificate or Associate's Degree or Bachelor's Degree and a "non-bachelor's credential" is defined as a Diploma, Certificate or Associate's degree. The term "dropout" is used to define the exit from any and all higher education institutions without a credential and failure to return during the observation period. "Stopout" is any period of non-continuous enrollment, excluding summer semesters, followed by a return to GSU or other post-secondary institution during the observation period. Periods of "stopout" were not a focus of the research in this study. Students in the cohort may or may not have graduated during the observation period. The study will track if students who graduated received a bachelor's degree from GSU, a bachelor's degree from an alternate institution, a non-bachelor's credential from an alternate institution or did not graduate prior to Spring 2014 semester. The study may also

reference “completers,” those who earn a Bachelor’s degree or a non-bachelor’s credential and “non-completers,” those who earned no credential by the end of the observation period.

Inaccurate or incomplete information regarding not just attrition, but the timing of student departure from an institution may lead a college or university to implement ineffectual or unnecessary policy. Identifying the independent variables that most accurately predict if a student will remain at GSU, transfer, or drop out can assist GSU in revising their campus plan and allocating their resources effectively. While it has been established that ignoring transfer students in retention data can result in inaccurate reporting of completion rates (Jones-White, et al, 2010; Porter, 2000), many studies have not considered predictors that may be identified in advance of the decision to transfer. Not only does the inclusion of these students potentially increase overall retention rates at an institution, but identifying students based on the predictors may assist the institution in retaining students who might have otherwise transferred to a different institution of higher education.

The independent variables used in the study include demographic variables, prior academic achievement, residency and citizenship status, and HOPE scholarship eligibility. The likelihood and timing of patterns of completer and non-completer behavior in the identified cohort as related to these variables will provide guidance on where GSU should focus its efforts regarding its campus completion plan and initiatives aimed at retaining and increasing baccalaureate degree completion of its students.

Research Questions

1. What variables are most likely to predict that a first-time full-time freshman student will continue at Georgia Southern University until completion of a bachelor's degree?
2. What variables are most likely to predict that a first-time full-time freshman student at Georgia Southern University will transfer to a different higher education institution prior to completion of a bachelor's degree?
3. What are the recommendations for areas of focus to increase the likelihood of success of Complete College Georgia and other initiatives directed at persistence at Georgia Southern University?

CHAPTER 2

LITERATURE REVIEW

Theoretical Models

Theoretical models such as Tinto's (1975, 1993) Student Integration Model and Bean's (1980) Student Attrition Model established the basis for identifying the factors contributing to student attrition in higher education. Empirical tests of these models (Cabrera, Castaneda, Nora, and Hengstler, 1992), and models applying psychological theory to the topic of persistence in higher education (Robbins, Lauver, Le, Langley, & Carlstrom, 2004) are only two of the many approaches researchers have undertaken to follow up the research of Tinto and Bean in the last four decades.

Tinto's Student Integration Model (1975, 1993) posits the characteristics students possess as they enter college. He also identifies factors regarding a student's level of commitment to the institution in particular, and to degree completion in general as the most influential factors affecting completion. Family background, individual attributes and pre-college schooling, combined with goal and institutional commitment are characteristics with which a student enters higher education. Performance and interaction in the academic and social systems of college then affect a student's integration into the system, as well as their continued commitment to degree attainment (Tinto, 1975). Subsequent empirical research notes perceived weaknesses in Tinto's model, especially the absence of mitigating external factors (Cabrera, Castaneda, Nora, & Hengstler, 1992; Braxton, J.M., Milem, J.F., & Sullivan, A.S., (2000); Stratton, O'Toole, &

Wetzel, 2008) and the lack of an appropriate longitudinal, multivariate statistical model (Terenzini, & Pascarella, 1978; DesJardins, Ahlburg, & McCall, 1999).

Bean's Student Attrition Model (1980) focuses on factors external to the institution and the behavioral and attitudinal characteristics of the students as motivators for persistence. Background variables Bean applies to the causal model are prior academic performance, socioeconomic status and residency. Numerous organizational determinants – institutional quality, integration, university GPA and staff/faculty relationship to name a few – are included along with the intervening variables of satisfaction and institutional commitment (Bean, 1980). Commonalities in the Student Integration Model and the Student Attrition Model are the emphasis on commitment, the impact of characteristics present prior to entering higher education, and the influence of integration into the college environment over time. Key differences include Tinto's focus on a student's perception of factors affecting their decision to persist versus behavioral characteristics defined by Bean, and the effect of external institutional factors as emphasized by Bean but not Tinto (Cabrera, Castaneda, Nora, & Hengstler, 1992; Stratton, O'Toole, & Wetzel, 2008).

Cabrera, Castaneda, Nora, & Hengstler (1992) examined the commonalities and differences between the Student Integration Model and the Student Attrition Model proposing a model based on the convergence of the two models. The authors conducted a longitudinal study featuring variables from both models. They found that the model that best predicted student persistence varied based on the emphasis of certain variables. Regarding convergence of the two models, rather than confirming the sole accuracy of one or the other, the study reveals that they complemented each other in terms of the relationship between a student, their commitment to

achievement and to the institution, and academic integration (Cabrera, Castaneda, Nora & Hengstler, 1992).

Robbins, Lauver, Le, Langley, & Carlstrom (2004) included the previously noted educational persistence models but added psychosocial elements of motivational theory in their model. Their goal was to evaluate the effects of psychosocial factors and study skills on whether a student persists to degree attainment. In addition to educational persistence models, the authors applied motivational theory models using the quantitative method of meta-analysis to identify variables that may predict college persistence. Their analysis pointed to a positive correlation between psychosocial and study skill factors and retention. They conclude that these factors should be included in any future research on persistence in higher education.

A limitation to the aforementioned research on college attrition is that the focus is solely on whether or not the student continues until completion rather than a focus on significant times of risk over the course of a student's program of study. Stratton, O'Toole, & Wetzel (2008) used a multinomial logistic model to study events of unenrollment or stopout – short and long term. Using data on a cohort from the Beginning Postsecondary Survey for a period of five years, they concluded that there were differences between the factors that affected stopout behavior and dropout behavior in a student's first year of college. The use of longitudinal data and the inclusion of stopout behavior is an improvement over earlier research. It moves a step closer to evaluating how characteristics influencing persistence may vary across a student's college career. One drawback to the study is the emphasis solely on the post-first year matriculation. The authors mention that a duration model would have been preferable if their goal were to establish the timing of the target behavior (stopout vs. dropout). This study evaluates persistence behavior at key times over a period of eight years.

A duration model has additional potential advantages. The factors that affect a student's success toward completion may have different emphases over time. DesJardins et al. (1999) posited that employing an event history analysis provides more detailed information about students' paths through college. They added time-varying regressors to common variables seen in previous research on persistence. The model gives the longitudinal research the added dimension of factors whose effects may change over time. The study applied two single-risk models as well as a competing risks model to evaluate the variables that affect a student's decision to stopout, dropout, or persist to attainment of a bachelor's degree. An event history analysis is not necessary, however, if the study includes data for a long enough time period. The need for censoring of students who may still be enrolled at the end of the study is less and less likely the more years encompassed in the data. Multinomial logistic and multimomial probit regression techniques are equally effective when analyzing longitudinal data and the effect of various independent variables on student persistence (Stratton, O'Toole, & Wetzel, 2008; Jones-White, Radcliffe, Huesman, Jr., & Kellogg, 2010).

Variables

Regardless of model, key demographic characteristics are often used as control variables or to predict the likelihood of completion of a higher education credential. Gender is used frequently as a control variable (Munro, 1981; Hoyt & Winn, 2004; Pascarella, et al, 2011), but when included as a predictor, female students are generally found to be more likely to persist to completion, whether associate's or bachelor's degree (Jones-White, et al, 2009; DesJardins, et al, 2002a, 2002b). These predictions have not, however, always proved to remain consistent over time. Early attitudinal studies on pre-college and institution-related factors which influenced persistence focused not so much on the number of completions for males and females, but how

factors such as level of academic commitment, end goals, social integration, and institutional commitment might influence a student differently based on the student's gender (Tinto, 1975; Bean, 1980). In a 1996 study by Nora et al, gender and race were the focus in terms of how they influenced the goodness of fit of the model. The researchers found that separating the students in the study by gender provided a way to more accurately predict the effects of certain variables on persistence (Nora, et al, 1996). DesJardins and colleagues extended the research and found that although males were less likely to complete a bachelor's degree when using time-constant coefficient event history models, the use of models that provided for time-varying coefficients indicated that, over time, completion rates for males were higher (2002a).

Race is also used as a control variable in some studies where the findings do not show a statistically significant relationship between race/ethnicity and persistence (Munro, 1981; Adelman, 1999; Braxton, et al, 2000; Herzog, 2005; Stratton, et al, 2008). Other studies show that students characterized as underrepresented minority students are less likely to complete a higher education credential when they are from a lower socio-economic background and have received a lower quality education through high school. However, race in itself does not appear to be a predictor of success in higher education when other factors such as financial need are controlled for, and factors such as performance are included in the analysis (Adelman, 1999; Desjardins et al, 2002a,b).

One might assume that students who have performed well in high school and on standardized tests are more likely to perform well in the higher education environment. However, the literature does not always bear out this assumption. Early attitudinal studies virtually ignore prior academic achievement in favor of commitment to goals, social integration and other qualitative variables (Bean, 1980; Tinto, 1975; Cabrera, et al, 1992; Robbins, et al,

2004). Later, the point was made that the rigor of one's high school curriculum potentially skews the predictive value of high school GPA. Without a consistent measure of achievement such as a standardized test, comparing success at one high school to another may be akin to comparing apples to oranges. A rigorous high school curriculum can serve to increase the odds of persistence in higher education (Adelman, 1999). The challenge when using a predictive model based on this variable is to identify the level of rigor of each student's high school experience.

Follow-up studies to Adelman's 1999 *Answers in the Toolbox* also reported a stronger correlation between high school curriculum and college completion than that between test scores or class rank (Herzog, 2005; Adelman, 2006). One study in particular found that students with a higher ACT/SAT score were *less* likely to graduate with an associate's degree or a bachelor's degree from an institution other than the home institution of study than they were to fail to graduate. There was no statistical significance in the ACT/SAT variable, controlling for other inputs, at the home institution of study where the student originally enrolled (Jones, et al, 2010).

Many studies on college persistence include variables related to affordability. Prior research establishes that unmet financial need has a negative effect on persistence (Titus, 2006). State and federal funding of higher education can be categorized as need-based or non-need-based (merit) financial aid. Prior to the past two decades, colleges and universities were able to keep tuition costs low because the state and federal governments provided funding for higher education. State funding directly to the student is most commonly provided as need-based aid, merit-based aid, and scholarships. Unfortunately, the increase in funding of this sort has not kept pace with the increasing cost of a college education, disproportionately affecting students from low-income families (Toutkoushian and Shafiq, 2010). In the past seven years, budget cuts and

a struggling economy have decreased state and federal funding of higher education. When policy decisions result in less funding for higher education, many institutions must increase tuition to make up the difference. `

Since 1980 funding has moved away from need-based federal and state financial aid and has put more of the onus of financing a college education on the family. This trend tends to affect access and affordability for some students more than others. Studies have found that there continues to be a persistence gap based on socio-economic status (SES). Students with a lower SES are less likely to persist in college. Those students who fall in the category of mid-level SES are 1.32 times more likely to persist than low SES students, and high-level SES students are 1.55 times more likely to persist than low SES students (Chen & St. John, 2011). A study by Titus (2009) used data from 49 states over a period of twelve years to investigate different sources of state funding for higher education and the impact on bachelor degree completion. He found a positive relationship between need-based aid funding and the number of bachelor's degrees awarded. Toutkoushian and Shafiq (2010) illustrated that need-based state financial aid is more likely to increase college enrollment than state appropriations awarded to public institutions. If less funding is now available, it stands to reason that the lower SES students will be most profoundly affected, and degree production will decrease overall.

Between 1985 and 2005, state aid for merit-based funding increased while need-based aid decreased. Research aimed at evaluating the effect of need-based and merit-based aid in specific states has been contradictory, but some national studies show that an increase in either type of financial aid increases persistence. One study showed that students in merit aid programs are more likely to persist. In particular, the data suggests that the HOPE scholarship program in Georgia has increased degree production by three to four percent since its inception (Hu,

Trengove & Zhang, 2012). One aim of this study is to investigate the impact on persistence of receiving, retaining, or losing The Helping Outstanding Pupils Educationally (HOPE) scholarship while attending one of Georgia's baccalaureate institutions.

Many students are unable to pay for college without some type of financial assistance. One option for many students at GSU is the HOPE scholarship program which began in Georgia in 1993. The scholarship program is a merit-based program funded by the Georgia Lottery. As of June 2014, over $7.3 billion dollars has been awarded to approximately 1.9 million students in Georgia. The HOPE scholarship program, as originally established, funded the first two years of tuition to a public college or university, or equivalent tuition to private institutions in Georgia, for students graduating from a Georgia high school with an average of 3.0 or higher. There was an income cap, first of $60,000 and later of $100,000, on family income to be eligible for the scholarship. In July 1994 the program was expanded to pay for four years of tuition, and the payment of mandatory fees and $100 for textbooks was added. In July 1995 the income cap was removed. Minor changes, such as allowing non-traditional students to qualify for the HOPE scholarship with a B average or higher their sophomore year and allowing students with twenty-four months residency in Georgia to qualify were implemented since the scholarship's inception (Georgia Student Finance Commission, 2012). In 2011 the qualifying grade point average for full tuition and fees, now designated the Zell Miller Scholarship was increased to 3.7 with a 1200 or higher on the SAT exam. A grade point average of 3.0 to 3.69 now qualifies for partial payment of tuition. Additional rigor requirements will be placed on students who graduate on or after May 1, 2015 (GACollege411, 2014).

The aim of the HOPE scholarship program is to encourage strong academic students to remain in Georgia rather than attend college in a different state. Another goal is to provide

financial assistance to students who perform well academically in high school but may not be able to afford to attend college without financial support (Turner, Jones & Hearn, 2004). The trend in state and federal aid over the past two decades, combined with a challenging economy, has led to less aid for higher education resulting in tuition increases. While some studies show increased persistence in Georgia for students receiving merit-based aid, other states have had different results (Chen & St. John, 2011). One aim of this study is to analyze the effect of retaining or losing HOPE scholarship eligibility on college persistence for the designated cohort of students at GSU.

The Pell Grant Program is a federal program that provides need-based funding for low-income students. Student eligibility is evaluated using the *Free Application for Federal Student Aid* (FAFSA). Determinants for eligibility include family income, whether the student is part-time or full-time, the cost of tuition at the student's institution of choice and the student's length of attendance at the institution (U.S. Department of Education, 2012). Data gathered for this study did not include Pell Grant eligibility. For the purposes of this study, only merit-based financial assistance will be evaluated as a potential predictor of persistence at GSU or a different higher education establishment. The addition of need-based aid as a predictor is recommended for further study.

CHAPTER 3

METHODS

Data

The Office of Strategic Research and Analysis at GSU accessed the USG by the Numbers data warehouse (USG123) and the National Student Clearinghouse (NSC) to provide data for this study. The data included in the study consists of information about a cohort of all first-time, full-time freshmen that matriculated to GSU in Fall Semester 2005 with students excluded for one or more instances of missing data (*n*=3057). Non-degree seeking students and part time students are excluded from the analysis. Sixty-eight students were excluded for one or more instances of missing data; 49 lacked a reported high school grade point average (hsgpa), 52 did not report SAT or ACT scores (testscore) and one person did not have an age at matriculation (matage1) noted. Thirty-four students were missing both test scores and high-school GPA resulting in the total of 68 dropped instances. The cohort started as bachelor's degree-seeking students at the same four-year public university. The study measures completion rates of these students at GSU as well as the completion of a credential at a non-GSU institution within six years following transfer.

Dependent Variables

The current measure of completion at GSU is consistent with how the National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System, or IPEDS, measures graduation rates at an institution. The completion rate is the percentage of first-time, full-time freshmen who entered GSU in the fall of 2005 and remained at GSU to complete a

bachelor's degree in 4, 5, or 6 years. The standard method for reporting graduation rates is to determine if a student who entered an institution, in this case GSU, earned a bachelor's degree at the same institution at 100% (four years) of the expected time to finish a degree program, 150% (five years) or 200% (six years). If a student left GSU and completed a degree, certificate or diploma of any kind at a different institution, that student is not counted as a GSU "completion." In fact, they are not counted as a completion at all in most cases. Falling through the cracks are students who transferred to a community or technical college and earned a certificate, diploma or associate's degree, students who transferred to a different baccalaureate institution and received a bachelor's degree and students who took longer than six years to complete a degree at GSU or any other institution. The current NCES measure of success and its failure to account for part-time students and transfer students can ultimately negatively affect funding for colleges and universities in states that have performance-based funding formulas (Spradlin, et al, 2010; Paterson and Gordon, 2010). The failure to include the success of students who began at GSU but completed at a different institution of higher education serves to understate the completion rates used to assess Complete College Georgia goal success.

A more accurate measure of the success of the Fall 2005 GSU cohort can be obtained through data from the National Student Clearinghouse (NSC). By searching the NSC database for information on students who began in the Fall 2005 cohort but did not graduate from GSU within six years, it is possible to track whether or not they completed at a different institution. The use of NSC data provides a more accurate evaluation of completion rates (Jones-White, et al, 2010), and assists in more clearly defining the inputs that may in fact predict student behavior. To achieve this more accurate assessment of persistence and completion this study evaluates the impact of specific independent variables on the dependent variables in Table 4.

Outcomes for the 2005 Cohort are illustrated in Table 5. Significant to the study is that 8.38% of the students who entered GSU Fall Semester 2005 earned a credential from a non-GSU school within six years of matriculation. These students are not counted as "completions" based on NCES standards. It is interesting to note that in the Spring 2014 semester, 114 of the original cohort (n=3057) were still enrolled at GSU. A closer look at the characteristics of these students regarding causes of stopout behavior is advised for future research.

Independent Variables

The possible number of independent variables is large when viewing previous research on attrition. Unlike theoretical models such as those by Tinto and Bean, attitudinal variables are not included in this study. In order for an institution to direct completion efforts toward predictors for success, ideally the predictors are those that are attainable as hard data without needing an attitudinal survey at matriculation. It is also important to note that the independent variables for this study were selected not based on what previous research has proved as consistent but what researchers have found to be *inconsistent* when factoring time (DesJardins, et al, 2002a; DesJardins, et al, 2002b), the definition of student success (Paterson and Gordon, 2010; Jones-White, et al, 2009; DesJardins, et al 2002b) and regression technique (Jones-White, et al 2009; Stratton, et al 2007) into the model.

The predictor variables included in the study are gender, race/ethnicity, SAT (composite) score or ACT score converted to SAT composite equivalency, age at matriculation, state residency status, transfer credit status, prior learning credit status, U.S. Citizenship, learning support status and HOPE Scholarship eligibility (Table 6).

Demographic Variables

Dummy variables for gender are assigned where male students were coded as 1, female as 0. All non-White students, or under-represented minorities, were combined for the variable "raceURM" where under-represented minorities = 1, White = 0. The age of students at matriculation "matage1" ranged from 15 years old to 48 years old.

Prior Achievement Variables

SAT scores and ACT scores converted to SAT equivalency, "testscore," ranged from a composite score of 690 to 1540. Students who transferred from a different institution upon matriculation, "tranadmit," to the Fall 2005 cohort were coded as transfer student = 1, non-transfer student = 0; the number of transfer credits for all students ranged from 0 – 69. Students who entered with Prior Learning Credit (PLC) such as Advanced Placement or CLEP credit, "PLCdum," were coded where those with PLC = 1, those with no PLC = 0; PLC totals ranged from 0 – 29 for the cohort.

Fifty-one students required learning support for either Math, Reading or Writing before they were permitted to enroll in freshman-level courses. Many of these students did not report a high-school GPA and/or a test score (SAT or ACT converted). Those with missing data were eliminated from the study resulting in a total of 19 learning support students. A dummy variable, "lsupdum," was created where students requiring learning support = 1, those not requiring learning support = 0. On the other hand, 2,568 students matriculated eligible for the HOPE Scholarship meaning they graduated from high school with a minimum GPA of 3.0. A dummy variable, "hopematdum," indicated HOPE Scholarship eligibility where students eligible at matriculation = 1, those ineligible = 0.

Residency and Citizenship Status Variables

Out-of-state students = 1 and in-state students = 0 in the dummy variable for residency status, “resdncydum1,” at matriculation. Students designated as alien or resident alien students were coded based on United States citizenship, “citzdum,” and were coded where alien and resident aliens students = 1, U.S. citizens = 0.

Behavioral patterns based on gender and race are tracked to assess whether male students and minority students have a higher likelihood of stopout and/or dropout behavior as has been evidenced in previous studies (DiPrete & Buchman, 2006; Kirst & Venezia, 2004; DesJardins, Ahlburg, McCall, 2002b). The study accounts for prior achievement using Scholastic Aptitude Test (SAT) composite score or ACT converted to SAT equivalent, and also accounts for prior learning credit. Successful prior achievement is expected to increase the likelihood that the student will persist in college. Joint enrollment and Advanced Placement are two of a variety of other opportunities in Georgia’s high schools that make it possible for a student to have prior college coursework transferred as a FTFTF. DesJardins et al (2002b) suggest that students with prior coursework are more likely to adapt to the college environment and are therefore more likely to persist.

GSU students are potentially eligible for the Helping Outstanding Pupils Educationally (HOPE) scholarship, a Georgia merit-based scholarship program. Based on findings by DesJardins et al (2002a, b), when analyzed temporally, the effects of aid on the likelihood of persistence varies dependent on the type of aid and when in a student’s program the aid is available. One element of this study will evaluate the likelihood of student persistence based on HOPE scholarship eligibility at matriculation. Students who graduated from a qualifying Georgia high school with a 3.0 or higher during the observation period were eligible to receive full, state-funded payment of tuition, mandatory fees, and textbooks for four years of post-

secondary education in Georgia. Students receiving the HOPE scholarship as FTFTF were required to maintain a B average or higher in college to retain the funding. If a student's grade point average dropped below a 3.0 at any time the first semester, they became ineligible for the scholarship. Students were able to regain eligibility when evaluated with a B average or higher at 30, 60, then 90 hours of credit completion.

Methodology

Stata Data Analysis and Statistical Software is used to apply the models to the data gathered for this study using binomial logistic regression (BLR) and multinomial logistic regression (MLR). Applying the models described below to the data gathered will allow for the analysis of the independent variables and their effect on persistence and transfer decisions for each year observed in the study. Analysis of the resulting output will allow for the prediction of student behavior as they enter their freshman year at GSU. Identifying predictors for continued enrollment, transfer and unenrollment will provide GSU with information that can be incorporated into its Complete College Georgia campus plan.

This study uses both BLR and MLR. BLR is applied in three models. Model 1 was run and analyzed where the two possible outcomes were a student either did (GradGSU=1) or did not (GradGSU=0) graduate within six years from GSU. Model 2 was run and analyzed where the two possible outcomes were a student either did (gradother2=1) or did not (gradother2=0) earn a credential from a 2-year, non-GSU college or university within six years. Model was run and analyzed where the two possible outcomes were a student either did (gradother4=1) or did not (gradother4=0) earn a credential from a 4-year, non-GSU college or university within six years.

MLR was used and resulting data was analyzed based on the dependent variable "Success" which is comprised of six possible outcomes: those who graduated with a bachelor's

degree from GSU within four years of matriculation to freshman year (Outcome 1) , those who graduated with a bachelor's degree within five years of matriculation to freshman year (Outcome 2), those who graduated within six years of matriculation to freshman year (Outcome 3), those who received a credential from a non-USG, 2-year institution within six years of matriculation to freshman year (Outcome 4), those who received a credential from a non-USG, 4-year institution within six years of matriculation to freshman year (Outcome 5), and those who did not receive a credential within 6 years or whose status is unknown (Outcome 0).

Time to degree is calculated using Fall Semester, 2005 as the start date for all students in the cohort. Those who graduated with a bachelor's degree by the end of Spring Semester, 2009 are considered to have graduated in four years or, excluding summer semesters, eight semesters or less after matriculation. Students who graduated between Fall Semester, 2009 and Spring Semester, 2010 are considered to have graduated in five years; between Fall Semester, 2010 and Spring Semester, 2011 within six years. Students who transferred to a different higher education institution and earned a credential by the end of Fall Semester, 2011 are counted as successful at a non-GSU institution. Anyone who did not graduate but remained enrolled at any institution of higher education or who were no longer enrolled, are considered to fall under the outcome "Did Not Graduate."

The degree to which each independent variable may affect the likelihood of event occurrence will also be evaluated. Each of the independent variables will be regressed collectively against each of the dependent variables in turn in Models 1, 2 and 3 to evaluate if there is a significant level of probable effect. The dependent variables in Models 1, 2 and 3 have only two possible outcomes. Model 4 evaluates the dependent variable "Success" which has six possible outcomes, thus the need for MLR versus BLR used with Models 1, 2 and 3. A

descriptive analysis of the data mined from USG123 and the NSC and results of the predictive models are provided in the study findings.

Correlations

The base case student in this study is a white male, approximately 18 years old at matriculation. He is a United States citizen and Georgia resident. He is eligible for the HOPE scholarship and does not require learning support prior to beginning his classes.

Gender, race and student age at matriculation are used as control variables. Females comprise approximately 47% of the beginning cohort of students. Almost 20 percent of the GSU students in this cohort are black, 2.1% Hispanic/Latino, 1.4% Asian and Pacific Islander, .16% Alaskan or American Indian and 2.6% self-identify as mixed-race. More than 89% of the cohort students are of traditional age (defined as 18 – 25 years old), 11% are under age 18 and less than 1% are over the age of 25.

The dummy variable for whether or not a student graduated from GSU (GSUgraddum), when analyzed for correlation with each independent variable in the study, indicate three variables of significance at the 1% level. There is a negative correlation (-0.1422) between gender (male=1) and completion at GSU. A negative correlation (-0.0504) also exists between age at matriculation and graduating from GSU. Eligibility for the HOPE scholarship at matriculation and completion at GSU are positively correlated (0.1394). No other independent variables showed a significant correlation to graduating or not graduating from GSU.

Models: Binomial and Multinomial Logistic Regression

The decision to use MLR in addition to BLR, and not to use multinomial probit regression (MPR) stems from previous findings regarding the use of regression in higher education (Jones-White, et al, 2009; Stratton, et al, 2008; Peng, et al, 2002; Porter, 2000).

Binomial logistic regression is not the appropriate model when using the dependent variable "Success" because the observed outcomes have more than two categories. The use of BLR in Models 1 and 2 does not provide for the larger number of variables included in Models 3 and 4, and would likely exclude results when factoring for multiple definitions of success. Results of both BLR and MLR models present the marginal effects of each of the predictor variables. The predictor, or outcome, variables in the study are categorical (Y = categorical). Therefore the use of MLR, which provides for categorical variables, is most appropriate.

Independent, or predictor, variables are divided into three categories: demographic variables (*D*) include gender, race, and age at matriculation; prior academic achievement variables (*P*) include SAT score, transfer credits, prior learning credits, need for learning support, and HOPE scholarship eligibility; and residency and citizenship status (*C*) identify out-of-state and international students. The variable (*S*) is one of six outcomes in Model 4. The main difference between and within models is the changes to the coefficient θ resulting in the various outcomes. The formula applied to the MLR analysis using these categories, is:

$$Y = \alpha + D\beta + P\gamma + C\delta + \theta S + \varepsilon$$

Y = Success (graduated GSU in 4 years, graduated GSU in 5 years, graduated GSU in 6 years, Did Not Graduate, graduated 2-year, non-GSU, graduated 4-year). .

CHAPTER 4

RESULTS

Descriptive Statistics: Dependent Variables

Table 5 provides descriptive statistics on completion broken down by the dependent variables in the study. Of the 43.1 percent of students in the study cohort who graduated by Fall 2011 from GSU, 559 (18.29%) graduated in four years, or 100% expected time to graduation; 570 (18.65%) graduated in five years, or 150% expected time to graduation; and 187 (6.12%) graduated in 6 years, or 200% expected time to graduation. The number of students who left GSU and earned a diploma, certificate, associate's degree or bachelor's degree from a non-GSU institution totaled 256 or 8.38% of the original cohort of students used in the study (n=3057). Of the 1485 students who did not earn a credential of any kind by the Fall Semester 2011, 114 (3.73%) from the original cohort were enrolled at GSU in Spring Semester 2014. The 1371 students who did not complete any credential at any institution by Fall Semester 2011 and were not enrolled in Spring Semester 2014 at GSU are considered non-completers. However, the data from the National Student Clearinghouse did not follow transfer student enrollment past March 2012 or graduation information past November 2011. For this reason, there is a chance that students included in the 1371 non-completers graduated from a different institution at some point after Fall Semester 2011. The focus of this study does not go beyond 200% expected time to graduation other than to note those that were enrolled at GSU for Spring Semester 2014. Further study might identify the non-completing students and, using NSC data, determine if any obtained a credential between November 2011 and the present.

Descriptive Statistics: Independent Variables

Descriptive statistics to include number of observations, mean, standard deviation and minimum and maximum values of the independent variables are provided in Table 7. The variables used in the study are demographic, prior achievement and citizenship or nationality variables. The sample means for the dummy variables "transfer student" and "prior learning credit" are included in Table 7 but were not used in the regression analysis because there were too few occurrences to prove relevant to the study.

Demographic variables indicate that GSU has a very small underrepresented minority population. The category "Underrepresented Minority" was chosen over individual race or ethnicity in the hope that the combined number would provide more statistically significant results. Ideally, the models could be applied in the future at institutions with a higher minority population for comparison of results. Male students are just over half of the beginning class and the mean age at matriculation is 18.4 years old.

Comprising the category of prior achievement variables are SAT/ACT score converted to SAT equivalency, high school grade point average (GPA), status as a transfer student or a student with transfer credit, prior learning credit earned, the need for learning support in Math, Reading or Writing, and HOPE Scholarship eligibility. Note that the SAT/ACT converted score and the high school GPA categories had missing data for some students. Students with a missing SAT/ACT converted score are not necessarily the same students as those with missing high school GPA. High school GPA was eliminated from the study due to multi-colinearity issues.

Of the cohort's 3057 students, just over 6% were out-of-state residents at matriculation. The largest numbers of out-of-state students were from Georgia border states Florida and South

Carolina. Less than 2% were categorized with alien or resident alien status. Out-of-state and international students are not eligible for the HOPE Scholarship and pay a higher tuition rate than Georgia residents.

Sample Means by Outcome

Sample means by outcome were determined with the comparison of independent variables to the GSU-specific outcomes (Table 8) and non-GSU outcomes (Table 9). Mean statistics for these outcomes include only students who graduated from GSU.

The tables show that male students are a higher percentage of those who graduate in five years, six years from GSU and within six years at a, 2-yearnon-GSU institution. However, because more female students graduate in four years than male students, they become a larger section of the remaining population. Underrepresented minority students comprised 25.7% of the beginning cohort and graduated as 22% to 38% of each completion outcome. Students who graduated in four years had higher SAT test scores than those who graduate in five or six years from GSU or at any time from a non-GSU institution. The study included so few students who entered GSU with transfer or prior learning credit, no significant conclusions can be drawn regarding the variables based on the data. More than 93% of students who graduated from GSU in four years were HOPE Scholarship eligible at matriculation. Percentage eligibility was consistent across all other outcomes. Out-of-state students in the cohort made up approximately 6 – 7 percent of those who finished in four or five years; less than 3% of those finishing in six.

Binomial Logistic Regression

Students who graduated from GSU at any time and students who graduated from a non-GSU, 2-year or 4-year higher education institution at any time were the outcome variables for

Models 1, 2 and 3 of this study. Binomial logistic regression was used to analyze the likelihood of each variable to occur when there were two possible outcomes. Table 10 shows the results of the three models.

Model 1

Model 1 uses binomial logistic regression. The results of the regression for this model are found in Table 10 and coefficients are listed as marginal effects. The outcome dummy variable "GSUgraddum" assigns a value of one to all students who graduated from GSU in four, five or six years from matriculation, zero to those who did not (*N*=1453). Each independent variable in this study was included in the BLR. Male students in the study were a statistically significant 12.5% less likely to graduate from GSU than female students. Students who were HOPE eligible at matriculation were 23% more likely to graduate from the university than those who were not eligible. Out-of-state students were 22.6% more likely to graduate from GSU than in-state students, but alien and resident alien students were 19.3% less likely to complete their degree. Implications and recommendations based on the data in all models are discussed in this study's next section.

Model 2

Model 2 uses binomial logistic regression. The results of the regression for this model are found in Table 10 and coefficients are listed as marginal effects. Model 2 regresses the independent variables against the "gradother2" outcome, or the students who began Fall Semester 2005 at GSU but earned a credential at a non-GSU, 2-year institution at some point by Fall Semester 2011. In this and other models in this research, the low number of students in the outcome (*N*=260) results in few statistically significant results. In Model 2, the only statistically

significant variable is “matage1” or age at matriculation. It is interesting to note that as age increases, the likelihood of a student in this cohort completing a credential at a 2-year institution decreases.

Model 3

Model 3 uses binomial logistic regression. The results of the regression for this model are found in Table 10 and coefficients are listed as marginal effects. Model 3 regresses the independent variables against the “gradother4” outcome, or the students who began Fall Semester 2005 at GSU but earned a credential at a non-GSU, 4-year institution at some point by Fall Semester 2011. Male students in this cohort were less likely to earn a credential at a non-GSU, 4-year institution than to do so within six years of matriculation to GSU. Gender was the only variable with a significant outcome in Model 3.

Multinomial Logistic Regression

Model 4

Model 4 uses multinomial logistic regression. The results of the regression for this model are found in Tables 11 and 12. The possible outcomes for the variable “Success” are “gradin4” or graduated in four years from GSU; “gradin5” or graduated in five years from GSU; “gradin6” or graduated in six years from GSU; “gradother2” or graduated from non-GSU, 2-year institution within six years of matriculation to GSU; “gradother4” or graduated from non-GSU, 4-year institution within six years of matriculation to GSU and “DNG” or did not graduate with any credential within six years of matriculation (base category). The use of MLR in this model as opposed to BLR allows for categorical outcomes versus the two outcomes in the first three

models. The chi-square likelihood ratio of 332.74 with a p-value of <.001 indicates goodness of fit of the model.

The ability to pinpoint graduation to four, five or six years at GSU, or at any time at non-GSU institutions, with the MLR model provides more accurate data regarding the success of students when categorized by the independent variables. The same independent variables as were used in Models 1, 2 and 3 are used in the MLR model.

Male students in the study were less likely than female students to graduate in four years from GSU and slightly less likely than females to graduate from a non-GSU 4-year institution. They were slightly more likely to graduate from GSU in six years, but also 12% more likely not to graduate at all than females. Underrepresented minority students were 2.9% more likely to graduate from GSU in six years than white students. Age at matriculation is significant regarding two outcomes. The older a student at matriculation, the more likely not to earn any credential regardless of institution and the less likely to earn a credential at a non-GSU institution in particular.

An increase in SAT/ACT converted scores have a minutely small positive effect on graduating in four years from GSU and a minutely negative effect on finishing in five years. Students who were eligible for the HOPE Scholarship at matriculation were 20% more likely than those who were ineligible to graduate in four years and 25% less likely not to graduate. However, HOPE eligibility was not statistically significant regarding graduating from GSU in five or six years or in earning a credential at a non-GSU college or university.

State residency was a statistically significant variable regarding all outcomes associated with GSU. Out-of-state students were 20.9% more likely than in-state students to finish at GSU in 4 years and 8.7% more likely that Georgia residents to finish in five years; they were less

likely than in-state students to finish in six years but also less likely not to graduate. On the other hand, alien and resident alien students were significantly less likely to graduate in five years than U.S. citizens and more likely than those students not to graduate.

CHAPTER 5

SUMMARY AND CONCLUSION

Discussion

College Completion is and has been one of the most researched topics in higher education. The establishment of Complete College America and the resulting efforts in the state of Georgia known as Complete College Georgia have turned a spotlight on completion and if there are predictors for whether a student will complete a higher education credential or not. Also of interest to individual institutions is whether there are predictors as to a student's likelihood to remain at that institution, transfer to another institution or drop out of school completely.

This study strives to build a model that can be applied to retention data at any institution for the purpose of evaluating retention and completion. One institution, GSU, is the focus of this study, but the regression models applied to the data from GSU can easily be applied to similar data at any higher education college or university. Ideally, all of the University System of Georgia's institutions would be evaluated to see if there are notable consistencies or inconsistences between institutions based on a number of characteristics that are unique to a college or university such as, but not limited to size, sector, and region of the state. This study merely provides a foundation from which to begin further research.

The results of the BLR on gender indicate that male students are less likely than female students to earn a credential both at GSU and at other four-year institutions. However, analysis using categorical variables indicates that while male students were less likely to graduate in four

years from GSU or from another 4-year institution than female students, they were *more* likely to graduate in six years than female students. Male students were also 12% more likely not to earn a credential anywhere at any time than females students. What characteristics of male college students in general, and those of the male student population at GSU in particular, correlate with these findings? Additional research on persistence from year to year in college may provide a valuable reference upon which to base retention efforts. In reference to GSU's CCG goals, it would be helpful to see how many male students dropout or stopout after the first year (Goal 1), after the second year (Goal 2); what factors may be affecting the time to degree that cause male students to take longer to finish than female students (Goal 3); and what attitudinal and cultural variables may influence male persistence from year to year (Goal 4). The gender variable is also one that lends itself to further research to include attitudinal and institutional variables. With more information, GSU can direct some retention efforts specifically to males during the time of highest risk of dropout.

Race and ethnicity were not of statistical significance to the outcomes in the BLR and MLR models of this study. The exceptionally low underrepresented minority population at GSU may be the reason for the lack of importance of this variable on the study outcomes.

Age at matriculation is very slightly significant in both the BLR and MLR models. According to the data in the BLR model, one year added to age at matriculation results in the student being almost 2% less likely to graduate from a different 2-year institution. The majority of students in the study were in the traditional age category of 18 – 25 so these results are of very little predictive value. Age at matriculation was slightly more influential when looking at the MLR model with data indicating a 5% greater chance for a student not to graduate for each additional year of age and slightly less likely to graduate from a different 2-year institution than

to be a part of the other five outcomes. As to addressing GSU's CCG goals, none of the goals specify age at matriculation as a focus of increased retention efforts. The USG as a system, however, is making a concerted effort to build pathways for adult learners to return to college. If GSU directs future recruiting efforts at the older, non-traditional students, it would be advisable to use further data and attitudinal survey information to determine how best to retain this population as they progress from first to second, then third year. Alternative pathways may make it possible to address Goal 3 by shortening time to degree or providing opportunities of competency-based and prior-learning credit.

Students who were eligible for the HOPE Scholarship at matriculation were more likely to complete college at GSU in the BLR model and, more likely to complete in 4 years specifically, in the MLR model. HOPE eligible students were also much *less likely* than those not eligible for the scholarship *not to finish* than to earn a credential at GSU or elsewhere. The transportability of the HOPE Scholarship to any accredited institution in Georgia may increase the likelihood that a student will transfer out of GSU before completing a bachelor's degree. Institution-specific scholarships may serve to discourage transfer. These considerations are beyond the scope of this research but open the possibility of more in-depth study of transfer students and HOPE eligibility.

GSU can apply this data to CCG Goal 1 of maintaining progress with first-year students by further research on the characteristics and attitudes of students who are HOPE eligible at matriculation versus those who are not. Identification of such characteristics would serve to inform decisions about first-year retention efforts. The same can be said for sophomore retention efforts aimed at achieving Goal 2. There are a limited number of semesters that a student may receive the HOPE scholarship. Developing programs that shorten time to degree and finding

ways to encourage students to enroll for a full schedule each semester (Goal 3) would make it more likely that a student will finish their degree before running out of funding. The students, however, must retain the scholarship from one semester to the next. Efforts focused on the fourth CCG goal might apply this data to evaluation of existing campus initiatives and their effect on student retention of the scholarship.

Test score (SAT/ACT converted) was of no statistical significance in the BLR model. Using the categorical data and MLR, each one-hundred point increase in test score resulted in little to no predictive value on the outcomes of this study. For this reason, standardized test scores do not appear to be relevant to promoting the four CCG goals or predictors for transfer behavior. Further study on academic performance after matriculation to GSU but prior to transfer has the potential to better guide retention programs. Further research is also advised to more closely analyze the consistency and potential predictive value of high school GPA and standardized test scores.

Finally, the success of out-of-state students in general, and particularly at four and five years bears further examination. Are there characteristics not present in this study that account for the data? For instance, since out-of-state tuition is higher than in-state tuition, and out-of-state students are not eligible for HOPE at matriculation, are there implications regarding family financial or socio-economic status? Are there characteristics inherent in students who leave their home states for higher education that make them more likely to be successful in college and to earn that success more quickly? Further research would potentially provide GSU with information on the value of more heavily recruiting out-of-state students.

Recommendations

The recommendations based on findings in this study are categorized below as they relate to the four goals of *The Georgia Southern University Complete College Georgia Plan 2012*.

Goal 1:

Maintain the forward progress achieved with the institution's first-year students, ensuring that strategies in place continue to be effective in first-year student retention and progression.

GSU has seen success in their programs aimed at first year students. The best way to continue and maximize that success is to identify the students who would most benefit from advisement and other intervention strategies immediately upon matriculation from high school. Students who are HOPE eligible at matriculation appear to have the greatest chance of success in general and within four years at GSU in particular. Students who met admission requirements but are HOPE scholarship ineligible are a group that could potentially benefit the most from early advisement and intervention. Identifying these students should be a priority. Once identified, attitudinal survey data may be useful in determining whether characteristics identified in Tinto's Student Integration Model and Bean's Student Attrition Model are influential regarding likelihood of "fit" at GSU. Programs for first year students may benefit equally from academic and non-academic foci.

Additional data should be gathered and analyzed regarding adult students, other non-traditional students and part-time students to see if it is consistent with data on FTFTF. The goal of Georgia's *Go Back, Move Ahead* initiative is to make it easier for non-traditional students who were non-completers in the past to return to higher education. With the potential increase in the number of these students, it would be advisable to determine if the predictors for traditional

students who are FTFTF are consistent with these students. If not, advisement and intervention efforts should be adapted for the growing non-traditional population.

Goal 2:

Continue to assess strategies to guide an increase of the overall sophomore retention rate from 64/66% to 69%.

One way to focus on sophomore retention rates is to look more closely at the students in this study who graduated in five or six years rather than in four years. What characteristics set them apart from students who graduate in four years? It stands to reason that the second year of matriculation is a key time to identify those students who are not on track to graduate in 100% time. Further research on persistence and year-to-year retention would add valuable data to this study. The next recommendation regarding this goal is to determine when transfer students are leaving GSU. Students in this study who transferred to a different USG institution most commonly transferred to GT, GaSt, Kennesaw State University (KSU) and Georgia Perimeter College (GPC). Transfers went to thirty different states and thirty different TCSG institutions. Specifically, 219 out of the 591 students who transferred to a TCSG institution transferred to Ogeechee Technical College with is also in Statesboro, Georgia. An exit survey should be implemented for students who withdraw from GSU with one question being whether the student is transferring to a different institution and, if so, Why? Such a survey also has the potential to identify attitudinal characteristics that may stand as roadblocks to a personal connection to GSU.

Goal 3:

Shorten time to degree by addressing inhibiting factors, getting students to enroll for full semester loads, and continuing to promote summer enrollment.

The data in this study provides a starting point for identifying those students who are least likely to complete a degree in four years. Male students are less likely to complete in four years than female students but more likely to complete in six years than female students. This points to a higher risk of dropout of male students from the very beginning of their freshman year. All students, but those at-risk students especially, should be provided a curriculum map that minimizes course options that are potentially more confusing than helpful. If a student has access to a pre-determined path to a degree, it makes it less likely that the student will take unnecessary courses. Early advisement of freshman students regarding full semester loads and summer enrollment should be followed up with consistent distribution of the information throughout a student's time at GSU. The emphasis on this during advisement should not be limited to the freshman year. For example, all registration materials should emphasize the benefit of taking a full load of coursework and staying to take courses during the Summer Semester.

Goal 4:

Evaluate programming to support student success, inventory all efforts, and build upon Georgia Southern's culture where students are engaged at multiple levels through intentional delivery of in and out-of-class opportunities.

In conjunction with evaluating the programming currently in place at GSU, it is recommended that data similar to that in this study be evaluated over a number of years to see if the findings herein are consistent over time. Changes such as the requirements for HOPE Scholarship eligibility may have significantly affected the outcomes of students entering GSU after this cohort in 2005. The hard data, combined with information gathered from attitudinal surveys have the potential to guide the evaluation of current efforts at increasing persistence and

college completion. It is also recommended that GSU evaluate the data based on a student's declared major. If certain programs of study are consistently successful at graduating students in four years, what are these programs doing that can be replicated? Are students who have not declared a major or are General Studies majors more or less likely to complete?

The goals of Complete College America and Complete College Georgia, and those at individual campuses such as GSU, are almost entirely tied to completion rates. If an accurate measure of college completion is to be attained for the purposes of evaluating the progress toward these goals, data beyond what is reported to IPEDS is essential. In the case of GSU, the six-year credential attainment rate of the 2005 cohort was 8.38% higher than what is reported in IPEDS. This is a significant discrepancy in the accuracy of GSU's perceived completion rate. The potential that GSU will receive performance funding based on the inaccurate numbers serves to increase the urgency of finding a way to better measure completion. Beyond the completion goals, GSU's CCG goals focus on retaining students and shortening the time for students to earn a degree. Further qualitative research based on the findings of this study would provide valuable insight into which students are most at-risk and therefore most likely to benefit from retention initiatives.

Limitations

This study is limited by the lack of data on need-based aid and other socio-economic indicators. Any future research should seek to identify variables regarding economic need and include that data in all of the regression models. One area of interest for future study in this category is whether students from low socio-economic backgrounds receive a lower quality K-12 education. If so, what are the implications regarding college readiness, college access and likelihood of college persistence and success?

Another limitation is the lack of information regarding the rigor of the high school curriculum of the students who apply to and attend GSU. How might this affect high school GPA and performance on standardized tests? Without this information, it is difficult to tell the entire story on the students as they matriculated to GSU.

While the data on where students transferred and non-GSU credentials earned were provided as part of the NSC search, the data was limited to six years after matriculation to GSU. Of the 1371 students who did not graduate within six years and were not enrolled at GSU during Spring Semester, 2014, some may have earned a credential in the interim.

Conclusion

To conclude, the most important goal to set for ourselves in terms of measuring college completion is to establish a more accurate measure than that currently used in IPEDS. There are currently efforts to change the reporting data in IPEDS to better reflect part-time student progress. However, the database does not yet provide detailed information about transfer students. Efforts such as the Statewide Longitudinal Data System in Georgia and the Student Achievement Measure supported by six higher education association are steps in the right direction.

Table 1: Enrollment for Research and Regional Sectors of the USG, 2005 Cohort

Institution Name	Full-time first-time degree-seeking undergraduate (freshman)
Georgia Institute of Technology-Main Campus	2419
Georgia Southern University	3125
Georgia State University	2325
University of Georgia	4656
Valdosta State University	1775

Source: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics.

Table 2: USG Graduation Report for Research and Regional Universities: Fall 2005 Cohort

Institution	Total Beginning Cohort	% Bachelor's in Four Years	% Bachelor's in Five Years	% Bachelor's in Six Years
Research Institutions				
Georgia Institute of Technology	2422	31.34	72.13	78.65
Georgia State University	2284	18.04	40.11	48.07
University of Georgia	4651	53.84	77.77	81.60
Regional Universities				
Georgia Southern University	3125	20.06	40.32	46.62
Valdosta State University	1763	17.19	36.25	42.99

Source: University System of Georgia, Academic Data Mart and/or Student Information Reporting System.

Table 3: Selectivity and Admissions Yield for Research and Regional Sectors of the USG						
Institution Name	2006-07		2007-08		2008-09	
	%Admit	Yield	%Admit	Yield	%Admit	Yield
Georgia Institute of Technology-Main Campus	67	46	63	45	63	43
Georgia Southern University	55	69	47	79	45	83
Georgia State University	52	50	52	52	53	50
University of Georgia	65	59	58	55	55	51
Valdosta State University	63	48	63	55	62	49

Source: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics.

Table 4: Dependent Variables	
	N
Bachelor's at GSU total (GSUgraddum)	1316
Graduated GSU in 4 years (gradin4)	559
Graduated GSU in 5 years (gradin5)	570
Graduated GSU in 6 years (gradin6)	187
Graduated from other institution, 2- or 4-year (gradother)	256
Graduated from other 2-year institution (grad2other)	88
Graduated from other 4-year institution (grad4other)	168
Did not graduate or unknown (DNG)	1485

Table 5: Completion Rate Outcomes			
OUTCOME	*N* [a]	% [b]	Cumulative
Earned Credential			
Bachelor's at GSU			
In 4 years	559	18.29	18.29
In 5 years	570	18.65	36.94
In 6 years	187	6.12	43.06
2-year, non-GSU credential*	88	2.88	45.94
4-year, non-GSU credential*	168	5.50	51.44
Total	1572	51.44	
No Credential			
Enrolled 2014 at GSU	114	3.73	55.17
Not enrolled 2014	1371	44.85	100

Notes: Sample size is n=3057. [a] *N* = number of students. [b] % = percentage of cohort.
*Credential is defined as bachelor's degree, associate's degree, certificate or diploma.

Table 6: Independent Variable Definitions	
Gender (genderdum1)	1 If male
Underrepresented minority (raceURM)	1 If Black, Hispanic, Asian, American Indian, Alaska Native, Multiracial
Age at matriculation (matage1)	15 – 48
SAT/ACT converted (testscore)	690-1540
Transfer Student (tranadmit)	1 If Yes
Prior Learning Credit (PLCdum)	1 If Yes
Learning Support (lsupdum)	1 If Yes
HOPE Eligible at matriculation (hopematdum)	1 If Yes
Residency (resdncydum1)	1 if Yes
Alien or Resident Alien (citzdum)	1 If Yes

Notes: Sample size is n=3057. Reference group for gender is "male." Reference group for race is "non-Hispanic white." The race/ethnicity categories of "black," "Asian/Pacific Islander," "Hispanic/Latino," "American Indian/Alaska native," and "multiracial" are collapsed into the variable "Underrepresented minority." ACT scores were converted to SAT composite equivalency. Reference group for residency is "Georgia resident." Reference group for citizenship is "U.S. Citizen."

Table 7: Descriptive statistics of analysis sample				
Variable	Mean	Std Dev	Minimum	Maximum
Male	.5293	0.4992	0	1
Underrepresented Minority	.2571	0.4371	0	1
Age at matriculation	18.44	.4072	15.78	22.56
SAT/ACT converted	1073.51	105.34	690	1540
Prior Learning Credit	.0147	.1205	0	1
Learning Support	.0062	.0786	0	1
HOPE Eligible at matriculation	.8314	.3745	0	1
Out-of-State Resident	.0588	.2354	0	1
Alien or Resident Alien	.0147	.1205	0	1

Notes: Sample size is n=3057. Reference group for gender is "male." Reference group for race is "non-Hispanic white." The race/ethnicity categories of "black," "Asian/Pacific Islander," "Hispanic/Latino," "American Indian/Alaska native," and "multiracial" are collapsed into the variable "Underrepresented minority." ACT scores were converted to SAT composite equivalency. Reference group for residency is "Georgia resident." Reference group for citizenship is "U.S. Citizen."

Table 8: Sample Means by Outcome; Bachelor's Degree at GSU				
Variable	Graduated GSU in 4 years N=607	Graduated GSU in 5 years N=622	Graduated GSU in 6 years N=196	Did Not Graduate[a] GSU N=1632
Male	0.310 (0.463)	0.540 (0.499)	0.622 (0.486)	0.596 (0.491)
Underrepresented Minority	0.224 (0.417)	0.265 (0.442)	0.378 (0.486)	0.252 (0.434)
Age at matriculation	18.42 (0.386)	18.42 (0.353)	18.39 (0.438)	18.45 (0.429)
SAT/ACT converted	1093 (112.3)	1067 (100.5)	1059 (99.24)	1070 (104.3)
Transfer Student	0.005 (0.071)	0.002 (0.040)	0.005 (0.071)	0 0
Prior Learning Credit	0.020 (0.139)	0.023 (0.148)	0.015 (0.123)	0.010 (0.099)
Learning Support	0 (0)	0.006 (0.080)	0 (0)	0.009 (0.095)
HOPE Eligible at matriculation	0.931 (0.254)	0.871 (0.335)	0.857 (0.351)	0.792 (0.406)
Out-of-State Resident	0.069 (0.254)	0.061 0.240	0.026 (0.158)	0.058 (0.234)
Alien or Resident Alien	0.016 (0.127)	0.010 (0.098)	0.015 (0.123)	0.016 (0.125)

Notes: Sample size is n=3057. Standard deviation in parentheses. [a] Did not graduate from GSU within 6 years but may have earned credential at other institution. Reference group for gender is "male." Reference group for race is "non-Hispanic white." The race/ethnicity categories of "black," "Asian/Pacific Islander," "Hispanic/Latino," "American Indian/Alaska native," and "multiracial" are collapsed into the variable "Underrepresented minority." ACT scores were converted to SAT composite equivalency. Reference group for residency is "Georgia resident." Reference group for citizenship is "U.S. Citizen."

Table 9: Sample Means by Outcome; Non-GSU credential			
Variable	Graduated Other 2-year	Graduated other 4-year	Graduated other total
Male	0.534 (0.502)	0.435 (0.497)	0.469 (0.5)
Underrepresented Minority	0.284 (0.454)	0.25 (0.434)	0.262 (0.440)
Age at matriculation	18.35 (0.350)	18.45 (0.347)	18.41 (0.351)
SAT/ACT converted	1067 (94.92)	1063 (101.6)	1064 (99.21)
Transfer Student	0.011 (0.107)	0 0	0.004 (0.063)
Prior Learning Credit	0.023 (0.213)	0.006 (0.771)	0.008 (0.088)
Learning Support	0.011 (0.107)	0.006 (0.077)	0.008 (0.088)
HOPE Eligible at matriculation	0.886 (0.319)	0.857 (0.351)	0.867 (0.340)
Out-of-State Resident	0.034 (0.183)	0.065 (0.248)	0.055 (0.228)
Alien or Resident Alien	0.011 (0.107)	0.006 (0.077)	0.008 (0.088)

Notes: Sample size is n=3057. Standard deviation in parentheses. Reference group for gender is "male." Reference group for race is "non-Hispanic white." The race/ethnicity categories of "black," "Asian/Pacific Islander," "Hispanic/Latino," "American Indian/Alaska native," and "multiracial" are collapsed into the variable "Underrepresented minority." ACT scores were converted to SAT composite equivalency. Reference group for residency is "Georgia resident." Reference group for citizenship is "U.S. Citizen."

Table 10: Logistic Regression of Independent Variables with Two Outcomes			
Model	**1**	**2**	**3**
Variable	Y=Graduated GSU N = 1453	Y=Graduated Other 2-yr Institution N = 88	Y=Graduated Other 4-yr Institution N = 168
Male	-0.125*** (-7.11)	0.00321 (0.51)	-0.0181* (-2.11)
Underrepresented Minority	0.0281 (1.34)	0.00173 (0.25)	-0.00284 (-0.29)
Age at matriculation	-0.0372 (-1.67)	-0.0179* (-2.15)	0.00446 (0.44)
SAT/ACT converted[a]	0.0169 (1.90)	-0.00227 (-0.72)	-0.00462 (-1.06)
Learning Support	-0.205 (-1.49)	0.0233 (0.78)	-0.0106 (-0.20)
HOPE Eligible at matriculation	0.230*** (7.71)	0.00995 (0.94)	0.0146 (1.01)
Out-of-State Resident	0.226*** (4.53)	-0.0129 (-0.59)	0.0290 (1.36)
Alien or Resident Alien	-0.193* (-2.20)	0.00663 (0.19)	-0.0704 (-1.25)

Notes: Sample size for each model is n=3057. [a] SAT/ACT converted presented in 100 unit increments. Logistic regression analysis was used for all Models; Model 1 (Y=Student graduated with a Bachelor's degree from GSU in 4, 5 or 6 years), Model 2 (Y=Student earned a diploma, certificate or associate's degree from a non-GSU institution within six years of matriculation to GSU as a freshman), Model 3 (Y= Student earned a Bachelor's degree from a non-GSU institution within six years of matriculation to GSU as a freshman). Coefficients for all variables are reported as average marginal effects. Reference group for gender is "male." Reference group for race is "non-Hispanic white." The race/ethnicity categories of "black," "Asian/Pacific Islander," "Hispanic/Latino," "American Indian/Alaska native," and "multiracial" are collapsed into the variable "Underrepresented minority." ACT scores were converted to SAT composite equivalency. Reference group for residency is "Georgia resident." Reference group for citizenship is "U.S. Citizen."

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t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 11: Multinomial Logistic Regression of Independent Variables with Multiple Outcomes

Model	4					
Variable	Y=Graduated GSU in 4 years *N*=559	Y=Graduated GSU in 5 years *N*=570	Y=Graduated GSU in 6 years *N*=187	Y= Did Not Graduate *N*=1485	Y=Graduated other in 2 years *N*=88	Y=Graduated other in 4 years *N*=168
Male	-0.160***	0.0252	0.0278**	0.121***	0.00324	-0.0171*
	(-11.50)	(1.80)	(3.12)	(6.86)	(0.54)	(-2.07)
Underrepresented Minority	-0.0143	0.0000678	0.0293**	-0.0147	0.00199	-0.00230
	(-0.87)	(0.00)	(3.10)	(-0.70)	(0.29)	(-0.24)
Age at matriculation	0.00789	-0.0277	-0.0202	0.0532*	-0.0180*	0.00483
	(0.46)	(-1.52)	(-1.77)	(2.38)	(-2.15)	(0.47)
SAT/ACT converted[a]	0.0418***	-0.0172*	-0.00902	-0.0153	-0.0000218	-0.0000443
	(6.24)	(-2.3)	(-1.96)	(-1.71)	(-0.70)	(-1.03)
Learning Support	-1.815	0.570	-0.710	1.652	0.120	0.183
	(-0.02)	(0.02)	(-0.01)	(0.02)	(0.02)	(0.02)
HOPE Eligible at matriculation	0.202***	0.0427	-0.00674	-0.248***	0.00484	0.00497
	(5.60)	(1.70)	(-0.53)	(-7.99)	(0.46)	(0.34)
Out-of-State Resident	0.209***	0.0873*	-0.0883*	-0.216***	-0.0153	0.0242
	(4.61)	(2.25)	(-2.08)	(-4.01)	(-0.69)	(1.12)
Alien or Resident Alien	-0.0805	-0.159*	0.0521	0.242**	0.00992	-0.0643
	(-1.18)	(-1.98)	(0.89)	(2.59)	(0.28)	(-1.14)

Notes: Sample size for each model is *n*=3057. [a] SAT/ACT converted presented in 100 unit increments (testscore1). Multinomial logistic regression was used for the Model 3 (graduated GSU in 4 years, graduated GSU in 5 years, graduated GSU in 6 years, Did Not Graduate, graduated 2-year, non-GSU, graduated 4-year). Coefficients for all variables are reported as average marginal effects. Reference group for gender is "male." Reference group for race is "non-Hispanic white." The race/ethnicity categories of "black," "Asian/Pacific Islander," "Hispanic/Latino," "American Indian/Alaska native," and "multiracial" are collapsed into the variable "Underrepresented minority." ACT scores were converted to SAT composite equivalency. Reference group for residency is "Georgia resident." Reference group for citizenship is "U.S. Citizen." Log likelihood = -4135.0451, Pseudo R2 = 0.0387, t statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001

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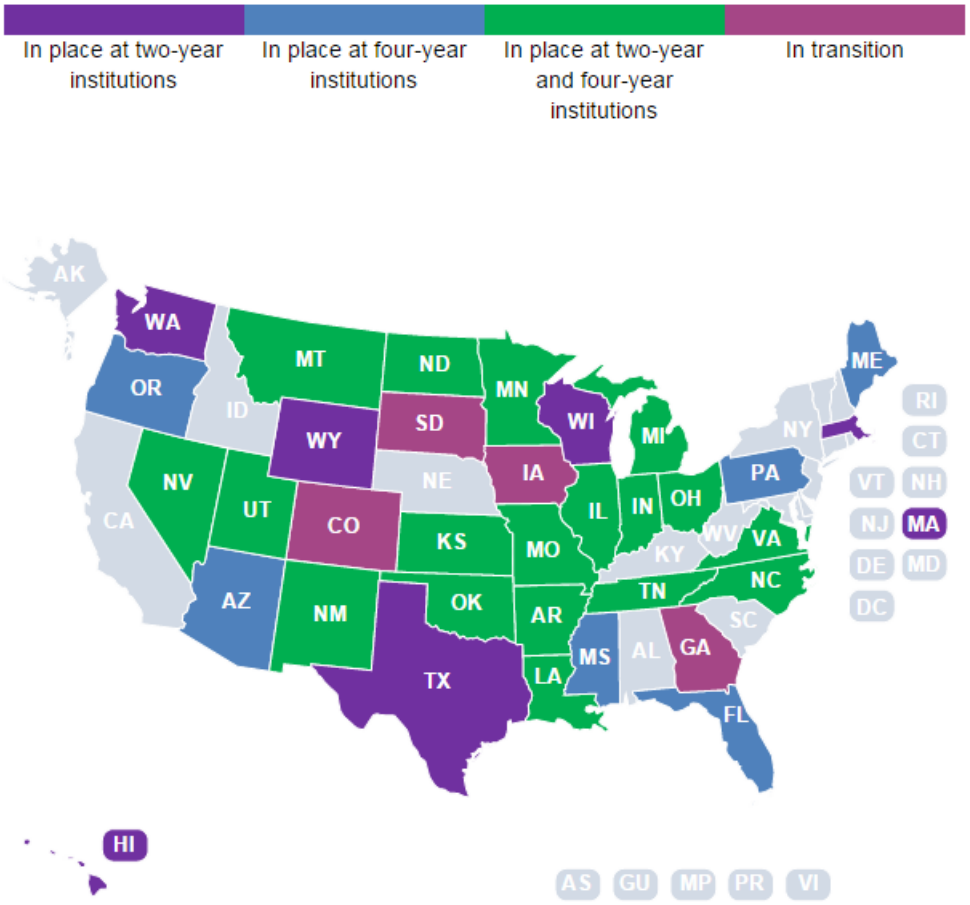
Appendix A: Performance-Based Funding for Higher Education, 2015



Source: National Conference of State Legislatures.
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