PREDICTORS OF RETENTION AND GRADUATION IN AN UNDERGRATUATE HEALTH SERVICES ADMINISTRATION PROGRAM

Salvatore A. Barbera

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ABSTRACT

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by Salvatore A. Barbera

A plethora of research spanning several decades has attempted to understand predictors of retention and graduation in undergraduate bachelor's degree programs. The topic is no less important today, as larger and larger swaths of the American population attend college each year. Studies have demonstrated that key demographic variables, such as gender and race, are often predictors of students' decisions to remain in a particular program and their ability to graduate in a timely manner from that program. Indicators of academic readiness, such as high school GPA and standardized test scores (e.g., the SAT) demonstrate similar predictive utility to those key demographic variables. Other variables, such as the financial ability to pay for college, also appear to be important. To date, the most useful theoretical model for synthesizing this broad array of findings is Tinto's (2012) model, which argued that student expectations, perceived support, involvement, and assessment and feedback, were critical for student persistence. However, many of the studies reviewed here have focused specifically on STEM (science, technology, engineering, and mathematics) programs or have not attended to academic discipline at all.

The goal of the current study was to identify demographic (i.e., gender, race, age), academic (e.g., high school GPA), and financial variables (i.e., recipient of a federal Pell grant) that contributed to retention and graduation rates undergraduate Health Services Administration (HSA) bachelor's degree programs. Data were drawn from a database of first-year students (N = 832) enrolled in the HSA program at a large, public university. An initial demographic comparison revealed that First Time in College (FTIC) students and transfer students differed

substantially in terms of their timely graduation rates and other key academic variables (e.g., proportion identified as full-time status). Thus, all analyses were conducted separately for FTIC and transfer students.

Results of binary logistic regression analyses revealed several interesting patterns. FTIC students who entered the program declared as HSA majors were less likely to be retained by the program after one year. Two additional models indicated that predictors of graduation were different for FTIC and transfer students. For FTIC students, declaring initially for the HSA program decreased the likelihood of graduation, while being older and the recipient of a federal Pell grant helped chances of graduation. For transfer students, having taken more required pre-requisite courses being full-time status both helped chances of graduation. Each of these significant predictors maps nicely onto one of Tinto's (2012) hypothesized dimensions, lending theoretical support to the findings reported here.

Importantly, traditional predictors of academic readiness (e.g., high school GPA, SAT scores) did not predict one-year retention or timely graduation in either FTIC or transfer students, and the implications of those null findings are discussed at length. All results are discussed in terms of theoretical validity, but also in terms of potential applications to recruitment, admissions, and program evaluation and development procedures. Given that the current study was limited by its focus on a single institution and a single program, but encouraging in terms of its somewhat novel findings, extensive attention is also paid to directions for future research.

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CHAPTER I

INTRODUCTION

Over the past several decades, the attainment of a college degree has become synonymous with financial success and personal well-being. For this reason, the number of students interested in attending college has grown exponentially since 1990. While a great number of those aspiring to a degree eventually end up enrolling in college courses after high school graduation, quite a few terminate their studies before completion of their coursework. College dropout and low retention are concerns for post-secondary institutions around the country, primarily because graduation rates are a marker of success for major universities and community colleges alike. However, low graduation rates are also a precursor to a larger social issue, relevant to the financial and professional success of the nation as a whole. Students spend, and borrow, an extraordinary amount of money attempting their college degrees, yet many fail to reach the finish line, resulting in an exorbitant number of debt-ridden, undereducated individuals entering, and participating in, the workforce each year.

Chapter II reviews the literature on known contributors to college dropout, including academic ability, gender, socioeconomic status, and extracurricular activities. Some of what has already been discovered is intuitive, such as higher relative dropout rates for low-income students who do not obtain financial aid, compared to those not reliant on financial assistance. Other findings from this extensive body of research are more complex, such as the fact that women are more likely to graduate than men, and that this gender gap is partially explained by other personal factors that often overlap with gender. Chapter II will explore each of these nuances in turn in an attempt to elucidate the already substantial array of findings on this issue.

While informative in a general sense, the literature reviewed in the following chapter highlights a major gap in our knowledge. Much of what we know about graduation rates, and retention within an institution, is limited to specific majors. Administrators, government officials, and scientists alike are particularly invested in understanding graduation and retention in collegiate programs focused on careers in science, technology, engineering, and mathematics (STEM). This interest derives primarily from the subjective view that STEM majors are more difficult than others (e.g., hospitality, psychology). However, scant attention has been paid to students pursuing other degrees, including those in business. What little research that has been done in this area focuses primarily on accounting and marketing majors. Chapter II will also review those findings. However, the current study examines predictors of graduation and retention for a much more narrow population.

The Current Study

This study attempted to identify those variables that contributed to one-year retention and timely graduation (four-to-six years) in students enrolled in a bachelor's degree program in health services administration (HSA) in the southeastern United States. Chapter III of this manuscript details the specific predictor and outcome variables of interest, as well as the database which served as the sample for the study.

This study's focus on an HSA program is warranted for two reasons. First, an understanding of the predictors of success within this program may help direct interested students into a rewarding career within this specific discipline. For instance, if it becomes clear that financial markers have no bearing on graduation within an HSA program, it may be an indicator that students with limited financial means are most likely to get a large return on their time and financial investments by seeking an HSA degree. This first focus is inherently practical,

and will hopefully lend a helping hand to college-bound students across the country. Second, recent findings on general and STEM-specific graduation and retention rates have pointed researchers to several theoretical models (see Chapter II for a review). If these models are based on a rather limited population (i.e., those pursuing STEM degrees, in particular), there is ample reason to assume these theoretical models are incomplete, or entirely misguided, for understanding graduation and retention rates in students pursuing other degrees. This reason for study is more academic in nature, but no less significant. A diverse research focus precedes a thorough understanding of the problem at hand.

Research Questions

This study sought to understand how demographic, academic, and financial variables contributed to one-year retention and four- or six-year graduation rates in first-year students within the sample HSA program. Given the literature reviewed, it is clear that predictors of retention and graduation may differ for students who are entering the program as First Time in College (FTIC) students and those who are transferring from a two-year community college. Hence, all research questions will be addressed separately for these two sub-groups.

1. Which demographic, academic, and financial variables are the best predictors of "retained" status one year into the program for first-year FTIC students in the HSA program?
2. Which demographic, academic, and financial variables are the best predictors of six-year "graduated" status for first-year FTIC students in the HSA program?
3. Which demographic, academic, and financial variables are the best predictors of four-year "graduated" status for first-year transfer students in the HSA program?

Hypothesis

Given the scarcity of research examining retention and graduation rates in HSA programs, the current study was primarily exploratory in nature and, therefore, testing specific hypotheses would have been misguided. However, several studies have demonstrated a relationship between high standardized testing scores (e.g., the ACT, the SAT) and retention in a program of choice (e.g., ACT, 2014; Mattern & Patterson, 2012a). Other studies have demonstrated that variables such as financial aid have had a positive impact on retention (e.g., Stewart, Lim, & Kim, 2015). It was expected that many of these patterns would replicate in the current study. See Chapter IV of this manuscript for a detailed description of the findings.

The Investigator

This study was conducted by a professional administrator overseeing an undergraduate HSA degree program. It is important to note that all data were collected independently of the investigator by the cooperating institution(s). The investigator played no role in the design or implementation of data collection, nor did the investigator have any direct contact with participants.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction and Background

In fall 2013, 17.5 million students were pursuing postsecondary degrees in colleges and universities throughout the U.S. (Kena et al., 2015). This figure marks an increase of 46% from the 12 million students enrolled in higher learning in 1990 (Kena et al., 2015), and nearly double the 9 million students enrolled in degree programs in 1980 (Tinto, 2012). Over the decade from 2000 to 2010 undergraduate enrollment rose 37%, with a slight dip (3%) from 2010 to 2013 (Kena et al., 2015). According to current projections, by 2024 the undergraduate population will approach 20 million. While these numbers are partially attributable to population growth, they also speak to the growing demands on colleges and universities nationwide and are likely due, in part, to changing cultural perspectives on the availability and necessity of a college degree.

The overwhelming majority of new high school graduates aspire to a college degree (Stephan, Davis, Lindsay, & Miller, 2015). Postsecondary education is increasingly viewed as an essential step toward a bright economic future (Kena et al., 2015). The benefits of a college education extend beyond financial outcomes. On numerous measures, including personal development, health, and civic engagement, college graduates are advantaged over those without a college credential (Tinto, 2012). At the societal level, the benefits of a college-educated adult population include lower rates of poverty, unemployment, and incarceration, higher levels of volunteerism, and critically, a workforce capable of maintaining the nation's standing in a technology-driven, competitive global marketplace (Tinto, 2012; Stephan et al., 2015). President Obama has made it a high priority to cultivate a college-educated workforce, having set a goal

for the U.S. to have the world's highest proportion of college graduates by the year 2020 (Wyatt, Wiley, Camara, & Proestler, 2012).

The national data reveal a marked discrepancy between the high aspirations of students, educators, and policymakers and actual rates of college retention and graduation. Despite the expansion of access to college by public, nonprofit, and private sector organizations, increasing importance of a college degree, and the investment of institutions in programs to retain their students, graduation rates have remained virtually stagnant since 1980 (Tinto, 2012). Less than 60% of the students entering higher education successfully complete a degree (Stephan et al., 2015). Furthermore, while college campuses have become more diverse there are notable disparities in degree attainment. Black, Hispanic, and Native American students have lower probability of earning a degree than their White and Asian counterparts (Kena et al., 2015; Tinto, 2012). Students from low-income backgrounds, often the first in their families to attend college, are especially disadvantaged in comparison to their more affluent peers. Women have surpassed men in enrolling in higher education and are more likely to persist to graduate with a bachelor's degree (Ewert, 2012). The gender gap in degree completion transcends ethnicity, race, and socioeconomic class.

The question of why students voluntarily leave college is a persistent dilemma. According to Sloan (2013), exit interviews with students, part of an Inside Track case study of college freshmen, suggest that finances are the primary reason they drop out of college or transfer to another institution. To be sure, finances do play a prominent role, especially as college tuitions soar and more students entering college qualify for needs-based grants (R. Chen, 2012; Musoba & Krichevskiy, 2014; Tuttle & Musoba, 2013). However, analysis of the findings disclosed that the "term *finances* [original emphasis] was often shorthand for a cost/benefit

analysis of value" masking unmet personal, academic, and psychosocial needs (Sloan, 2013, p. 36). Moreover, Sloan points out that even high academic achievement cannot assure that students are not at risk for dropping out. Historically, GPA was viewed as the decisive factor in college persistence. Tinto (1993) was the first theorist to recognize that the decision to persist or drop out of an institution of higher learning is contingent on an intricate interaction of student, institutional, and environmental factors.

Originally devised in the 1970s as a theory of early departure by traditional students from four-year residential colleges and universities, Tinto's (1993) interactionalist theory has served as a springboard for an accumulating body of theoretical and empirical literature leading to the development of elaborate models for identifying students at risk for dropping out. According to Smith, Therry, and Whale (2012), identifying at-risk students is essential for proactively targeting interventions and support services. In almost all cases dropping out is a *process* rather than an event. Many new students are unaware of available resources or find it difficult to seek help. As a result, they may seek assistance only after their academic difficulties or psychosocial distress seems insurmountable, or in some cases not at all (Sloan, 2013; Smith et al., 2012). In the cost-benefit analysis, identifying students at risk for the purpose of early intervention benefits the institution by allowing for the targeted allocation of resources as well as reducing the rate of attrition, and enables the students to advance toward their degree goals. As described by Shaw and Mattern (2013), the development of "complex and multifaceted" models "represents an opportunity to simplify available information for institutions to connect the research to practice that supports successful outcomes for all" (p. 251).

The purpose of this quantitative study is to develop a predictive model incorporating a constellation of student variables in order to identify students at risk for dropping out of

undergraduate health services administration programs. A review of the empirical literature on persistence, retention, and graduation in higher education turned up virtually no studies focused on students in health services administration. Most studies that focus on particular programs or courses of study are centered on persistence and retention among students in STEM (science, technology, engineering, and mathematics) disciplines. Studies in this area produce valuable insights that extend beyond STEM programs as they often compare STEM majors with students in other disciplines (X. Chen, 2013; Xu, 2016) and draw attention to underrepresented groups (Whalen & Shelley, 2010).

Moreover, students in the health sciences, business, and STEM fields are all required to pass gateway science and mathematics courses that pose an obstacle to persistence for many students (X. Chen, 2012; Harackiewicz et al., 2014; Herrera, 2013; Smith et al., 2012). Studies have found that mathematical and technical academic courses are among the most difficult college courses (Whalen & Shelley, 2010). Having to repeat a required course can diminish students' confidence, leading them to question their chosen field. Evidence from research with business students suggests that those who are more certain about a specific career path are more likely to persist (Willcoxson & Wynder, 2010). Proactive interventions can boost at-risk students' self-efficacy and commitment.

In some institutions (e.g., many private, for-profit colleges and universities), all students are required to pass at least one online course in order to graduate. In fall 2013, roughly 4.6 million undergraduate students took distance education courses and their numbers consistently grow (Kena et al., 2015). The burgeoning popularity of online courses and programs, combined with high rates of attrition, has made distance learning a major topic of research attention. A study by Leeds, Campbell, Baker, Ali, and Brawley (2014) examining the impact of an array of

empirically supported student engagement strategies (learning communities, learner-centered environment, student support services) found that none significantly improved retention among online learners, leading the researchers to conclude that individual characteristics are the main determinants of why some students persist and others did not. Building on that assumption, Cochran, Campbell, Baker, and Leeds (2014) explored the role of student attributes in predicting retention in online courses using characteristics derived from research with students in traditional face-to-face settings. Synthesizing results from research conducted with online and face-to-face students expands the scope of potential variables on which to design a predictive model and should be especially useful in a program of study where students are likely to take online or hybrid courses.

Furthermore, the proliferation of online courses has led to the creation of huge databases allowing researchers to use data mining to identify at-risk students and analyze relationships among key variables for the purpose of developing more targeted and effective interventions (Niemi & Gitin, 2012). Even with the inclusion of multiple factors known to affect persistence predictive models often have inadequate explanatory power due to limitations in the available student data (Smith et al., 2012; Stephan et al., 2015). A comprehensive review of the literature highlights the numerous factors affecting persistence in higher education and the dynamic interactions among them.

The literature presented in this review is drawn from the following EBSCO databases: Academic Search Premier, MasterFILE Premier, Business Source Premier, ERIC, PsycINFO, and PsycARTICLES. Keywords used either individually or in conjunction include: students, colleges, universities, higher education, postsecondary education, health sciences, persistence, retention, academic achievement, academic performance, grade point average (GPA), ethnicity,

gender, socioeconomic status (SES), first generation students, nontraditional students, international students, transfer students, at-risk students, programs, courses, faculty, involvement, engagement, logistic regression modeling, and structural equation modeling (SEM).

Theoretical Models

Virtually all models of persistence in higher education have evolved from Tinto's (1993) interactionist theory. Indeed, even without direct reference to Tinto the terms *academic integration* and *social integration* are ubiquitous in the literature. Tinto theorized that the intention to persevere in college depends upon the degree to which students are integrated into the academic and social spheres of the institution. Both types of integration affect goal commitment and institutional commitment. Academic integration has a more direct influence on goal commitment while social integration exerts a stronger impact on institutional commitment. Consistent with the concept of person-environment fit, the model proposes that students who feel a greater sense of congruence with the institution are more likely to graduate while those who experience a sense of social or academic dissonance are more predisposed to leave.

To capture the complexities of college persistence, Tinto (1993) went beyond GPA to include family background, individual student characteristics, and high school experience as interrelated influences on persistence for students entering postsecondary education. He emphasized the importance of the first year of college in which traditional undergraduate students find themselves in an environment that can be alienating and intimidating after the secure and familiar surroundings of family and community. Exit interviews with traditional age students reveal that many felt lost and were unaware of where to turn for assistance (Sloan,

2013). Statistics confirm that college attrition rates are highest the first year (R. Chen, 2012; Markle, 2015; Tinto, 2012).

Bean (1982) also emphasized external factors in the decision to leave, adding students' interactions with faculty and time spent working off campus as important influences on institutional commitment. Bean viewed student attrition as analogous to turnover in business organizations and derived his model from theories of organizational turnover and planned behavior. In Bean's model, as in the theory of planned behavior, intentions are presupposed to predict actions. A complex interaction of internal and external variables motivates the student's intentions and ultimately the decision to leave or stay.

Cabrera, Nora, and Castaneda (1993) elaborated on complementary features of Bean's (1982) and Tinto's (1993) theories synthesizing elements of both models into a cohesive framework. The integrated model provided a more comprehensive portrayal of the complex interplay of individual, institutional, and environmental factors affecting the processes underlying the decision to leave or persist (Cabrera et al., 1993). A notable feature of the model is that Cabrera et al. included financial attitudes which become more important as most students now rely on some form of financial aid (R. Chen, 2012; Musoba & Krichevskiy, 2014; Sloan, 2013; Stewart, Lim, & Kim, 2015; Tuttle & Musoba, 2013).

The sociodemographic landscape of U.S. higher education has changed considerably since Tinto (1993) presented his original model of student attrition. Roughly one-third of undergraduate students are age 25 or older, often balancing their academic studies with work and family obligations (Markle, 2015). Even students enrolled in college directly from high school are often attending part-time (Stephan et al., 2015). More than 85% of college and university students live off-campus and commute to school (Gianoutsos and Rosser, 2014). Racial and

ethnic minority students are attending college in increasing numbers but with the exception of Asian students they have high rates of attrition (Kena et al., 2015; Tinto, 2012). Drawing on Tinto's (1993) theory, Rigali-Oiler and Kurpius (2013) argue that racial/ethnic identity is an important personal characteristic for understanding how person-environment fit shapes persistence.

In recent work, Tinto (2012) has expounded on the inequities in higher education that leave low-income, minority, and first generation students at heightened risk for leaving without a degree. In fact, Tinto has become a harsh critic of both the nature of research on student attrition and of most tactics employed by institutions to boost retention, which on the whole have not improved retention rates. According to Tinto, a major problem is that much of the research is based on the flawed assumption that persistence and departure are parallel processes; that is, that knowing why students leave is equal to knowing why they persist to successfully earn a degree. Moreover, although the terms persistence and retention are often used interchangeably they are not identical; *persistence* refers to a students' perseverance toward graduation whereas *retention* is an institutional outcome (Hagedorn, 2005; Reason, 2009). This distinction is actually implicit in the conceptualizations of goal commitment and institutional commitment (Tinto, 1993).

Institutions are understandably concerned with retention. A reputation for successfully graduating students enhances the value of the institution in the eyes of students, parents, and stakeholders (Hagedorn, 2005). High retention rates enable colleges to attract talented students and faculty. Furthermore, when students drop out, institutions lose revenue and are compelled to devote additional resources to recruiting new students. However, Jones-White, Radcliffe, Huesman, and Kellogg (2010) are critical of the institutional focus. Instead, they argue for a student-centered model of college success that recognizes that students "succeed if they earn a

degree, regardless of whether it is from their original institution" (p. 171). Their own research uniquely made use of multinomial regression techniques to model students' successful persistence across multiple institutions.

Tinto's (1993) theory broadly provided a framework for Jones-White et al. (2010), whose perspective is that students will succeed in graduating when there is a good fit between the student and the institution. Ironically, Tinto (2012) is skeptical of the relevance of the theoretical concepts of academic and social integration to the practical application of designing practices that enhance students' academic and social engagement with the institutional and thus their motivation to persist. In an environment where most students do not live on campus and many have other responsibilities, the most effective strategies for retaining students are those that synthesize academic and social engagement. First-year seminars, integrated educational programs organized around themes and often combining curricular and cocurricular activities, learning communities, writing-intensive courses, collaborative work, undergraduate research, diversity experiences, service learning, internships, and project-based learning all fall under the heading of "high-impact" educational practices due to their documented effectiveness in boosting student retention (Kuh, 2013).

According to Tinto (2012) the focus of efforts to engage students and help them succeed should be in the classroom. Classroom experiences, as well as curricular and out-of-class learning experiences figure prominently in Terenzini and Reason's model of influences on student learning and persistence, which builds on the work of Tinto (1993), Astin (1999), and Pascarella (Reason, 2009). In a study comparing persistence intentions between STEM majors and non-STEM majors, Xu (2016) found that the perceived quality of the learning environment was an important influence on intentions for both groups. The magnitude of this effect was

especially strong for the STEM majors. Class size, quality of instruction, and quality of the academic program, which Xu equated with academic integration, were all influential.

Tinto (2012) outlined four key conditions that promote students' classroom success: expectations, support, assessment and feedback, and involvement. Students respond positively to expectations that are both clear and encourage them to invest more effort to perform at a high level. At the same time, many students require support to meet expectations for success, including financial support which can be critical (R. Chen, 2012). In Xu's (2016) research financial pressure was the key reason non-STEM majors considered dropping out. Academic and social supports are provided simultaneously through practices such as learning communities, supplemental instruction, mentoring, tutoring, and advising (Tinto, 2012).

With respect to assessment and feedback, Tinto (2012) points out that students have higher probability of succeeding in classrooms where their performance is regularly assessed and faculty as well as students are provided ongoing feedback designed to promote their success. Feedback is especially critical during the first year then students are attempting to adapt to the demands of a rigorous college level academic curriculum. According to Musoba and Krichevskiy (2014), Black and Latino students may feel a need for affirmation that they belong in higher education and view their performance in early coursework as feedback. Feedback from faculty members can serve to validate good performance and guide and encourage students whose performance requires improvement. Feedback that helps students realistically appraise their own strengths and weaknesses can effectively build self-efficacy and resilience in students from low-income backgrounds (Morales, 2014). Indeed, Willis et al. (2012) include self-efficacy as a component of a proposed model for improving the college success of low-income and first

generation students, along with academic behavior, academic achievement, and on-academic factors such as employment.

Involvement, or engagement, is the final condition for students' success (Tinto, 2012). Astin (1999) defined student involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (p. 518). High-impact practices grew out of Astin's work on student involvement (Kuh, 2013). Providing students with a variety of learning experiences that foster relationships with peers and faculty as well as advance their academic development not only promotes academic and social integration but also accommodates different learning styles. Strategies such as collaborative learning and group tutoring may be especially beneficial for Black and Latino students (Musoba & Krichevskiy, 2014). For students in health studies, engaging in discipline relevant research with faculty and peers has been found to increase engagement with both groups (Naug, Colson, & Donner, 2012). Xu (2016) observed that STEM students in particular desired active learning activities and research projects. The absence of high quality instruction and engaging learning experiences undermined intentions to persist for STEM and non-STEM students.

To Jones-White et al. (2010), persistence and retention can be antithetical if the institution does not serve the students' needs. Activities that foster connections between the students and the campus environment while promoting the students' academic success serve the goals of the students and the institution (Tinto, 2012). At the same time, students enter college with attributes and experiences that may make them more vulnerable to dropping out. Virtually all models of persistence and retention include precollege characteristics (Astin & Antonio, 2012; Bean, 1982; Cabrera et al., 1993; Pascarella & Terenzini, 2005; Reason, 2009). Prior academic performance is one of the major contributors to students' college success.

College Preparatory Assessments

Most secondary school students preparing for college take the ACT or the SAT. The purveyors of both assessments produce annual reports with information on the graduating class students who took the respective exams, their destinations for postsecondary education, and their patterns of persistence and retention. In a three-part series, the *College Choice Report* follows graduates of the class of 2012 who took the ACT, documenting their preferences for higher education, enrollment patterns, and persistence and transfer (ACT, 2013a, 2013b, 2014). The College Board which administers the SAT formed a research consortium with four-year colleges and universities to create a higher education database for the purpose of validating the predictive validity of the ACT as a college admission test. To that aim analyses have been conducted with 2006, 2007, 2008, 2009, and 2010 high school graduates who began college the following fall (Mattern & Patterson, 2010, 2011, 2012a, 2012b, 2013). In 2005, the SAT added a writing session that includes an essay as well as multiple choice items (Shaw & Kobrin, 2013). The findings from these studies provide valuable information on how high school graduates' ACT and SAT performance interact with other characteristics affecting college persistence.

ACT College Choice Report

In 2012, 1,666,017 high school seniors across the U.S. took the ACT (ACT, 2013a). The overall findings showed that students who prefer to enroll in a four-year college tend to have higher ACT Composite scores, parental education levels, and degree aspirations. The highest performing students tend to send their test scores to more institutions. Although speculative, that may reflect encouragement from high school counselors for students they deem especially promising or more active role in the college choice process by highly educated parents. Furthermore, with the exception of students residing in states where the ACT is given to all 11th

grade students, those with higher academic achievement were more likely to take the ACT before entering 12th grade (ACT, 2013b).

Among ACT-tested 2012 graduates who entered higher education, 16% dropped out before their second year (ACT, 2014). Overall, students who enrolled in colleges that were congruent with their preferences for institutional type, location, or distance away from home were less likely to transfer, thereby supporting the importance of student-environment fit (Bowman & Denson, 2014; Tinto, 1993). Students with higher ACT scores had higher probability of being accepted to colleges that met their preferences (ACT, 2013b). Although attending the college of their choice is only one of many probable reasons, high achieving ACT-tested students were least likely to drop out or transfer (ACT, 2014). This pattern had one significant exception: higher achieving students who began college at a two-year institution were more likely to transfer before their second year. Higher community college GPA is one predictor of transfer students' success in baccalaureate degree programs (Wang, 2009).

A particularly notable finding was that higher ACT scores narrowed disparities in dropout and transfer rates between first generation college students and those whose parents had a college degree (ACT, 2014). From the perspective of identifying students at elevated risk for dropping out, in view of the student variables analyzed, those most vulnerable among students who took the ACT would be first generation students with low ACT scores. Students with that profile were further at risk for dropping out if they delayed entry to college, had lower educational aspirations, and did not attend their preferred type of institution.

SAT Scores and College Retention

After forming the research consortium, the College Board undertook the first analysis of the relationship of SAT scores (mathematics, reading, and writing) to college retention with first-time, first-year students who began college at 110 institutions in the fall semester 2006 (Mattern & Patterson, 2010). For those students, retention figures were available for the third and fourth years (Mattern & Patterson, 2010; 2011). Incremental increases in SAT scores and high school GPA increased the probability of returning. At the highest and lowest ends of the spectrum the proportion of high achieving students who returned the third year more than double that for the lowest scores on both academic measures. The difference was not as striking for fourth year retention though there was still a substantial gap (Mattern & Patterson, 2011). Across the three successive years, higher SAT scores were associated with higher rates of retention even after controlling for other factors including high school GPA. Controlling for SAT performance, particularly for students who scored at the highest levels, reduced and in some cases neutralized differences in retention by student subgroup characteristics (race/ethnicity, gender, parental education, family income, high school GPA) and institutional features (size, admittance rates).

The original first to second year retention study was replicated with data from students who began college in the fall semesters of 2007, 2008, 2009, and 2010 (Mattern & Patterson, 2012a, 2012b, 2013). These studies expanded upon the original by including additional institutions. The findings were consistent across cohorts that SAT performance minimized or eradicated the effects of student and institutional characteristics in predicting college retention. The association between SAT scores and first to second year retention remained even among students with comparable high school GPAs.

The addition of the writing component to the SAT has drawn mixed responses. Advocates of authentic assessments welcomed the use of an essay, or direct writing assessment, while critics cited the lower reliability of direct writing compared to multiple choice responses (Shaw & Kobrin, 2013). The College Board defended the change to the SAT English assessment by citing research demonstrating the utility of essays in predicting college performance, particularly when combined with multiple choice tests. The sample for the SAT Essay validity study was derived from the original 110 baccalaureate institutions in the SAT Validity Study with a final sample of 120,897 students. The analyses suggested that SAT essay scores predict GPA during first-year English classes, particularly for high-achieving students (though, this relationship is not clear for below-average achievers).

Sizable gaps emerged in SAT essay performance in relation to academic performance subgroups (Shaw & Kobrin, 2013). Overall, essay performance followed the same trend as the other SAT components: as multiple choice scores increased so did essay scores. Demographically, female and Asian students had the highest SAT essay scores although the effects were small. For the purpose of predicting early college success, the SAT essay scores were consistently linked with the students' first year college GPA and first year English GPA.

Academic Readiness and Retention

First-Time Students

Focusing on new college students' early success, Stephan et al. (2015) used data from the Indiana Student Information System to examine the academic trajectories of students who graduated from Indiana high schools in 2010 and enrolled in a two-year or four-year degree program the following fall. The term "early college success" was used to denote what is usually

called “college readiness.” Noting that there no agreed upon single indicator of early college success, the researchers turned to three widely used measures: taking only non-remedial courses the first semester, completing all attempted credits the first semester, and persisting to a second year. A composite measure was added to capture all three factors. Student sociodemographic characteristics, high school academic performance, high school attendance, taking the ACT or the SAT, high school academic climate (proportion of students who passed the 10th grade English assessment), and college selectivity were all included in a series of regression models.

Based on a single measure of early college success, the vast majority of Indiana students (92%) could be classified as successful but this figure dropped to 50% for the composite measure (Stephan et al., 2015). Students who entered four-year colleges were much more likely to be successful on all three measures than those who enrolled in two-year institutions (66% versus 13%). Substantial disparities arose between White/Other (“other” denoting students who were not White, Black, or Hispanic) and Black students but White/Other and Hispanic students had comparable college success. A marked gap emerged between low-income and more affluent students. High school academic performance was linked with all three early success measures as well as the composite score. Taking the ACT or SAT was only significant in predicting the performance of students attending two-year colleges, but high school attendance affected the students’ successful completion of credits and persistence, along with the composite score. Although high school academic climate was associated with the three success measures, the researchers noted that its predictive value was minimal.

Despite the array of variables, the models derived from the data accounted for no more than 35% of the variation in early college success for the total sample and 26% or less for students attending a four-year college (Stephan et al., 2015). R. Chen (2012) argues that more

attention must be given to institutional features in understanding why students continue (or not). Other researchers stress the importance of non-cognitive attributes that influence motivation and behavior (Laskey & Hetzel, 2011; Markle, 2015; Morales, 2014; Shaw & Mattern, 2013; Smith et al., 2012; Willis et al., 2012).

In addition, the data did not capture learning experiences that affect first year students' persistence. For example, summer bridge programs between high school and college and summer learning programs at the end of the freshman year can significantly boost persistence and retention, especially among students at risk for college failure (Attewell & Jang, 2013). Involvement in high-impact programs the first year of college improves retention, although to the particular advantage of at-risk students (Kuh, 2013; Tinto, 2012). Shaw and Mattern (2013) are especially critical of the exclusive reliance on institutional data, claiming that there are data points for gathering information on factors such as motivation, coping, mental health, interactions with faculty and peers, and sense of belonging that affect students' risk persistence. Stephan et al. (2015) acknowledged that there are other factors affecting students' college readiness and persistence beyond the information in the state database that warrant research attention. Nonetheless, they view their findings as a good starting point for identifying students who begin college at risk for dropping out and who are therefore in need of targeted supports.

From the perspective of Tinto's (1993) interactionist model, Stewart, Lim, and Kim (2015) explored the persistence of new first-year students entering a large, public research university. Their study encompassed a comprehensive array of student characteristics, with emphasis on whether or not the students were placed in remedial courses. The sample consisted of 3,213 first-time, full-time and part-time students (52.9% female; 75.5% White), who were enrolled continuously from fall 2006 through fall 2008). The overwhelming majority (83.8%)

received some type of financial aid and 10.3% were assigned to remedial courses. Analysis of variance (ANOVA), Pearson's product-moment correlations, and stepwise regression analysis was used to analyze the effects of gender, race/ethnicity, family income, financial aid, high school GPA, ACT composite scores, college cumulative GPA, and remedial status on the students' persistence.

Most students persisted for five semesters or more; although the proportion was higher for non-remedial students (73.2% versus 60.5%). Not surprisingly, high school GPA and first-semester college GPA played a significant role in persistence, collectively accounting for 26% of variations in persistence (Stewart et al., 2015). However, higher high school GPA *decreased* rather than increased the probability that students would remain at the institution beyond the first year. This finding supports the claim that persisting at a single institution does not necessarily signify students' college success (Jones-White et al., 2010). While family income had no significant influence on persistence, receipt of financial aid had a powerful positive impact on persistence (Stewart et al., 2015). According to Stewart et al., students who receive financial aid are likely to be motivated to maintain the requisite passing grades and may have less need to work while attending college. Having a high first-semester GPA was linked with persistence. Gender had no significant effect on persistence.

With respect to ethnicity, Asian students were most likely to persist, followed by Black students, White students, Hispanic students, and Native American students. Stewart et al. (2015) attributed the high persistence of Black students to the presence of cultural diversity programs that create a welcome environment for Black students on predominately White campuses. Tuttle and Musoba (2013) point to the high rates of retention for Hispanic students at Hispanic-serving

institutions as illustration of how colleges can build on students' cultures to create a supportive learning environment that promotes retention.

Using survival analysis, Musoba and Krichevskiy (2014) examined the relationship of students' experiences in requisite first-year English and mathematics courses to their future persistence and graduation. The study took place at a Hispanic-serving research university, based on data from all first-time students entering the university from 2005 to 2010 who had applied for financial aid. Preliminary analysis showed these students were largely representative of the overall student body. The analysis involved 3,304 Latino students, 771 Black students, and 552 White students.

Different patterns emerged for the associations of academic indicators to persistence and graduation for students of the three ethnic groups (Musoba & Krichevskiy, 2014). With respect to academic preparation, high school GPA emerged as a significant factor in graduation for Latino students but not for White or Black students and composite SAT had no significant impact on persistence or graduation for students of any ethnicity. The first year mathematics and English courses, the focal point of the study, were important for students of all three ethnic groups but less so for White students, for whom graduation was linked only with first-semester GPA. In contrast, first-term GPA was not a significant factor for Latino students, while successful completion of first-term mathematics and English composition courses was a significant factor in graduation. For Black students, first-term GPA and success in first-semester math and English courses were all significant for persistence and graduation.

Musoba and Krichevskiy (2014) speculated that the performance of Black and Latino students on gateway English and mathematics courses may influence their perceptions of whether they belong in college. Given the importance of mathematics courses to further study in

business and health science programs as well as in STEM fields, and the low pass rates in requisite math courses at many institutions (including the university where the study took place, Musoba and Krichevskiy recommend strategies such as collaborative learning and group tutoring, which may be especially beneficial for Black and Latino students. These are among the practices Tinto (2012) recommends to foster academic and social engagement.

Shaw and Mattern (2013) employed a novel approach to identifying students at risk for dropping out of college by examining the trajectories of students who *outperform* their expectations as well as those who underperform. They are strongly critical of predictive models that fail to include psychosocial influences on persistence. The focal point of their study was *predicted first year GPA* and the relationship of *differential prediction* of GPA to retention. The sample was derived from the College Board sample of students who entered college in fall 2007. The sample used for the study included 120,698 students whose college data was available over four years. The measures included in the analyses were: students' demographic profiles, high school GPA, SAT scores, institutional feature (selectivity, public or private), first year GPA, and college retention through the fourth year. Regression analyses determined the extent that students over- or underperformed their first year of college based on the difference between first year GPA as predicted by high school GPA and SAT scores and actual first year college GPA.

The findings confirmed that the difference between a student's predicted first year college GPA and observed first year GPA could be a useful measure for identifying students at risk for leaving an institution before graduation (Shaw & Mattern, 2013). Even after controlling for sociodemographic characteristics, prior academic performance, and college selectivity, the smaller the gap between the students' predicted and observed college GPAs (i.e., the residual) the more likely they were to return each year and successfully graduate. Shaw and Mattern

emphasized that the *size* of the residual rather than the *direction* of the residual was the decisive factor. In other words, students who underperformed *and* students who exceeded their predicted GPA were at risk for leaving, and the further students were from their predicted GPA in either direction, the less likely to were to be retained by the institution.

Shaw and Mattern (2013) noted that all the variables examined, specifically academic performance, gender, race/ethnicity, parental education, and institutional features were associated with retention. However, the patterns were not always as expected. Male students were more likely to persist than females, which contrasts with overall trends in college graduation (Ewert, 2012). Moreover, underrepresented minority students were more likely to persist than White and Asian students (Shaw & Mattern, 2013). This finding contrasts with the national student data (Kena et al., 2015), although Black and Latino students have higher retention rates at individual institutions (Stewart et al., 2015; Tuttle & Musoba, 2013). According to Shaw and Mattern (2013) students' residual is a useful measure for identifying students at risk for dropping out because it is easy to calculate and comprehend.

Academic Rigor

According to Wyatt et al. (2012), academic rigor or academic intensity of students' high school curriculum is positively associated with college outcomes such as the lack of need for remedial coursework and persistence to graduation. However, there has been minimal research on this important academic indicator, which the researchers ascribe to the challenge of devising a quantitative measure for use across schools and districts. Wyatt et al. endeavored to develop an academic rigor index (ARI) based on students' responses to the SAT Questionnaire (SAT-Q), which they complete when registering for the SAT exam. The SAT-Q is designed to obtain a detailed picture of the scope and rigor of students' high school coursework, encompassing

questions on English, mathematics, science, social science and history, and foreign and classical language courses. The analysis was based on 68,000 students from the sample of the original SAT Validity study (Mattern & Patterson, 2010).

The first stage in developing the ARI involved conducting analyses of the associations between high school coursework and first-year college GPA for each of the five subject areas with comparisons between the GPAs of students who did and did not take each course (Wyatt et al., 2012). In the second stage data was added from the 2007 and 2009 SAT College-Bound Seniors sample with high school GPA, SAT performance, college enrollment status, first-year GPA, and for the 2007 cohort, retention to the sophomore year included in the analysis. The final results revealed a number of relationships between academic rigor in high school and academic performance in high school and college. On the whole, students who engaged in more rigorous coursework in high school earned higher grades and attained higher SAT scores, and beyond high school were more likely to attend a baccalaureate institution, earn higher college GPAs, and persist to the second college year. By implication, taking few or less rigorous high school courses could be a red flag for the probability that new college students are academically unprepared for college level coursework and at elevated risk for dropping out.

High School Economic Composition

Fifty years ago, the publication of the Coleman report gave rise to an ongoing controversy over the relative influence of family background versus school characteristics on disparities in students' academic achievement (Niu & Tienda, 2013). The annual *Condition of Education* report by the National Center for Education Statistics (NCES) consistently documents disparities in academic achievement and postsecondary aspirations and graduation rates based on

SES, even as K-12 schools strive to neutralize achievement gaps and more students from disadvantaged backgrounds go on to postsecondary education (Kena et al., 2015). Students in economically disadvantaged schools often do not have the opportunity to take the rigorous courses that prepare students for college success (Wyatt et al., 2012). Niu and Tienda (2013) observed that very few studies have investigated the prospective influence of high school economic composition on college persistence and graduation. Moreover, none have included community colleges where low-income students are most likely to enroll upon graduation.

Based on the theory that high school economic composition acts as a proxy for attributes that affect college success (such as school climate and challenging coursework), Niu and Tienda (2013) investigated the association between high school economic composition and college persistence using longitudinal data gathered through the Texas higher education opportunity project (THEOP). According to the researchers, Texas is an excellent venue for testing this proposed link due to the state's top 10% law, under which students who graduate in the top 10% of their senior class are automatically granted admission to any Texas public university. In theory, the law "leveled the playing field by weakening the association between family background and college access" (p. 33); however, critics argue that top-ranked students from underperforming schools still lack sufficient academic preparation for college success. The data, based on 2002 seniors who pursued postsecondary education, was drawn from three waves of the survey and includes demographic and socioeconomic characteristics, along with information on high school and college academic performance and experiences.

Roughly 60% of the class of 2002 enrolled in four-year institutions, 35% entered community colleges, and a small proportion enrolled in short vocational programs (Niu & Tienda, 2013). Expectedly, given the Texas top 10% law, the vast majority of top-ranked

students (85%) entered four-year institutions, compared to 52% of lower ranking students. However, as Niu and Tienda surmised, there were substantial disparities based on differences in high school economic profiles. Three-quarters of top-ranked graduates from low-income schools entered four-year colleges, versus 89% of students from affluent high schools, while 25% of top-ranked graduates from low-income schools entered community colleges, compared to 11% of their peers from affluent schools.

The findings for graduation confirmed that students from affluent high schools had the highest rates of persistence and on-time graduation from college whereas those from low-income schools had the lowest rates (Niu & Tienda, 2013). Multivariate analyses revealed that the array of variables examined, which encompassed high school college orientation and academic rigor, family background, academic preparedness for college, and college characteristics, could not fully account for the advantages of having attended an affluent high school on persistence and four-year college graduation. Among students who began their college career at a community college, high school college orientation, academic preparation, and family background essentially explained higher transfer rates for students from affluent high schools, but failed to explain the low transfer rates among students from disadvantaged high schools.

Niu and Tienda (2013) suspected that differences in the high school curriculum, in particular the lack of advanced placement (AP) courses in many schools serving poor students, have more of an impact on four-year college persistence and graduation than their analyses suggested. Their main recommendation is for public universities to partner with secondary schools through summer bridge programs and collaborative efforts with teachers to enrich the high school curriculum. Summer bridge programs have proven very successful (Attewell &

Jang, 2013). Tinto (2012) makes similar recommendations for providing low-income students with learning experiences that are academically challenging and socially engaging.

Student Characteristics

Gender

In fall 2013, women comprised 56% of the undergraduate population (Kena et al., 2015). From 2000 to 2010, when overall college enrollment soared, the proportion of women increased at a higher rate than the proportion of men (39% versus 36%). Forecasts over the next decade project a 15% increase for women versus a 9% increase for men by 2024. Women consistently earn more degrees at the undergraduate, graduate, and recently, postgraduate levels.

Women achieved parity with men in graduation from college in the early 1980s, a phenomenon attributed to a convergence of factors including measures to address discrimination, changing gender and family norms, occupational redesign, and increasing return on investment to women for earning a college degree (Ewert, 2012). However, as Ewert points out, while these factors "may help to explain why women caught up to men in college graduation rates, these explanations cannot fully account for why women *surpassed* [original emphasis] men" (p. 824). According to Ewert, the key to understanding the gender gap or the "female advantage" in successfully graduating from college lies in exploring prospective gender differences in the college experience. Drawing on the theories of Tinto (1997) and Bean (1982), Ewert (2012) investigated four major aspects of college that potentially differ by gender to the disadvantage of men: disrupted attendance patterns (part-time attendance and taking time off), choice of college major, social integration, and academic integration. Using data from the National Education Longitudinal Study of 1988 (NELS:88), logistic regression analysis was conducted with the

sample of 8,570 students who enrolled in higher education by 1994, roughly two years after timely high school graduation.

By 2000, 46% of the women and 42% of the men had earned a bachelor's degree (Ewert, 2012). Based only on students who began college at a four-year institution, the 4% gender disparity increased to 6.9%. There were no significant gender differences in graduation rates for students who transferred from a two-year institution. However, while more men than women transferred from community colleges, women who transferred were more likely to graduate.

Ewert's (2012) proposed hypotheses were partly supported by the final analysis. As Ewert supposed, more men than women majored in engineering, mathematics, and the physical sciences (18% versus 4%), while women outnumbered men in health and education majors (32% versus 12%). However, the choice of major had no significant impact on men's and women's respective graduation rates. While requisite science courses can present obstacles to degree completion, this holds true for students in the health and biological sciences where women predominate as well as in male-dominated STEM disciplines (Harackiewicz et al., 2014; Herrera, 2013). Moreover, STEM majors at the baccalaureate level actually have lower attrition rates than students who major in education, humanities, and health sciences (X. Chen, 2013).

Rather than choice of major, lower cumulative GPA is a major risk factor for dropping out of STEM programs (X. Chen, 2013; Whalen & Shelley, 2010; Xu, 2016). Ewert (2012) used GPA as the measure of academic integration, and consistent with her hypothesis, men on average, earned lower grades than women, which affected their graduation rates. Also consistent with Ewert's hypotheses, men were more likely than women to attend college part-time (40% versus 34%) and take time off (31% versus 24%), which made them less likely to graduate.

Both Tinto's (1993) and Astin's (1999) theories strongly support the positive impact of social integration on graduation. Based on the NELS data, women were more involved in social and academic clubs while men were more likely to play intramural or varsity sports (Ewert, 2012). These involvement experiences were beneficial regardless of gender. Interestingly, however, they proved even more advantageous for men. According to Ewert, "if not for men's higher rates in varsity and intramural sports relative to women," the gender disparity in graduation would be even more pronounced (p. 842). Greater social integration can actually be detrimental to persistence when social activities distract students from academic work. This has been found to be the case for academically at-risk students (Laskey & Hetzel, 2011) and international students (Mamiseishvili, 2012).

In the final analysis, more disrupted attendance patterns and lower academic and social integration were the decisive factors in the men's lower graduation rates (Ewert, 2012). However, rather than targeting men per se, Ewert called on postsecondary institutions to reinforce efforts to "improve the academic performance of struggling students, encourage more continuous attendance patterns, and foster social integration" through programs and policies designed to boost graduation rates for *all* students" (p. 843). Although her proposal is based on the premise that such strategies might be especially beneficial for men, the advantages would extend beyond any particular student group. Sloan (2013), Tinto (2012), and Kuh (2013) make similar recommendations.

In certain disciplines, gender differences in retention can be based on the concept of critical mass to the detriment or advantage of men or women. In Whalen and Shelley's (2010) study of six-year graduate rates of STEM students at a Midwestern university, both women and underrepresented minority students were far more likely to drop out than male and White and

Asian students. In fact, male and non-minority students had nearly 75% higher probability of persisting and graduating. Whalen and Shelley attributed the gender gap, in part, to expectations by women that they would not perform well in math and science courses, reflecting cultural gender stereotypes. At the same time, there is evidence that women in the hard sciences are often excluded from group learning and study experiences and in general, face a hostile academic climate. On the other hand, male students have high rates of dropout in nursing programs, where men comprise less than 10% of the students (Herrera, 2013.). Herrera attributes the high dropout rates to lack of support for male students, who, like their female counterparts in the hard sciences, may lack opportunities for academic and social integration.

Socioeconomic Status

Diemer and Li (2012) used expectancy-value theory as a framework for investigating how precollege factors affect the college persistence of low-income students. The researchers chose to focus on persistence rather than graduation to gain insight into the developmental processes that contribute to the college success of students from economically disadvantaged backgrounds. The precollege factors examined were: parental self-efficacy, maternal expectations, contextual postsecondary support (discussions of future plans with family and friends), educational expectancies, and academic achievement. Postsecondary persistence included enrollment status and enrollment continuity. Structural equation modeling was used to analyze data from the Child Development Supplement (CDS-II:2002) and Transition to Adulthood (TA—2005; TA—2007) involving a subsample of 439 youths classified as low-income based on five years of family income data.

Path analysis revealed that precollege contexts influenced the youths' expectancies, which had a direct impact on persistence three years later and an indirect impact on persistence

five years later (Diemer & Li, 2012). Mothers' expectations had a particularly strong effect on the youths' educational expectations, and the expectations of the young men and women were fairly robust predictors of their persistence at three and five years. Academic achievement affected mothers' expectations, suggesting that parents hold higher expectations for higher performing children. However, academic achievement per se was insignificant in the analysis. In addition to maternal expectations, parents influenced their children's educational future through the indirect effect of parental self-efficacy, which seemed to imbue the youths with a sense of resilience. This may be especially important given the predominance of minority youths in the low-income subsample. Gender and age had negligible effects. This study is illuminating because it approaches the situation of students traditionally labeled at-risk from the perspective of protective influences on educational aspirations.

Academically At-Risk Students

Laskey and Hetzel (2011) explored the factors affecting retention and academic performance of academically at-risk students attending a university under a Conditional Acceptance Program (CAP). The CAP program is designed for students who do not meet the admission requirements of a high school GPA of 2.0 and ACT composite score of 20, but who show potential for being successful on the basis of ACT scores of 16 or higher, English and writing performance, and a personal interview. Students in the one-year CAP program take part in an intensive curriculum that includes weekly tutoring sessions the first semester, weekly peer meetings, and developmental coursework. During the second semester CAP students can take up to 12 regular college credit courses and those with a first year GPA of 2.0 or higher are admitted to the university under the standard admission policy.

A unique feature of the CAP program is that the students are given the Five Factor Inventory (NEO-FFI) or Big Five personality test, which assesses the personality characteristics of neuroticism, extraversion, openness, agreeableness, and conscientiousness. Laskey and Hetzel (2011) included these personality factors in their endeavor to create a profile capable of distinguishing between successful and non-successful at-risk students. Several studies have found that combining non-cognitive attributes with academic indicators enhances the ability to predict students' success. Drawing on Tinto's (1993) theory, Laskey and Hetzel (2011) emphasize the interplay between student characteristics and the supportive design of the CAP program as creating a learning environment conducive to the success of at-risk learners.

Based on three consecutive years of CAP program data, bivariate correlations and regression analysis were performed to discern the relationships between the students' personal characteristics, tutoring experiences, ACT scores, and high school and college GPAs (Laskey & Hetzel, 2011). Neither high school GPA nor ACT scores were significant factors in the CAP students' college success, nor did the demographic factors of gender, ethnicity, or high school profile affect success. Indeed, of all the precollege characteristics only personality was linked with retention and academic success. Extraversion was a liability; more extraverted students tended to be distracted by social activities to the detriment of their academic progress and thus had lower GPAs and were less likely to be retained. In contrast, conscientiousness and agreeableness were associated with more extensive use of tutoring services, which in turn had a direct positive impact on GPA and performance. Students who regularly attended tutoring sessions earned higher grades, which enabled them to meet the requisite admission standards. Finally, with respect to personality, students who scored higher in neuroticism tended to perform well academically. Although this may seem paradoxical, Laskey and Hetzel proposed that these

students' concern over their grades might motivate them to try harder. For women in particular, higher neuroticism was an advantage.

First Generation Students

Soria and Stebleton (2012) explore academic engagement and retention from the perspective of social capital. From the standpoint that social capital is passed through generations in families, "first generation students lack social capital to being successful in higher education because they do not acquire it from their parents who did not earn a baccalaureate degree" (p. 675). Often first generation students lack confidence in their academic capabilities and may feel isolated or disengaged from poor privileged peers on campus to the detriment of both academic and social isolation. Understanding their college experience is an essential step in helping them succeed in their goal of being the first in their family to earn a degree.

Soria and Stebleton (2012) analyzed data drawn from students at a large, public research university who completed the Student Experience in the Research University (SERU) survey. The survey produced a sample of 1,864 first generation and non-first generation students entering college for the fall 2010 semester. As minority, low-income, and working class students were disproportionately represented in the first generation group, the researcher controlled for these factors in their analysis. The survey covers four key themes: academic engagement, community and civic engagement, global knowledge and skills, and student life and development. First to second year retention rates were predicted by logistic regression controlling for race, gender, social class, GPA, campus climate, and sense of belonging.

The results showed significant differences in between first generation students and their non-first generation peers on all indices of academic engagement (Soria & Stebleton, 2012). That is, first generation students enjoyed fewer interactions with faculty members in the

classroom, were less inclined to contribute to class discussions and to bring up ideas and concepts from other courses during discussions, and asked fewer insightful questions. These differences decreased the probability of retention for first generation students.

Ascribing the differences in engagement to social capital, Soria and Stebleton (2012) call on faculty members to reach out to first generation students, engaging them in formal and informal discussions. Not unexpectedly, engagement was linked with a stronger sense of belonging. Declaring that first generation students may benefit from being part of *communities of belonging,* Soria and Stebleton specifically advocate learning communities, which are recognized as high-impact practices (Kuh, 2013; Tinto, 2012). Tovar (2015), who used social capital and college impact models as a framework for examining success and persistence in Latino community college students found that supportive practices and an academically rigorous curriculum had a positive impact on the students' academic success and persistence. Informal interactions with faculty had a slight positive impact on GPA but did not affect persistence.

Residential Versus Commuter Students

Tinto's (1993) original model was based on the experiences of new high school graduates leaving home for the first time to live on the college campus. Gianoutsos and Rosser (2014) observed that most comparisons of residential and commuter studies are conducted at primarily residential colleges. However, this practice ignores the fact that the vast majority of college students today are commuters regardless of institution. Furthermore, public commuter institutions tend to have very diverse populations compared to residential campuses. Gianoutsos and Rosser conducted their research at a large western public research university where commuter students predominate. Most undergraduate students are enrolled full-time (>71%) and most students are state residents (76.6%) and under age 25 (72.5%). In addition to commuter

versus residential status the variables analyzed included demographic characteristics, precollege academic performance (high school GPA and ACT Composite and SAT scores), and student statuses during college (cumulative GPA, enrollment status, earned credits, class standing, retention, athletic involvement, and financial aid).

One aim of the study was to develop a model that could differentiate residential and commuter students based on student profile attributes (Gianoutsos and Rosser, 2014). The model accurately classified 87.9% of the total sample of 2,639 students, including 92% of the commuter students and 71.8% of the residential students. Residential students were more likely to be African American, come from families with higher SES and parental education, earn more credits, and receive more financial aid, including grants, loans, and work study. Commuter students were more likely to be Latino and to be in-state students. No other sociodemographic factors distinguished between the two groups. Despite these differences in profile, with the exception of accumulated credits there were no differences between the two groups on measures of academic success.

Adult Students

Markle (2015) focused on nontraditional-age students who represent a growing presence in U.S. higher education. For the purpose of this research, which was based on role theory, nontraditional students were defined as students who are: age 25 or older or with a five-year gap between high school and college, employed full-time or part-time, or have the role of spouse, domestic partner, parent, or caretaker. The mixed methods study captured the effects of demographic, academic, and situational factors on persistence through quantitative analysis, augmented by qualitative accounts of the participants' reasons for contemplating leaving or remaining in college and recommendations for institutional support.

Role theory offers an excellent framework for understanding the college experience of students involved in balancing their studies and educational goals with work and family responsibilities. Thus interrole conflict was chosen as a situational factor, along with social integration, university satisfaction, confidence in graduating, and considering withdrawal (Markle, 2015). Notably, persistence was tracked over three years based on the Consortium of Student Retention Data Exchange documenting attrition rates of 21%, 11%, and 9%, respectively for the first, second, and third or subsequent years of college.

The sample was composed of 494 nontraditional students attending a large public university (Markle, 2015). Not unexpectedly, GPA was an important contributor to persistence as was confidence in graduating. These factors affected persistence for both women and men. For women, enrollment status also predicted persistence; in contrast to the typical pattern for traditional age students, women enrolled part-time were more likely to persist. This pattern makes sense in light of the higher levels of interrole conflict reported by women. Several women related being "put down" or "patronized" by professors, especially in regard to parental responsibilities (p. 277). Markle noted that none of the men were criticized or downgraded for having families. While women were most likely to consider leaving college due to interrole conflict, men were most concerned with financial issues and tended to view continuing college through a cost-benefit lens. Despite having different concerns, academic factors were the overarching predictors of persistence for men and women, who persisted at comparable rates. Though the women perceived more barriers to attaining their educational goals, according to Markle, they displayed a *"will to persist* [original emphasis] that enabled them to overcome obstacles and ultimately graduate" (p. 281).

In response to the question of what services the university could provide to alleviate the stress experienced by the students, affordable on-campus child care and more night courses were two suggestions more relevant to nontraditional students, but other suggestions are consistently found in the higher education literature: expanded course offerings, better student advising, and greater access to faculty members (Markle, 2015). The increasing numbers of nontraditional students in higher education add more weight to the assertion that institutions will boost their retention rates by allocating more resources to student services (R. Chen, 2012). The qualitative responses of Markle's (2015) participants also highlight the importance of psychosocial factors, especially for students who face obstacles to persistence (Laskey & Hetzel, 2011).

International Students

Mamiseishvili (2012) observed that while there are numerous studies exploring the cultural and adjustment aspects of international students' college experience, there is almost no research on international students' persistence. Drawing on Hagedorn's (2005) distinction between persistence and retention, Mamiseishvili (2012) notes that colleges and universities invest heavily in attracting and retaining international students but without knowledge of the factors that influence their decisions to persist (or not). A common presupposition is that international students have strong academic and financial resources and intend to return to their home countries but even if accurate, this profile fails to provide insight into the personal characteristics and college experiences that drive persistence.

Using logistic regression modeling, Mamiseishvili (2012) analyzed data on international students drawn from the Beginning Postsecondary Longitudinal Study (BPS:04/06) dataset, focusing on a sample of 200 foreign or international students. Asian students accounted for nearly half the sample and roughly three-quarters received some financial support from their

parents. An interesting finding was that a substantially higher proportion of students within the sample attended two-year colleges than the figure reported for the overall international student population for academic year 2003-2004 (41.9% versus 13.2%). Mamiseishvili made use of relative weights to correct for oversampling and create a more representative sample.

The variables under study included race/ethnicity, gender, first-year GPA, enrollment patterns, remediation, type of first institution, degree plans, net price of college attendance, financial aid, financial assistance from family, and finally, academic and social integration (Mamiseishvili, 2012). Reflecting the national profile of international students, most received financial help from their families but less than one-third received financial aid. Most lived off-campus (62.2%) and consistent with the requirement of most institutions, most international students were enrolled full-time (78.6%). On average, these students had high GPAs (3.17), and less than one-quarter took remedial coursework. Notably, only 12% of the students who persisted took a remedial English course, compared to 32.8% of the students who dropped out.

In the final model, GPA, degree goals, and academic integration were significantly associated with first-year persistence, thereby highlighting the importance of the academic aspects of the college experience for international students (Mamiseishvili, 2012). The high average GPA of the group attests to their academic commitment. In fact, social integration had a negative influence on persistence implying that more successful international students devote their time and energy to academic pursuits. Mamiseishvili noted that the lower persistence of international students required to take remedial English has been reported in other studies. Like Soria and Stebleton (2012) and Musoba and Krichevskiy (2014), Mamiseishvili (2012) recommends collaborative learning and other first-year learning experiences that promote academic and social engagement.

Business Students

Despite the "difficult" label attached to mathematics and science courses, students who major in STEM disciplines are more likely than non-STEM majors to persist to earn a degree (X. Chen, 2013). A potential explanation is that STEM students enter their programs with clear goals for their major and future career. As Willcoxson and Wynder (2010) observed, a number of studies have found that entering college with a definite major and choice of career increases the probability of persistence. Based on these findings, the researchers theorized that within a professionally oriented program, students involved in a course of study connected to a specific career would be more invested in earning their degree than students enrolled in a more general course of study.

Willcoxson and Wynder (2010) tested their theory by investigating and comparing the college experiences and intentions of students enrolled in three different majors within a College of Business: Bachelor of Accounting, which prepares students for professional accreditation; Bachelor of Business in Marketing, which prepares students for a specific career that has no requisite accreditation; and a generic Bachelor of Business in which students are free to choose from an array of business courses. The study took place at a small, regional university in Australia where roughly half the student population is composed of nontraditional and first generation students. The sample included 90 accounting majors, 50 marketing majors, and 92 business majors.

Distinct differences arose between the accounting majors, who were most likely to be employed and enrolled part-time and the marketing majors, who were typically new high school graduates attending college full-time (Willcoxson & Wynder, 2010). However, consistent with the proposed effects of clear career goals both the accounting and marketing majors expressed

stronger commitment to fulfilling their degree aspirations than the generic business majors. Detailed analysis revealed that within the two career oriented majors, those accounting and marketing majors with the clearest occupational goals expressed the greatest commitment. It is notable that for the accounting majors, goal clarity overrode the potential liability of their part-time and adult learner status on persistence. Although the study examined intentions as opposed to behavior, intention is the central facet of Bean's (1982) model, which is derived from theories of organizational turnover and planned behavior. Moreover, the differences in intentions between the three groups of students are congruent with the programs' respective attrition rates, which average 24% for accounting students, 26% for marketing students, and 30% for students in the generic Bachelor of Business (Willcoxson & Wynder, 2010).

Willcoxson and Wynder (2010) proposed that academic performance would be more influential for students in the accounting and marketing programs than the generic business program; however, that assumption was only supported for the accounting students. It seems plausible that students who perform poorly in a professional discipline would lack confidence in their ability to pass a certification exam and therefore be more inclined to drop out. At the same time, the analysis revealed a strong association between poor academic performance on the part of the Bachelor of Business students and intentions to leave the program. In fact, for these students who lacked clear career goals, academic performance appeared to be the most important factor in persistence. The findings of Willcoxson and Wynder may be applicable to students in undergraduate health sciences administration programs, who differ with respect to their choice of and commitment to specific careers within the field.

Smith et al. (2012) also focused on students enrolled in business courses at an Australian university in their endeavor to create a predictive model for identifying students at risk for failure

in a first year accounting unit. A constellation of personal characteristics that affect academic performance were derived from an extensive review of the literature and information available in the university database. This excluded the students' prior GPAs and college entrance exam score, which were not available although the researchers recognized their potential value in predicting college performance. The analyses drew comparisons between demographic and academic characteristics of the 206 students who passed the unit and 119 students who failed.

In the final regression analysis the factors distinguishing students at risk for failure were male gender, younger than age 25, non-business major, English as a second language, and deferring completion of the accounting unit beyond the first semester (Smith et al., 2012). Smith et al. acknowledged that the model's predictive value was poor, explaining less than 11% of the variations in performance. The inclusion of prior GPA and college entrance exam scores would probably enhance its explanatory power; in fact, Smith et al. regard the absence of the entrance score a serious limitation. Furthermore, Smith et al, like Stephan et al. (2015) recognize that their datasets lack psychosocial characteristics that affect academic behavior. Smith et al. (2012) also note that factors such as class size, teaching quality, or other features of the learning environment could affect students' success in the accounting course.

Online Course Retention

Although online course retention may be a distinct strand of research, the study of Cochran et al. (2014) was included as it focused on creating a predictive model based on student characteristics derived from research with face-to-face university students. A unique strength of the study is that it examines retention at the course and the institutional level. The sample involved 2,314 undergraduate students enrolled in online courses at one university during the

spring 2010 semester. The characteristics analyzed were: age, gender, race/ethnicity, GPA, financial aid status, major, and online course withdrawal history. Business students made up the largest proportion of online learners, followed by students in the humanities and social science, and health sciences. Binary logit regression was used to determine the magnitude of relationships between withdrawal from online courses and the variables under study.

For almost all student subgroups, cumulative GPA was significantly linked with persistence (Cochran et al., 2014). Specifically, students with GPAs of 3.0 or higher were least likely to drop out. However, GPA was not significant for Black students, older students, or students awarded Pell grants. Despite the strong association between GPA and persistence in the final model, GPA was only significant for business and STEM majors. Age, on the other hand, was the only significant factor for students in the health sciences, where older students (>24 years) were less likely to withdraw. The findings for gender were intriguing. In business and STEM majors where men predominate, women were more likely to drop out, whereas in health and education where women are in the majority, men were more likely to drop out. This finding parallels the patterns for STEM and health disciplines in general (Herrera, 2013; Whalen & Shelley, 2010). In the interaction between ethnicity and major, Black students were less likely than other students to withdraw within the business major but more likely to withdraw within education (Cochran et al., 2014). Previous withdrawal from an online course was only significant for business majors.

For all students, the overarching predictor of online course persistence was academic experience (Cochran et al., 2014). Seniors were least likely to drop out and the probability of persistence decreased with each class rank. To some degree this reflects the fact that seniors are more mature and have successfully persisted through their college career. The health science

majors were the only exception to this effect, probably because age was more influential. As many institutions now require students to complete at least one online course in order to graduate, this study reveals which students may be at risk within their respective disciplines.

Institutional Characteristics

In contrast to Jones-White et al. (2010), who argue that college success is often defined through an institutional lens as opposed to a student-centered perspective, R. Chen (2012) takes the opposite standpoint; namely that a "student-centered research tradition" has led to neglect of the role institutional features play in students' persistence or withdrawal. Certain attributes such as size, selectivity, and student demographics have been empirically linked with retention (ACT, 2014). However, the influence of faculty characteristics on students' persistence has rarely been examined and the few studies that have examined the effectives of institutional expenditures have produced inconclusive results (R. Chen, 2012). In order to provide a comprehensive analysis of the interaction between student and institutional characteristics, R. Chen synthesized elements of Tinto's (1993), Bean's (1982), and Berger and Milem's (2000) work into a conceptual model. Based on the premise that institutional demographics, structural features, faculty, and financial resources potentially influence student' risk of dropping out, the innovative study examined these institutional factors in conjunction with students' sociodemographic profiles, aspirations and achievement, financial aid, and integration into campus life using multilevel event history modeling (R. Chen, 2012). Two national datasets were combined for the study: the Beginning Postsecondary Students (BPS96/01) and the Integrated Education Data System (IPEDS) 1995-2000.

In accordance with Tinto's (1993) theory, students' educational aspirations, first-year GPA, and academic and social integration all diminished the risk of dropping out of the institution (R. Chen, 2012). Furthermore, the more financial aid students received, the less likely they were to drop out. A particularly notable finding was that financial aid that decreases net tuition such as Pell grants or merit aid was especially beneficial for low-income students, serving to narrow the dropout gap between low-SES students and their more affluent peers. Consistent with this finding, Musoba and Krichevskiy (2014) observed that Latino students awarded larger dollar amounts of financial aid during their first semester had a higher probability of graduating and total financial aid had a significant impact on whether Latino students dropped out or persisted. For Black students, however, financial aid had a negative impact on graduation. Those students with the greatest need for financial support received the highest dollar amounts, but the researchers surmised that the package might still have been insufficient to cover their needs. Overall, Black and Latino students whose families had higher incomes were more likely to graduate. Neither family income nor financial significantly influenced graduation rates for White students. The data confirmed that all students were most likely to leave the first year.

At the institutional level, expenditure on student services emerged as a critical factor in students' decisions to leave or stay (R. Chen, 2012). Specifically, greater investment in student services translated into lower student dropout rates. Interestingly, financial investment in instruction and academic support were not significantly connected to dropout risk. Based on these findings, R, Chen decried the traditional viewpoint that financial investment in student services is frivolous or superfluous. The study confirmed the importance of financial aid for retaining students. It seems plausible that students from underrepresented or nontraditional groups such as first generation, minority, international, and mature students, already at

heightened risk for dropping out, would gain the greatest benefit from investment in student services that fit their unique needs.

Social and Academic Engagement

Drawing on Tinto's (1993) theory, Flynn (2014) used data from BPS:04/09 to investigate the effects of academic and social engagement on persistence and baccalaureate degree completion. The persistence analysis involved 8,700 students from 1,350 colleges and universities and the degree attainment sample involved 8,250 students. The Academic and Social Integration Index scales captured academic and social engagement, with separate scores for each measure for 2004 and 2006. Persistence and degree attainment were calculated by two separate logistic regression analyses. The variables included were student demographics, GPA, and major, and institutional attributes.

The first research question examined the students' junior year persistence as a reflection of first year engagement (Flynn, 2014). The relationship between the two was fairly weak, although Black and Latino students who were more engaged had higher probability of persistence. The second research question explored the association between engagement and graduation after controlling for student and institutional attributes. Academic and social engagement during the freshman year both proved to be predictive of baccalaureate degree attainment. With ethnicity in the equation, however, the findings were paradoxical compared to the results for persistence. That is, Black and Latino students who were more engaged were more likely to persist but less likely to graduate. It is possible they took longer to graduate than the six years covered by the data. This unusual pattern merits further research.

The final research question explored the interactions of student engagement behaviors in relation to degree completion (Flynn, 2014). Notably, the effects of academic and social engagement were independent of each other. There was no additive effect. The pattern implied that increasing either academic or social behavior should increase the probability of successfully earning a bachelor's degree. The findings also suggested that for graduation, third year rather than first year engagement is more important. The overarching finding is that student engagement is directly connected with persisting through college to graduate with a baccalaureate degree. Having formulated the theory on which this line of research is based, Tinto (2012) is most concerned with translating theory and research into effective practices at the institutional level.

As part of ongoing research on learning outcomes, Hu and McCormick (2012) used students' responses to the 2006 Wabash National Study of Liberal Arts Education (WNSLAE) to create a typology of student engagement. The study was based on 2,290 students from a broad array of baccalaureate institutions. Engagement scores were based on five benchmarks: degree of academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, and supportive campus environment. Seven types emerged from the analysis: *Academics, Unconventionals, Disengaged, Collegiates, Maximizers, Grinds,* and *Conventionals.* Grinds were used as the control for comparison purposes.

Logistic regression modeling for persistence revealed marked differences among the various types (Hu & McCormick, 2012). Maximizers had nearly six times the probability of persisting to the sophomore year as Grinds. For Academics, Unconventionals, Collegiates, and Conventionals, the probability of persisting relative to Grinds ranged from 1.9 to 3.7 times higher. The Grinds and Disengaged had comparable odds of persisting. However, as the title

implies, the Disengaged represented a particularly high risk group for poor college outcomes. Beyond their engagement profile they had lower GPAs than the other groups, who despite their different attributes had similar GPAs. Men were overrepresented among the Disengaged, which could contribute to their lower graduation rates (Ewert, 2012). Black students were disproportionately represented among the Maximizers, who had high scores on all engagement measures and strong positive learning outcomes, which may be reflected in the higher retention rates of Black students reported in some studies (Stewart et al., 2015). Hu and McCormick (2012) recommend early intervention for students who fit the Disengaged profile.

Community College Transfer Students

In 2009, President Obama launched the American Graduation Initiative for community colleges as part of the overall goal of increasing the proportion of U.S. adults with college degrees (Tuttle & Musoba, 2013). Colloquially known as the "people's college," public two-year colleges have long represented a pathway for upward mobility for low-income and underrepresented minority students. In difficult economic times, more middle-class students have come to view entry into a community college as a cost-effective option for beginning a college career. Indeed, a majority of students enter community colleges with the aim of transferring to a four-year institution and earning a bachelor's degree (D'Amico, Dika, Elling, Algozzonine, & Ginn, 2014; Niu & Tienda, 2013). However, the national data reveal a substantial gap between these students' expressed aspirations and their attainment of their educational goals.

Wang (2009) used data from NELS:88 and the Postsecondary Education Transcript Study (PETS), which extended NELS to 2000, to explore the relationships of students'

sociodemographic characteristics, precollege characteristics (high school curriculum, self-concept, locus of control, baccalaureate aspirations), college experience (full-time enrollment, remediation in reading, remediation in mathematics, college involvement, community college GPA), and environment factors (employment hours, dependents) to persistence and attainment of a bachelor's degree by students who transferred from a community college. The analysis, using logistic regression models, was based on 786 transfer students.

Of the sample of transfer students, slightly more than three-quarters (76.2%), and 62.6% earned a bachelor's degree by 2000 (Wang, 2009). Female students were more likely to graduate than their male counterparts, reflecting overall gender differences in graduation from college (Ewert, 2012). In addition to the effects of gender, students from higher SES backgrounds, who were in an academic rather than vocational curriculum in high school, had aspirations to a baccalaureate degree by 12th grade, had higher community college GPAs, and who were more involved in college had higher probability of graduating from their four-year college (Wang, 2009). Higher community college GPA was associated with both persistence and graduation.

While placement in remedial reading had no effect on graduation, remedial math placement had a negative impact (Wang, 2009). Most students who require remediation do so in math (Crisp & Delgado, 2014). Using data from BP:04/09, Crisp and Delgado found that placement in developmental education for reading and mathematics adversely affected the probability of community college students transferring to a four-year institution. In addition, developmental education students were disproportionately racial and ethnic minority and first generation students, which intensified the risk for dropping out of college irrespective of developmental education persistence.

In Wang's (2009) analysis, the major contributors to persistence were community college GPA and perceived locus of control (Wang, 2009). Wang argues that the role of locus of control in college persistence warrants more research attention as it may signify that students hold themselves accountable for their educational outcomes and thus may be more motivated to persevere through challenges to attain their goals. Indeed, Astin (1999) made a similar claim two decades ago. Notably, locus of control maintained its predictive value even after controlling for other factors (Wang, 2009). Internal locus of control may protect against the "transfer shock" that some students experience upon entering a four-year college (Tuttle & Musoba, 2013).

Tuttle and Musoba (2013) investigated the persistence of community college transfer students at the Hispanic-serving research university where Musoba and Krichevskiy (2014) conducted their research. As in the study of first-year course completion, financial aid was one of the factors under study. In fact, financial was a focal point of the study, which examined the effects of both *type* and *amount* of financial aid awarded to transfer students on persistence (Tuttle & Musoba, 2013). Tuttle and Musoba noted that financial aid has rarely been studied in relation to transfer students' persistence, which is ironic given that lower-income students are most likely to begin their college careers at a community college (Kena et al., 2015).

The transfer students were all Associate of Arts degree graduates who entered the university over four consecutive fall terms (Tuttle & Musoba, 2013). Three separate multinomial models were analyzed to capture the effects of financial aid: (a) type of financial aid, (b) dollar amount of need-based financial aid, and (c) dollar amount of loans. These aspects of financial aid were analyzed in conjunction with sociodemographic and academic factors. As in other studies, students with higher university GPAs were more likely to graduate; thus the research documenting the strong predictive value of college GPA includes transfer students as

well as traditional students (Stewart et al., 2015), international students (Mamiseishvili, 2012), and mature students (Markle, 2015). Among the transfer students, however, older students were less likely graduate and full-time students persisted at higher rates (Tuttle & Musoba, 2013).

The findings revealed a strong association between higher GPA and financial aid; that is, students who received higher dollar amounts of need-based grants earned high grades (Tuttle & Musoba, 2013). Similar effects were observed in the studies of Musoba and Krichevskiy (2014) and R. Chen (2012). According to R. Chen's (2012), needs-based financial aid packages substantially boost retention for low-income students and work to narrow the socioeconomic graduation gap. Tuttle and Musoba (2013) find this especially relevant for Hispanic students, who often begin college at a community college and attend college part-time so they can work to pay their tuition rather than having to take out loans: a pattern that undermines their chances for graduation. To Tuttle and Musoba, institutions that actively support Hispanic students and encourage them to apply for financial aid thus allowing them to be more engaged in campus life, would enjoy higher retention rates among their Hispanic students. Loan amounts had no effects on persistence and graduation. Notably, after controlling for other factors, Hispanic students had higher graduation rates than their White peers, which Tuttle and Musoba ascribe to the culture of the Hispanic-serving institution.

D'Amico et al. (2014) used Tinto's (1993) interactionist theory to explore the adjustment and success of community college transfer students. The researchers noted that despite the widespread use of the theory it has rarely been applied to transfer students. The aim of the study was to discern factors connected with the early academic and social integration of transfer students at the four-year institution. Regression models for early academic and social integration and success were assessed by six outcome measures: first semester GPA, second semester GPA,

second semester enrollment, third semester enrollment, first semester earned hours ratio, and second semester earned hours ratio. The study took place at a large, urban university located in the South with a sizable population of transfer students. The university is part of a state system partnership between two-year and four-year institutions facilitate seamless transfer. The participants were 968 transfer students.

Perceived academic fit emerged as the most consistent predictor of successful integration by association with all outcome variables except second semester earned hours (D'Amico et al., 2014). Perceived social fit was not significantly related to successful adjustment but was associated with lower GPA, thus supporting the idea that social integration can detract from academics. Academic fit and classroom participation were the strongest predictors of persistence to the second semester). Tinto (2012) views academic engagement as the focal point for adopting practices and cites the importance of involving students in the classroom. Paradoxically, students who were more satisfied with their major were less likely to return but the difference was minimal and the overall rate of persistence was high (91.5% who were satisfied with the major and 95.4% who were not satisfied).

Although higher transfer GPA predicted higher academic performance, GPA did not affect persistence (D'Amico et al., 2014). This contrasts with Wang's (2009) findings. Being a STEM major was associated with lower GPA and fewer earned hours. A high proportion of STEM professionals began college in associate degree programs and transferred (X. Chen, 2013). At both associate and baccalaureate degree levels STEM students with higher GPAs are more likely to persist, but students with lower GPAs often switch majors rather than drop out of college. D'Amico et al. (2014) noted that interactions with faculty and peers at the university had minimal impact. However, meeting with advisors during the second semester was important

to further success. The overarching implication is that promoting the success of community college transfer students should be centered on academic engagement.

First Year Retention

DeNicco, Harrington, and Fogg (2015) investigated an array of factors affecting first-year to second-year retention of 1,800 students who began their college careers at a community college within a large state public higher education system in 2006. Retention was defined as being enrolled at any of the state institutions in fall 2007 and thus included both transfer students and associate degree candidates. The researchers used logistic regression modeling, first analyzing demographic characteristics, and adding high school attributes, Accuplacer assessment scores, first year academic performance, and remediation. In contrast to Niu and Tienda (2013), who focused on high school socioeconomic composition, DeNicco et al. (2015) concentrated on the feature of the learning environment, encompassing graduation and dropout rates, standardized test performance, suspensions, and attendance rates.

Freshman year academic performance proved to be the most powerful predictor of retention the following fall (DeNicco et al., 2015). Both freshman GPA and the number of credits earned were significant in the model. Indeed, in the final model no other variables retained significance. Remedial coursework per se was not significantly linked with retention although it may operate indirectly by detracting from the number of credits students earn for degree completion or transfer. The recommendations of DeNicco et al. (2015) for retaining students reflect Tinto's (2012) assertion to focus on engaging students academically.

Conclusion

Despite an abundant body of theoretical and empirical literature, increasing importance of a college education, and investment by institutions in retaining students, college graduation rates have been virtually stagnant for more than 30 years (Tinto, 2012). The vast majority of high school seniors aspire to college but scarcely 60% persist to earn a degree (Stephan et al., 2015). Guided by the development of theoretical models, notably Tinto's (1993) interactionist models, researchers have been creating elaborate models designed to illuminate the complex interaction between student characteristics and features of the college experience. National statistics show that low-income, first generation, and underrepresented minority students are less likely to graduate (Kena et al., 2015). However, the negative effects of demographic (unchangeable) characteristics are often less significant when other factors are considered. Pell grants and merit based aid, for example substantial narrow the graduation gap between high and low-income students (R. Chen, 2012). Higher GPA is almost invariably linked with persistence across different contexts, including first-year college persistence (Stewart et al., 2015), community college transfer (Wang, 2009), and online course completion (Cochran et al., 2014).

A distinct flaw in most models is that they are based on data from institutional databases that do not include psychosocial characteristics that influence motivation and behavior (Markle, 2015; Shaw & Mattern, 2013). As a consequence explanatory power tended to be limited if not poor (Smith et al., 2012; Stephan et al., 2015). The engagement typology created by Hu and McCormick (2012), derived from multiple analyses of students' responses, offers a useful framework for helping to identify at-risk students in conjunction with student information from the institutional database. The overall findings are consistent with Tinto's (2012) current

position that promoting academic engagement through high-impact learning activities should be high priority for improving persistence and retention to the advantage of the students and the institution.

CHAPTER III

PROCEDURES

The current study addressed two primary research goals. The first was to identify student-level demographic, academic, and financial variables that contributed to one-year retention and six-year graduation for first-year students in a Health Services Administration (HSA) bachelor's degree program. The second goal is to identify these student-level predictors of four-year graduation in students transferring into the same bachelor's degree program from two-year community colleges. Using binary logistic regression, the research investigated the relative contribution of demographic variables, including age, gender and ethnicity, academic variables, such as standardized test scores, and financial aid status. Given the exploratory nature of the study, advancing specific hypotheses was inappropriate. Therefore, the models tested the null hypothesis that none of the demographic, academic, or financial variables would predict retention and graduation rates, and the alternative hypotheses that at least one of the variables would predict retention and graduation rate. It was expected that many of the variables that have contributed to retention and graduation rates in other types of programs (e.g., SAT scores, receipt of financial aid) would also contribute to retention and graduation in an HSA program.

Method

Data Characteristics

The population of interest in this study was all students enrolled in bachelor's degree programs for HSA. Given the goals of this study, research questions focused exclusively on students in their first year in the program. Data were drawn from a large database of student records obtained by retention offices for a large public university in the southeastern United

States. The data included all first-year students enrolled in the HSA program from 2007 to 2014. The overall sample was divided into two sub-samples. The first included all first-year students entering the program directly from high school. From this point forward, this sub-sample will be identified as First Time in College (FTIC) students (n = 481). The second sub-sample included all first-year students transferring into the HSA program from two-year community colleges (n = 351). Following, D'Amico et al. (2013), students transferring from other four-year institutions or from other academic programs within the institution under investigation were excluded from all analyses.

Descriptions of Variables

The focus of the current study was to use student demographic, academic, and financial variables to predict retention and graduation rates. Key predictor and outcome variables are described here.

Demographic Predictor Variables

This investigation used student age (in years), gender (male vs. female), and ethnicity as predictor variables. All demographic data were self-reported.

Academic Predictor Variables

Academic aptitude upon admission to the program was be assessed differently for FTIC and transfer students. For FTIC students, high school GPA (0 – 6.0[1]), standardized college

[1] Several students graduating high school have GPAs over the traditional maximum of 4.0. This is because "honors" courses and courses for college credit award up to a 6.0 for an A, a 4.5 for a B, etc. In the current sample, 27 FTIC students had high school GPAs over 4.0.

admission testing scores (SAT; 1600 scale), and full-time status (full- vs. part-time) served as the primary academic predictors.

For transfer students, community college GPA (0 – 4.0), the raw count of required pre-requisites taken at the community college level (0 – 5), and full-time status (full- vs. part-time) served as the primary academic predictors. All academic indicators, for both FTIC and transfer students were drawn from official academic transcripts (i.e., they were no self-reported).

Two additional academic variables were assessed in an identical fashion for FTIC and transfer students and both were measured via official university records. The first was whether the student initially declared as an HSA major upon entry into the program. This was a dichotomous variable (initially indicated as HSA major vs. declared as another major). Full-time academic status was also measured as a dichotomous variable (full-time vs. part-time).

Financial Predictor Variable

Student financial aid status served as the financial predictor. This was a binary variable (yes vs. no) indicating whether the student had financial support in the form of a federal Pell grant.

Outcome Variables

The focal outcomes for this study were retention and graduation for first-year students in the HSA program. For FTIC students only, retention were assessed at one year after entry into the program. This was be a binary variable (retained vs. not retained) and was measured based on whether the student was still enrolled in the HSA program at this institution in the fall semester of their (potentially) second year in the program.

Graduation status was assessed for both FTIC and transfer students, but was measured slightly differently for the two sub-samples. For FTIC students, a binary variable (graduated vs. not graduated) indicated whether the student had graduated from the HSA program at this institution within *six* years of their first semester in the program. For transfer students, a binary variable (graduated vs. not graduated) indicated whether the student had graduated from the HSA program at this institution within *four* years of their first semester in the program. This discrepancy accounts for the fact that transfer students typically have two years of collegiate education completed upon entry to the program. Thus, this approach assessed retention for all students within six years of beginning their college education.

Data Analyses

IBM's Statistical Package for the Social Sciences (SPSS) was used for all analyses. The program was chosen because of the ease of importing from Microsoft Excel (the format in which the data were originally obtained) and because of the ease of the interface (i.e., "point and click") for conducting relatively simple models.

There were essentially three outcome (dependent) variables in this study. The first was one-year retention rates (retained vs. not retained) for FTIC students during their first year in the HSA program. The second was six-year graduation status (graduated vs. not graduated) for FTIC students. The third was four-year graduation status (graduated vs. not graduated) for transfer students. Given that each of the outcome variables were binary (rather than continuous), the current study used binary logistic regression to answer the following research questions.

1. Which demographic, academic, and financial variables were the best predictors of "retained" status one year into the program for first-year FTIC students in the HSA program?

2. Which demographic, academic, and financial variables were the best predictors of six-year "graduated" status for first-year FTIC students in the HSA program?

3. Which demographic, academic, and financial variables were the best predictors of four-year "graduated" status for first-year transfer students in the HSA program?

Given the differences in the operationalization of the predictor and outcome variables for FTIC and transfer students, analyses were only for the appropriate sub-sample (e.g., one-year retention status only served as an outcome variable in the FTIC sub-sample). Thus, three binary logistic regression models were analyzed (one for each of the three research questions listed above). In each of the models, all demographic, academic, and financial variables were entered simultaneously as predictors, with one-year retention status (FTIC students), six-year graduation status (FTIC students), and four-year graduation status (transfer students) each taking turns as the dependent variable. The decision to enter all variables simultaneously (rather than using step-wise entry) was made in consideration of the exploratory nature of the study.

It should be noted that logistic regression (as opposed to discriminant function analysis or DFA) was appropriate for these data because the sample size was relatively large. Logistic regression is also better-suited for categorical predictors, which are present in the current study, and for handling any statistical outliers in the predictor variables (e.g., standardized test scores, age, etc.).

There are three focal statistics reported here. The first are the unstandardized betas (and accompanying p-values), providing an indication of the relative role that each predictor variable

plays in classifying students according to the focal binary variable. The second was the odds ratio (and 95% confidence interval), providing an indication of the additional probability of being classified into the non-reference group for each one-unit increase in the predictor variable. The third reported variable was the classification accuracy rates (0 – 100%). It is expected that better-than-chance classification accuracy (> 50%) will be obtained with each of these models.

CHAPTER IV

RESULTS

Descriptive statistics and demographic information for each variable, separately by sub-sample (FTIC vs. transfer students), are discussed. Next, the results of three binomial logistic regression analyses, which were conducted to investigate predictors of retention and graduation rates in the FTIC student sub-sample and graduation rates in the transfer student sub-sample, will be discussed. Results of logistic regression analyses are discussed separately for the sub-samples because predictor variables used in each sub-sample differed slightly.

Descriptive Statistics and Demographic Information

Table 1. Descriptive Statistics and Demographic Information Separately by Sub-Sample

Variable	FTIC Students (N = 481)	Transfer Students (N = 351)
Outcome variables [a]		
One-year retention	80.2%	--
Six-year graduation	51.4%	--
Four-year graduation	--	70.1%
Categorical Predictor Variables		
% Full-time status	93.6%	41.6%
% HSA as initial major	39.9%	88.0%
% Male	27.7%	21.7%
% Latino participant	59.3%	63.0%
% Black participant	21.6%	25.6%
% White participant	7.3%	5.1%
% Asian/Pacific Islander participant	5.6%	3.7%
% Other race participant	6.2%	5.1%
% Financial aid recipient	54.1%	60.1%

Continuous Predictor Variables		
M *(SD)* Age in years	18.67 (2.04)	24.99 (5.34)
M *(SD)* SAT score (1600 scale)	1041.61 (80.19)	--
M *(SD)* High school GPA	3.67 (.47)	--
M *(SD)* No. of transferred pre-requisites	--	3.36 (1.44)
M *(SD)* Transfer GPA	--	2.94 (.61)

[a] Values are percentages of participants meeting criteria for each outcome variable.

Descriptive statistics and all other relevant demographic information is provided separately for each sample in Table 1. There are some notable differences between First Time in College (FTIC) and transfer students on several dimensions, especially with regard to age at entry (transfer students were older) and likelihood of qualifying as "full-time" (higher in FTIC students). Transfer students were also more likely to receive financial aid and to identify HSA as their initial major upon entry into the program. Quite importantly, transfer students were more likely to graduate from the HSA program at this institution within four years (70.1%) than FTIC students were to graduate within six years (51.4%). As a matter of fact, the only dimension on which the two sub-samples seem to be somewhat similar is in terms of their racial/ethnic composition. For instance, both samples are made up largely of Latino students (59.3% for FTIC students and 63% for transfer students). The fact that there are more differences than similarities between the two sub-samples underscores the need to examine these samples separately.

Predictors of One-Year Retention in FTIC Students

A binomial logistic regression analysis was conducted for FTIC students to determine whether any of the focal demographic, academic, or financial predictor variables predicted one-year retention (by the HSA program at this institution, from first to second year). Participant ethnicity was originally coded as a five-category variable. In order to allow for accurate interpretation of these results, the original five-level categorical variable was replaced with a

binomial dummy-coded variable. Since the sample overwhelming identified as Latino (see Table 1), this group served as the reference group.[2] All predictors were entered simultaneously. Student cohort (year of entry into the program) was also entered as a covariate for control purposes.

A summary of this analysis is presented in Table 2 (middle column). Results revealed just one significant, but interesting finding. Students who began their college career as a Health Services Administration (HSA) major were less likely to be retained by the program (OR[3] = .12, p[4] = .006). In this data set, FTIC students beginning their studies as HSA majors had 12/100 (or 3/25) chance of being retained compared to students who did not begin in the HSA program. While there were no specific hypotheses advanced about this academic variable, the finding is counterintuitive and is discussed in detail in Chapter V.

Gender, age, dummy-coded ethnicity, full-time status, high school GPA, SAT scores, and financial aid status did not predict one-year retention. Again, no specific hypotheses were made. However, the fact that age, gender, and race were not significant predictors of retention was particularly striking, given findings from previous studies. That GPA and SAT scores were equally useless to the model was also surprising, given that many universities use these measures explicitly as indicators of academic readiness. These findings will be discussed in detail in Chapter V.

The final model logistic regression model accurately predicted one-year retention status for 88% of participants.

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[2] For each of three predictive models (predicting one-year retention and six-year graduation in FTIC students, and four-year graduation in transfer students) a second analysis was conducted with White participants serving as the reference group for race. In these three additional models, dummy-coded ethnicity did not predict the outcome variables.

[3] OR = odds ratio. The odds ratio is the ratio of odds of an event occurring in one group compared to the odds of the event occurring in another group.

[4] The value of p is the probability of rejecting the null hypothesis when the null hypothesis is true.

Predictors of Six-Year Graduation in FTIC Students

A separate binomial logistic regression analysis was conducted for FTIC students to determine whether any of the focal demographic, academic, or financial predictor variables predicted six-year graduation (from the HSA program at this institution). As in the model predicting retention, participant ethnicity was entered as a binomial, dummy-coded variable, with Latino participants serving as the reference group. Again, student cohort was entered as a covariate for control purposes and all predictors were entered simultaneously. A summary of this analysis is presented in Table 2 (far-right column). As was the case with retention, students who began their college career as HSA majors were less likely to graduate within six years (OR = .15, p = .012; students beginning their studies as HSA majors had 15/100 or 3/20 chance of being retained compared to students who did not begin in the HSA program). As was the case with predicting retention, this finding – that students who initially declared for HSA were less likely to graduate – was unexpected and has strong implications for administrators within HSA programs. This finding will be discussed in Chapter V.

In addition, older students were more likely to graduate within six years (OR = 2.12, p = .005; students who were just one year older were 2.12 times more likely to graduate within six years) and students receiving financial aid in the form of a federal Pell grant were more likely to graduate within six years (OR = 4.91, p = .025; students receiving financial aid were 4.91 times more likely to graduate within six years). Each of these findings was to be expected given previous literature, but will be discussed later, specifically in terms of their implications for helping FTIC students get through the program successfully.

Other variables, including gender, dummy-coded ethnicity, full-time status, high school GPA, and SAT scores did not predict graduation within six years. Again, the fact that high school GPA and SAT scores were not useful predictors of graduation is interesting given the literature and has broad-reaching implications for administrators of this type of program. These and other counterintuitive findings will be discussed later.

This logistic regression model correctly accurately predicted six-year graduation status for 80.7% of participants.

Table 2. Binary Logistic Regression of Demographic, Academic, and Financial Predictors of One-Year Retention and Six-Year Graduation in FTIC Students

	Retained vs. not retained [a]		Graduated vs. not graduated [b]	
Predictor Variable	b[5]	Odds ratio (95% CI)[6]	b	Odds ratio (95% CI)
Demographic variables				
Sex [c]	-.13	.88 (.13, 5.84)	-.41	.67 (.13, 3.45)
Age	.40	1.49 (.94, 3.23)	.75**	2.12 (1.26, 3.58)
Ethnicity [d]	-.83	2.30 (.52, 10.15)	.08	.93 (.25, 3.40)
Academic variables				
HSA as initial major [e]	-2.13**	.12 (.03, .54)	-1.93*	.15 (.03, .66)
Full-time status [f]	1.16	3.18 (.31, 33.13)	1.13	3.10 (.32, 30.66)
SAT score	-.00	1.00 (.98, 1.01)	.00	1.00 (.99, 1.01)
High school GPA	.38	1.46 (.29, 7.32)	.96	2.60 (.56, 12.26)
Financial variable				
Financial aid recipient [g]	-.85	.43 (.10, 1.78)	1.59*	4.91 (1.22, 19.80)

[a] Not retained was the reference group; [b] Not graduated was the reference group; [c] Females were the reference group; [d] Latino participants were the reference group; [e] Students without HSA as their first major were the reference group; [f] Students with part-time status were the reference group; [g] Students without financial aid were the reference group.

* $p < .05$; ** $p < .01$

[5] b = unstandardized regression beta weight. The regression beta is a measure of the relative contribution of a predictor or independent variable to the outcome or dependent variable. In standard multiple regression, the beta represents the expected incremental increase in the outcome for each one-unit increase in the predictor variable. However, in logistic regression, the outcome variable is categorical. Thus, betas are not as interpretable as the accompanying odds ratio (explained in a previous note). It should be noted that the beta is directly related to the odds ratio. Positive betas will produce an odds ratio over 1, negative betas will produce an odds ratio under 1, and betas of 0 will produce an odds ratio equal to 1.

[6] CI = confidence interval. The confidence interval is the range of values within which the predictive model estimates the true value of the statistic (odds ratio) would fall in the population. In a 95% confidence interval, such as the ones presented here, the sample collected has provided an estimation of the population value of the odds ratio with 95% reliability. In general, the wider the confidence interval, the less reliable the finding.

Predictors of Four-Year Graduation in Transfer Students

A third binomial logistic regression analysis was conducted to determine whether any of the focal demographic, academic, or financial predictor variables predicted four-year graduation (from the HSA program at this institution) in first-year transfer students. As was the case in the FTIC sub-sample, participant ethnicity was entered as a binomial, dummy-coded variable, with Latino participants serving as the reference group. Again, student cohort was entered as a covariate for control purposes and all predictors were entered simultaneously. A summary of this analysis is presented in Table 3.

Unlike the patterns seen in the FTIC sub-sample, only academic predictor variables contributed to four-year graduation, though academic predictors were different for the transfer students than for FTIC students. Specifically, transfer students transferring in with more required pre-requisite courses were more likely to graduate within four years [OR = 1.82, $p < .001$; students were 1.82 times more likely to graduate within four years for each additional pre-requisite that they completed prior to entering the program (up to five)]. Students who identified as "full-time" students were also more likely to graduate within four years (OR = 3.22, $p < .001$; students who identified as full-time were 3.22 times more likely to graduate within four years); compared to students identified as "part-time". In the absence of specific hypotheses, both of these findings were to be expected, at the very least, and will be discussed in Chapter V.

Other variables, including gender, age, dummy-coded ethnicity, and initial HSA major status, transfer GPA, and financial aid status did not predict four-year graduation. Again, without specific hypotheses, it would be misguided to argue that these null findings were unexpected. However, they certainly are not in line with the literature, which suggests most robustly that

ethnicity and financial aid status are particularly important predictors of graduation, regardless of transfer status.

The final logistic regression model correctly predicted graduation within four years for 75.5% of participants. Taken together, these findings on predictors of graduation in transfer students are particularly intriguing because they do not seem to overlap with the predictors of graduation in FTIC students (i.e., HSA as initial major, age, and Pell grant status). The fact that FTIC and transfer students seem to function differently in the college environment is of interest here and in the literature and will be discussed in detail in Chapter V.

Table 3. Binary Logistic Regression of Demographic, Academic, and Financial Predictors of Four-Year Graduation in Transfer Students

	Graduated vs. not graduated [a]	
Predictor Variable	b	Odds ratio (95% CI)
Demographic variables		
Sex [b]	-.14	.87 (.46, 1.64)
Age	-.04	.96 (.92, 1.01)
Ethnicity [c]	.27	.76 (.43, 1.36)
Academic variables		
HSA as initial major [d]	.12	1.13 (.53, 2.42)
Full-time status [e]	1.17***	3.22 (1.79, 5.81)
No. of transferred pre-requisites	.60***	1.82 (1.50, 2.21)
Transfer GPA	.19	1.21 (.78, 1.87)
Financial variable		
Financial aid recipient [f]	.12	1.13 (.66, 1.95)

[a] Not graduated was the reference group; [b] Females were the reference group; [c] Latino participants were the reference group; [d] Students without HSA as their first major were the reference group; [e] Students with part-time status were the reference group; [f] Students without financial aid were the reference group.
*** $p < .001$

CHAPTER V

SUMMARY

This chapter will begin by summarizing and discussing the descriptive differences between the FTIC and transfer samples, as well as results of the predictive models for each of the demographic, academic, and financial predictor variables separately for First Time in College (FTIC) and transfer students and separately for each outcome variable. Next, the theoretical and practical implications of the findings will be discussed, followed by an acknowledgement of the study's limitations and suggestions for future research.

Descriptive Differences between Samples

Results of the focal predictive analyses for this study are described below separately for FTIC and transfer students, and the analyses that were conducted prohibit a direct comparison between the predictor-to-outcome relationships for the two sub-samples. However, before discussing the predictive models, it is important to point out some basic descriptive differences between the FTIC and transfer students, as some of these differences may have contributed to the focal patterns described in the sections below.

The most notable difference between the FTIC and transfer students was in one of the outcomes. Specifically, transfer students were more likely to graduate from this HSA program within four years than FTIC students were to graduate from this HSA program within years. There are likely several differences between the samples that contribute to this disparate outcome. First, transfer students were, on average, 6.32 years older than their FTIC counterparts. This is unsurprising, as most FTIC students enter the program in the fall following high school graduation, whereas, by definition, transfer students are *at least* two years removed from high school (and, often, qualify as "nontraditional" students). The data corroborate this conclusion to

an extent. As will be discussed later, a more mature age was a contributor to graduation for FTIC students, indicating that younger students were at a disadvantage in that sample. Thus, the overall younger age of the FTIC sample may be contributing to their lower graduation rate compared to the transfer counterparts.

Another important difference between the FTIC and transfer students was their initial commitment to the program. Transfer students were approximately twice as likely to initial declare as an HSA major upon entry into the program than FTIC students. This increased commitment to the HSA program may very well be contributing to the graduation success for the transfer sample as a whole.

Predicting Retention in FTIC Students

Demographic Predictors

Of the three demographic predictors used in this study to predict one-year retention in FTIC students (gender, age, dummy-coded ethnicity), none predicted retention. In the case of gender, recent findings had been markedly inconsistent. For instance, Shaw and Mattern (2013) found an advantage for male students, while Ewert (2012) found an advantage for female students. Prior to this study, age had been investigated as a focal variable far fewer times than gender. One study examined the interaction of age and gender, finding that age seemed to discourage retention in older women (Markle, 2015). The current sample size and study design prohibited a direct comparative analysis. However, age did not seem to be a factor here, as it was for students in a separate study (Cochran et al., 2014), where older students were significantly more likely to persist when taking online classes.

Perhaps the most surprising finding with regard to demographic predictors of retention was the null finding on ethnicity. Almost every study reviewed suggested that ethnicity was a major contributor to retention (e.g., Musoba & Krichevskiy, 2014; Stewart et al., 2015; Tinto, 2012). One possible explanation for the complete lack of contribution by each of our demographic predictors is that typical demographic information did not serve as salient cues for the students enrolled in this particular HSA program or in HSA programs in general. Practical and theoretical implications of that will be discussed below.

Academic Predictors

The sole predictor of retention in FTIC students was initial status as an HSA major. Specifically, students who entered the program in their first year already declared as HSA majors were significantly *less* likely to be retained by the program. There are several potential explanations for this. The most general explanation is that this is consistent with previous findings (e.g., Chen, 2013) that students in health services programs (among others) are less likely to be retained than those enrolled in traditional STEM programs. An extension of this explanation is that students' expectations are not met in health services programs. Perhaps they enter the program expecting their coursework to be more clinical, while it actually ends up being more business-oriented. Another explanation is institution-specific, such that students in *this* HSA program are particularly disappointed by their experience. In either case, a violation of expectations would be consistent with Tinto's (2012) model as a relevant predictor of retention.

Unexpectedly, the other three academic predictors – high school GPA, SAT scores, and full-time status – were not predictive of retention. The fact that high school GPA and SAT scores, in particular, were not significant predictors of retention, was especially surprising given a series of studies by Mattern and Patterson (2010, 2011, 2012a, 2012b, 2013). In one national

sample, Mattern and Patterson (2011) found that students with SAT scores above 2100 (on a 2400 scale) were twice as likely as students with scores below 900 to persist in a program from their second to third year. However, high school GPA and SAT scores were treated as continuous, rather than categorical predictors in the current study. Thus, the differences between the results presented in Chapter IV of this study and the series of Mattern and Patterson studies could speak to the differences between the two approaches to data analysis methodology. In short, the analysis conducted and presented in Chapter IV does not separate the two extremes of the distribution from one another, as was done in relevant previous studies.

To rule out the possibility that differences between the two study findings were due to analytical approaches, another logistic regression model was run in the FTIC sample predicting one-year retention. Here, continuous high school GPA and SAT scores were each replaced with two categorical dummy-coded predictor variables. For high school GPA, the first categorical dummy-coded variable assigned students in the top 25% (Range = 4.03 – 4.65) of the GPA distribution to a score of "1" and all other students (Range = 2.32 – 4.02) to a score of "0". Thus, students who were not exceptionally high-performing (i.e., GPAs under 4.02) served as the reference group. The second dummy-coded variable coded all students in the bottom 25% (Range = 2.32 – 3.33) of the GPA distribution as a "1" and all other students (Range = 3.34 – 4.65) as a "0". For this variable, students who were not exceptionally low-performing (i.e., GPA over 3.33) served as the reference group. An identical process was carried out for SAT scores. The first categorical dummy-coded variable coded students in the top 25% (Range = 1090 – 1330) of the SAT distribution as a "1" and all other students (Range = 870 – 1080) as a "0". The second dummy-coded variable coded all students in the bottom 25% (Range = 870 – 980) of the SAT distribution as a "1" and all other students (Range = 990 – 1330) as a "0". As was the case

with the two new categorical GPA variables, students who were not exceptionally high-performing and who were not exceptionally low-performing, respectively served as the reference groups.

According to findings by Mattern and Patterson (e.g., 2010), the new "extreme" categories entered into the new model should have *each* been predictive of retention. In other words, students who were exceptionally high-performing in terms of either GPA (i.e., GPAs over 4.02) and SAT scores (i.e., SAT scores over 1080) should have been *more likely* to be retained, while students who were exceptionally low-performing in either GPA (i.e., GPA under 3.34) or SAT (i.e., SAT under 990) should have been *less likely* to be retained. However, neither categorical predictor of either SAT nor GPA emerged as a significant predictor of retention. Moreover, other findings in the model (i.e., students with HSA as the first major being less likely to be retained) were unchanged. This suggests that the difference in the findings between the current study and Mattern and Patterson is not due to analytical approach, but is instead likely due to an institution-specific or program-specific factor. The possibilities and implications of this will be discussed later.

The null findings for high school GPA and SAT scores are mirrored in the analyses predicting graduation in FTIC students and transfer students, suggesting real, systematic differences in the utility of traditional measures of academic readiness in HSA programs. Full-time status likely is correlated with campus involvement, a variable to which Tinto (2012) assigned equal weight alongside both support and expectations. That full-time status was irrelevant here is yet another indicator that HSA programs may be somewhat unique compared to other sorts of programs, at least for FTIC students (though, see findings on transfer students below).

Financial Predictors

Federal Pell grant status did not predict retention. Simply put, it could be that the first year is not financially burdensome enough to produce this effect. As will be seen later, financial aid in this form *did* predict graduation for FTIC students.

Predicting Graduation in FTIC Students

Demographic Predictors

As was the case with retention, age and ethnicity did not predict six-year graduation in FTIC students. While this null result is unsurprising for gender (for reasons mentioned above), it is still surprising for ethnicity. Tinto (1993) suggested that students who are of good social "fit" with the institution are particularly likely to graduate, and this is certainly relevant at the present institution, where 59% of the same was Latino. Because of this large minority representation on campus, it is surprising that White and/or Black students were not less likely to graduate than their Hispanic counterparts. In a study of a Hispanic-serving institution similar to the one studied here, Tuttle and Musoba (2013) found higher rates of persistence for Hispanic students, owing to their ability to better integrate into the institution's culture. Again, the findings here suggest either that gender or ethnicity are not salient cues at *this institution,* or, for some reason, are not salient cues in HSA programs. Unfortunately, the purposes for which these data were collected (i.e., retention at this institution) prohibit an analysis of specific institutional or program specific features and the ways in which they may have overridden gender and ethnicity as salient cues for integration or involvement. A direct comparison to another Hispanic-serving institution would be necessary to determine whether these null findings on race, for instance, are due to institution-specific factors. For instance, perhaps faculty members at this institution, or in this HSA

program, pay less attention to race or are more racially diverse than the student body, contributing to a climate of academic and cultural diversity. Musoba and Krichevskiy (2014) found that positive feedback from faculty is particularly important for Black and Latino students. Therefore, one possibility is that faculty at this institution, or in this HSA program, are so supportive that ethnicity is just not as salient for students. According to R. Chen (2012), the quality of faculty/student interactions (which one would expect to vary based on the racial composition of both groups) is one of the most understudied institutional characteristics to date, and suggested further that institutional characteristics may be just as important as student-level characteristics in predicting the important outcomes studied here. The implications of this, as it pertains to the methodology of this study, will be discussed later.

Age was a significant predictor of six-year graduation, with older students demonstrating a greater likelihood of graduation. This should be unsurprising, given that older students may be intrinsically more motivated by their studies. For instance, they could be seeking promotion or a salary increase in an existing job or be more determined to finish in a timely manner because of work and family obligations.

Academic Predictors

The only academic variable that predicted six-year graduation was initial declaration as an HSA major, with students who entered the program as HSA majors less likely to graduate from the program. It is likely that the same factors that contributed to this variable presenting in the retention analyses (e.g., a violation of expectations about the nature of the program) contributed to its predictive power here. This result will be discussed theoretically and practically below.

The other three academic predictors – high school GPA, SAT scores, and full-time status – were not predictive of graduation. To ensure that analytic method (i.e., examining GPA and SAT as continuous, rather than categorical, predictors) was not the reason for the null findings for high GPA and SAT, a separate logistic regression model was run predicting six-year graduation. This analysis paralleled that conducted for one-year retention in FTIC students discussed above. For both high school GPA and SAT scores, two new dummy-coded variables (separating the top and bottom 25% of students for each variable from all other students) were created and substituted into the original model in place of the continuous forms of these predictors. The ranges for each of the new categorical variables are also provided in the section above on academic predictors of retention in FTIC students.

As was the case with retention, the categorical forms of GPA and SAT did not contribute to six-year graduation from this HSA program for FTIC students, nor did the entry of these categorical predictors affect the contribution of any other predictor in the model to six-year graduation. In other words, regardless of whether high school GPA and SAT were entered as continuous or categorical predictors, they did not predict six-year graduation, while age, HSA as initial major, and federal Pell grant status (see below) did predict six-year graduation. It is likely that high school GPA and SAT scores did not contribute to graduation for the same reasons that they did not contribute to retention – perhaps because these indicators of academic readiness were not terribly important in this particular program or at this institution. This particular finding is echoed in the transfer sample, as is discussed later, and likely speaks to the curricular focus or academic rigor of this program or institution.

Financial Predictors

Federal Pell grant status predicted six-year graduation, such that students who received a Federal Pell grant were more likely to graduate. This is unsurprising given previous results (e.g., Stewart et al., 2015), and should definitely be noted as a practical consideration.

Predicting Graduation in Transfer Students

Demographic Predictors

Demographically, predictors of four-year graduation in the transfer sample were very similar to predictors of six-year graduation in the FTIC sample. Gender and ethnicity were not predictive. Unlike the FTIC sample, however, age was not predictive of graduation for transfer students. It is possible that these students, because they had already completed two years' worth of coursework at the community college level, were already deeply committed to the program upon entry. Thus, any demographic factors would have had their influence during this two-year period at community college. However, such an explanation would be inconsistent with the lack of demographic predictors of retention in FTIC students, who would have been undergoing a similar transitional period.

Academic Predictors

The only two predictors of four-year graduation for transfer students were academic in nature. Full-time status and having a higher raw number of transfer pre-requisite courses both increased the likelihood of graduation. Each of these variables speaks to Tinto's (2012) nod to involvement. Students who take full-time courses are more involved on campus, and, therefore, less likely to be distracted by off-campus events, such as work demands. Practically speaking, full-time status also allows an individual to progress through their coursework at a faster pace,

thus accelerating the graduation process. Unsurprisingly, students who transferred in more required pre-requisites were more likely to graduate in four years. These students may be more likely to graduate because of greater time and financial investment in the HSA program, compared to their less-invested counterparts.

Unlike FTIC students, transfer students were not affected by their status as HSA majors upon entering the program. In other words, transfer students were not less likely to graduate if they were enrolled in the program during their first year at the university. This is somewhat surprising, especially given the strong role that number of pre-requisites played in the model for transfer students. Given that finding, one would have expected that initial status as an HSA major would make transfer students *more* likely to graduate. Thus, the null finding is likely a simple statistical artifact – 88% of the transfer students initially declared as HSA majors upon entry into the program. Thus, there may not have been enough between-person variability in the sample to detect an effect.

As in the FTIC students, GPA (transfer, rather than high school) did not predict graduation. Again, this speaks to the possibility that academic ability – at least prior to entry into HSA programs – is irrelevant to success in these programs. One possibility is that the program assessed here focuses more on practical considerations associated with typical health services administrative responsibilities (e.g., personnel considerations, business models) than on courses that are traditionally considered academically "challenging", such as those that rely heavily on math and science.

Financial Predictors

Federal Pell grant status did not predict four-year graduation for transfer students. It is likely that these students were more financially independent than FTIC students, thus, less reliant

on financial aid. Transfer students in this sample were older, and therefore more likely to be employed. It should also be noted that these students have already successfully completed an associate's degree, and therefore, have proven their financial ability to pay for their coursework. In other words, their financial situation may just be more stable than that of their FTIC counterparts.

Theoretical and Practical Applications

Many of the findings reported above, for both FTIC and transfer students, are consistent with Tinto's (2012) model for student success. Of the four dimensions that he mentioned, three of them – support, expectations, and involvement – were indirectly assessed here.

Support was likely indirectly assessed with ethnicity, given that this particular institution was largely Hispanic-serving and previous studies have demonstrated a large role for ethnicity in academic success. However, in no case did ethnicity predict retention or graduation here. The best way to reconcile this with Tinto's (2012) model is to say quite simply that ethnicity was unlikely a salient source of support in this program, as was mentioned previously. Perhaps the diversity of this institution lead to an inclusive, rather than exclusive, mindset. Another possibility is that HSA programs in general are more diverse, thus, making ethnicity an irrelevant demographic factor. It is likely that students simply derive support through other characteristics than ethnicity, such as the inclusiveness of faculty and the availability of on-campus resources for assistance. For instance, being a recipient of a federal Pell grant made FTIC students more likely to graduate. Thus, financial support may be the most relevant form of support in HSA programs.

As mentioned above, *expectations* were likely assessed by including initial status as an HSA major in the model. For FTIC students in particular, it is possible that students entering the HSA program were simply expecting something different, likely affecting their interest in their coursework. That lack of interest ultimately interferes with students' academic immersion (Tinto, 1993), causing them to be less likely to persist (i.e., be retained by the program or graduate from the program) in their students.

For transfer students, demonstrated *involvement* with the coursework, via full-time status and having taken more pre-requisites, was the recipe for success. These students were more likely to graduate in four years. Interestingly, student expectations did not play a role for transfer students, likely owing to less variability in this sub-sample in terms of expectations, as discussed above.

The somewhat divergent findings for FTIC and transfer students should precipitate some practical considerations for administrators of HSA programs. For FTIC students, expectations should be tempered, or at the least, more accurate. It seems clear from this study that FTIC students were simply unaware of what lay ahead of them in terms of coursework and were rather disappointed by their subsequent experience. This has implications for recruiters and for retention efforts. For instance, FTIC students may benefit from some introductory course (perhaps for a single credit) that gives a very clear outline of what is to come in the program. Students could be introduced to this during the summer before they begin their first year or could be required to take the course during their first semester. Another possibility – barring administrative challenges that exist at all institutions – would be to prohibit official entry into the HSA program until students have taken a certain number of pre-requisite courses. This requirement would be supported by findings for transfer students which indicated that having

taken more pre-requisites predicted greater likelihood of graduation. A requirement to take multiple courses may also give FTIC students a chance to make any necessary financial considerations before officially declaring for the program. Notably, financial aid receipt was predictive of graduation only for FTIC students, and administrators should be aware of this during recruitment and retention efforts. It would be implausible and unethical to require students to secure financial aid before entry into any program. However, perhaps HSA administrators would be doing their students a service by allocating resources to extra scholarships and financial incentives for to their newest (FTIC) students, particularly those who show an interest in or special aptitude for the program.

For transfer students, it seems an emphasis on involvement in school is key. Given that off-campus jobs will undoubtedly coincide with part-time status, administrators should consider increasing the number of courses offered in non-traditional settings to circumvent this challenge for their transfer students. Online courses and courses offered during the evening hours allow students to maintain full-time status without compromising their day jobs. Administrators would also do well to consider that many transfer students are older, and will be less willing to compromise employment for coursework. Thus, providing opportunities for on-campus employment to transfer students may prove worthwhile and resources should be allocated accordingly. Of course, each of these implications could easily be studied empirically. A systematic comparison of institutions or programs that offer online courses to those who do not would be worthwhile.

Limitations and Directions for Future Research

The limitations of this study and resulting suggestions for future research go hand-in-hand, and will be discussed simultaneously. Perhaps most obviously, the current study drew its sample from a single institution, with a quite distinctive demographic makeup. It is possible that the findings reported here are artifacts of this institution, including its culture, administrative practices, admission requirements, and educational quality. Most other comprehensive studies of specific disciplines, such as those on STEM programs, have employed nationwide samples. Future research on HSA programs should aspire to the same level of methodological rigor, using the findings reported here as a practical starting point.

However, the "student-centered" approach taken by Tinto (2012) and in the current study is not new to this body of literature (R. Chen, 2012) and future research, regardless of geographic scope, should begin to consider institutional factors as predictors of retention and graduation. For instance, R. Chen (2012) discussed two primary issues – the availability of student services and the quality of faculty. Both of these variables speak to Tinto's (2012) *support* dimension of success quite explicitly, but also speak indirectly to his *involvement* dimension. Students who have ready access to certain academic and social services on campus, such as the library, medical services, financial aid assistance, and information regarding student clubs may be more interested in being on campus (*involvement*), but may also derive more resources (*support*) from that campus. Likewise, students who have generally positive interactions with faculty members are more likely to go to class (*involvement*) and are more likely to feel as though their academic success is being fostered by the institution (*support*). Access to student services and perceived quality of faculty interactions are routinely collected in the form of evaluative responses at many

institutions. Future researchers could easily consider these as factors affecting retention and graduation in multi-institution studies.

The fact that the current study was conducted within a single program should also give pause to these results. As alluded to in a previous section of this chapter, the admission and curriculum requirements for this program likely differ from other HSA programs. It was clear from the findings here that traditional indicators of academic readiness, like GPA and SAT scores, were irrelevant in this program. Thus, it is possible that this program simply isn't as academically rigorous as others, lending to the conclusion that other factors, such as psychological fit (see below) or financial ability, would be better predictors of success in the program. For this reason, administrators and researchers should take into account any interactive patterns between the student and the program or institution under study. These interactions, at the institutional level, were briefly mentioned by R. Chen (2012), but should be considered at the curricular or program level as well. Of course, an institution may be better functioning than any one of its programs, or vice-versa. Thus, the institution and program should be taken into consideration separately.

This study was exploratory and focused exclusively on variables available through routine enrollment management efforts. But it was noticeably lacking in psychosocial variables. To date, the only study to focus on these sorts of variables was Markle (2015), but even that study was qualitative in nature and focused exclusively on nontraditional students. It is likely that certain psychological features, such as interest, skill set, and relevant personality characteristics, will make a student better suited for a specific program. While psychological assessments may be popular in high school and college-level career counseling, there is no indication that retention and graduation studies have paid much attention to these obviously

relevant characteristics. In the current study, the lack of contribution by most demographic variables (i.e., gender, race) likely speaks to the precedence taken by unmeasured psychological variables. Some research from the field of psychology has demonstrated clear justification for the prediction that certain personalities are better suited for, or more satisfied in, certain majors. Working with a sample of business students, Logue, Lounsbury, Gupta, and Leong (2007) found that participants were more likely to report satisfaction with that major if they scored high on extraversion (e.g., seeking social situations), conscientiousness (e.g., being achievement-oriented, punctual) and assertiveness (e.g., being will to make reasonable demands that benefit the self). Students who were investigative and artistic, according to the Strong Interest Inventory (a very common questionnaire employed in career counseling) were *less likely* to be satisfied with their choice to major in business. Of course, the current study was focused specifically on HSA majors and there are reasons to believe they may be psychologically distinct from more traditional business majors. For instance, perhaps successful HSA students are those who are particularly interested in innovation and technology, and therefore will be intrinsically more interested in the coursework involved in a typical HSA program. Regardless, more research into these promising predictors is necessary and would require only minimal effort from institutions on the data collection end.

Another limitation of the study was that it did not follow students after they left the program. While the implication of this research is that all students who were not retained or did not graduate were college dropouts, there is no way of knowing whether these students transferred to another program or another institution to complete their studies. Of course, knowing the relative rates of dropout compared to inter-institutional transfer would highlight further any demographic, academic, financial, or psychosocial predictors. Are students not

graduating because *this* program is too expensive or because *this* program is disappointing? Or, are they not graduating because *college* is too expensive or too disappointing. The answers to these questions should be relevant academically and practically and deserve further study.

Conclusion

The current study accomplished its overall exploratory research goals by identifying key demographic, academic, and financial predictors for FTIC and transfer students. The findings should be of interest to any administrator of an HSA program, as there are clear implications for program development and retention efforts. However, the study also highlights the differences between HSA programs and more traditional areas of college programming, such as STEM and traditional business programs. The current literature seems to treat all degree programs equally, but some unexpected findings reported here clearly indicate that this approach is misguided. Overall, the study serves as an excellent starting point for researchers looking to take a more nuanced approach to understanding students and institutions in higher learning.

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