

THE RELATIONSHIP OF HIGH-RISK COURSES TO FIRST YEAR DROP-OUTS AT A
SMALL RURAL COMMUNITY COLLEGE

By

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To Richard

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LIST OF ABBREVIATIONS

AA	Associate of Arts degree. Two-year degree which is accepted for transfer to a four-year institution.
AS	Associate of Science degree. Terminal degree not intended for transfer to a four-year institution.
D/F/W	Grades of D, F or a Withdrawal from a course
First-in-Series	Courses which must be taken first before being allowed to continue within that discipline's coursework
FTIC	First-time-in-college
Full-time	Enrolled in at least 12 college credit hours at the beginning of a semester
GPA	Grade Point Average
Gateway/gatekeeper courses	First-in-series college courses which must be passed to advance in a given major
High-risk courses	Courses which have 20 percent or greater D/F/W rates
HS	High School
Opt-out	The option to bypass developmental math, English, or reading even if test scores are indicative of need
Part-time	Enrolled in less than 12 college credit hours at the beginning of a semester

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Student attrition, or dropping-out, from college is a source of concern as it impacts not only the student but the institution as well. Current literature, while rich in student retention studies at four-year institutions, provides little insight into factors impacting student retention at rural community colleges. This study, guided by the framework of academic momentum, is intended to fill a gap in rural community college literature.

This study evaluated high-risk courses, in correlation with selected demographic and academic variables, for their contributions to first-year student drop-out risk. Data was collected to assess a cohort of first-time-in-college, associate-of-arts or associate-of-science degree seeking students attending a small, rural community college located in the panhandle of Florida. Regression analyses were utilized to understand the effect of high-risk-course-taking behavior, in conjunction with other student attributes, on retention rates after one-semester and one-year of attendance. Additionally, the effect of high-risk courses on college GPA as a measure of student success was examined as was the effect of credit accrual. Results showed that high-risk courses, apart from Intermediate Algebra, were not a factor in retention rates. High-risk courses were a

factor in student success as measured by college GPA. Successful accrual of credit was found to be the best measure of student success and retention. The results of this study provide a deeper understanding of factors associated with first-year drop-out risk which can assist in advising and monitoring poor-performing students before they exit the institution.

CHAPTER 1 INTRODUCTION

In 2009, the Lumina Foundation challenged all higher education institutions to help meet their goal of 60 percent of all Americans obtaining a “high-quality postsecondary degree or credential by 2025” (Lumina Foundation, 2016, p. 1). Soon after, President Barack Obama presented higher education with the American Graduation Initiative, a plan aimed at community colleges to, in part, increase college graduation rates (White House Office of the Press Secretary, 2009). These challenges, coupled with state-generated accountability measures such as performance funding, to retain and graduate students within a reasonable timeframe have colleges and universities working feverishly to increase student retention, persistence and completion rates.

High attrition, or drop-out, rates pose a serious problem, especially at the community college level. Over seven million students, pursuing either an Associate of Arts (AA) or Associate of Science (AS) degree, enrolled in community colleges in the Fall of 2014 (American Association of Community Colleges [AACC], 2016). Unfortunately, only slightly more than half (54.7%) of these students returned to college the following fall (ACT, 2015, p. 3). This attrition rate for community college students has been consistent for nearly the last decade (McIntosh & Rouse, 2009; Schuetz, 2005, 2008).

Studies into reasons for lack of persistence/retention have identified numerous variables which may have an impact on student retention. High school grade point average (GPA) and standardized scores (Habley, Bloom, & Robbins, 2012) have often been used as benchmarks for college success as has first-year college GPA (Reason,

2003). Other factors such as first-year experience courses (Jamelske, 2009; Stewart, Lim, & Kim, 2015), learning communities, (Pike, Kuh, & McCormick, 2011), academic advising (Darling, 2015), and interaction with mentors (Hu & Ma, 2010) have been examined for their impact on retention/persistence. Moreover, demographic factors such as gender, ethnicity and socioeconomic status (SES) (Bailey, Calcagno, Jenkins, Leinbach, & Kienzl, 2006; Conway, 2009; Keels, 2013; Wolniak, Mayhew, & Engberg, 2012) have also been attributed to student persistence. Most of these studies however, have been focused on four-year institutions rather than two-year community colleges.

Community colleges, as open-access institutions, have a vastly different population of students. These institutions are generally commuter (non-residential) colleges. Nearly two-thirds of their population are part-time students with an average age of 28 (AACC, 2016). A study by Crisp and Mina (2012) found that more community college students were non-white, first-generation students requiring remediation, and earning a lower GPA during their first year of college. Additionally, most of the community college experience occurs within the classroom since a majority of students rarely remain on campus outside of classroom hours (Barnett, 2011).

Many of the students entering community colleges are underprepared academically. According to the *What Works in Student Retention* (WWISR) survey (Habley, Valiga, McClanahan, & Burkum, 2010), lack of academic preparation for college-level work was at the top of the list for causes of attrition. Studies have shown that students with higher high school GPAs, and higher admission test scores are more likely to succeed (Habley, Bloom, & Robbins, 2012) but these students are more likely to attend selective four-year institutions.

In the state of Florida, twenty-eight institutions serve as the open-access gateway to college. Designated as the Florida College System (FCS), these institutions offer both workforce development and baccalaureate degrees, but their primary focus are on AA/AS degree seeking students. Students enrolled in AA programs are most often intending to transfer to a four-year program after they either complete their AA or have finished the prerequisite courses needed for transfer. In Florida, AS programs are terminal degree programs and are not intended to be used for transfers. In 2015, the FCS student body make-up was 35 percent full-time, 65 percent part-time, with 59 percent being female and 58 percent being listed as minority ("FCS Facts," 2016). Colleges within this system range in size from large, multi-campus institutions to small, single-site, rural institutions.

Sixty percent of all community colleges are considered rural (Carnegie Foundation, 2010). These colleges typically have lower enrollments than urban institutions and most often cover a larger geographical area. Unlike their large, urban counterparts, rural institutions face pressures from lower incomes, higher poverty rates and under-prepared students (Fluharty & Scaggs, 2007). Most rural institutions must “do more with less” while still meeting the needs of the students and reaching the required benchmarks for continued funding (Hicks & Jones, 2011; Thornton & Friedel, 2016). One such rural institution is the College being utilized for this study.

Located in panhandle of Florida, the College serves students from a five-county area as well as from the states of Alabama and Georgia. Total student enrollment for the Fall of 2016 was 2265. Of these, 40 percent were incoming freshmen. The College has a fall-to-fall retention rate that is consistently in the 55-60 percent range which

exceeds the national average but does not meet the internal standards to which they aspire (M. White, personal communication, October 24, 2016). Identifying the students most likely to drop-out can assist the college with increasing its retention rate while ensuring an even greater number of students complete their AA/AS degrees.

Purpose Statement

Higher education institutions have, in the last several decades, faced intense scrutiny regarding the number of students that both stay in college (retention/persistence) and finish college (completion). The pressure to retain and graduate students within a reasonable timeframe has increased as states have used funding to drive institutional behaviors. The reasons for failure to remain in college include lack of student engagement, low GPA, financial pressures, and lack of clear advising (Chen and St. John, 2011; Gershenfeld, Hood, & Zhan, 2016; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Kuh, 2009) to name a few. However, most of this research has focused on the four-year institutions rather than the community colleges even though the data has consistently shown that close to half of all community college students will not return after their first year (ACT, 2015; McIntosh & Rouse, 2009; Schuetz, 2005, 2008).

While many studies have focused on GPA, gender, race, or socioeconomic status (Lotkowski, Robbins, & Noeth, 2004; Walpole, 2003) as predictors of student persistence/retention, very few have looked at them in relation to part-time/full-time status. Moreover, these factors in relation to the number and types of courses being taken have not been studied extensively. Identification of the combination of factors most likely to lead to dropping out would be useful for advising students when enrolling in college, especially during their first semester.

The purpose of this quantitative study is to develop a better understanding of the relationship of high-risk courses to first year drop-out risk for incoming first-time-in-college (FTIC) AA and AS degree-seeking students at the College by correlating the number of high-risk courses taken with high school GPA, gender, race, Pell status, part-time/full-time status and first-year college GPA.

Research Questions

This study utilized the following research questions to better understand factors associated with first-year drop-out risk at a rural community college:

- 1a. Is there a relationship between the number of high-risk courses attempted and first-semester student retention, after controlling for gender, race, Pell status, and/or full-time/part time status?
- 1b. Is this relationship robust to the inclusion of students' high school preparation as measured via high school GPA?
- 2a. Is there a relationship between the number of high-risk courses attempted and first-year student retention, after controlling for gender, race, Pell status, first-semester GPA, and/or full-time/part time status?
- 2b. Is this relationship robust to the inclusion of students' high school preparation as measured via high school GPA?
3. Is there a relationship between the number of cumulative high-risk courses attempted and first-year academic success as measured via first-year college GPA?

Significance of the Study

Most of the research regarding retention and completion has centered on four-year institutions which have different admissions standards and residential housing. Two-year colleges are “open-access” institutions and are mostly attended by commuter students. The difference in demographics of the two-year student population has been described by many authors (Crisp and Mina, 2012; Kuh, 2006) as has the effect of certain indicators, such as GPA, standardized test scores, race and socioeconomic status. (Kahn and Nauta, 2001; Smith, Droddy, & Guarino, 2011). A few studies have examined the coursework being attempted, but these have been limited. (Jamelske, 2009; Roska, Davis, Jaggars, Zeidenberg, & Cho, 2009).

The emphasis on retention and completion in higher education is not limited to a single school type nor a single state. Thirty-two states have some form of performance funding in place (National Conference of State Legislatures website, 2015) with retention and/or completion rates as part of their funding formula. For rural-serving institutions, the loss of a small number of students translates to a large percentage drop in retention rates. The results of this study can provide rural institutions with a deeper understanding of the relationship between high-risk courses and first-year drop-out risk which can provide additional ammunition to student advisors when registering and/or counseling students regarding the best pathway to remain in college and achieve their AA or AS degree.

Organization of the Study

The analyses of course-taking behavior as a factor of first-year drop-out risk is organized into five chapters. Chapter two provides a review of the literature, including current research on student persistence and retention, benchmarks for measuring

success, and the uniqueness of the rural college in higher education. Chapter three describes the research methodology utilized in this study, including the setting, data collection, variables, and analytic procedures. Chapter four presents the findings associated with the research questions, as well as additional observations which support the framework guiding this study. Chapter five provides a discussion of the results as they pertain to course-taking behaviors, implications for the institution, recommendations for further research, and limitations of the study. This final chapter highlights the contribution this study offers to the student retention efforts at small rural community colleges.

CHAPTER 2 LITERATURE REVIEW

The literature review was conducted to provide the background information regarding factors which are thought to contribute to student persistence/retention. This literature review is presented in four sections. Section one addresses the reasons for student attrition, or dropping-out, from college. Section two offers a review of the literature on the factors being addressed in this study cited as affecting student success. Section three describes rural community colleges and their importance to the communities they serve. Lastly, section four describes the framework of academic momentum which provides the scaffolding for this study's research design.

Reasons for Dropping Out

Reasons for students dropping-out have been studied for over a half a century. The early literature made a "few comfortable and familiar generalizations about the relationship between attrition and family background, ability, or academic performance" (Spady, 1970, p. 64). Spady (1970) was the first to examine the interaction of student attributes, such as interests and skills, with the external expectations and influences of faculty and peers. Spady posited that extrinsic rewards such as grades were more useful for negotiations associated with career opportunities. The development of intellect, however, fell into the category of intrinsic rewards. Here the conditions of normative congruence, having a compatibility with the academic environment, and friendship support, establishing close relationships within the system, were necessary for social integration (Spady, 1970, p. 77). Spady suggested that the chance of dropping out was linked to social integration which relied on an individual's satisfactory college experience and their commitment to the college.

Building on Spady's work, Tinto (1975) and Tinto & Pusser (2006), envisioned dropping out as a process built on characteristics of 1) the individual, 2) their interaction with the college setting, and 3) the higher education institution itself. While numerous individual characteristics play a role in an individual's ability to persist, Tinto concluded that ability and personality were two of the most important individual characteristics. Once in college, an individual's level of integration, both academically and social, will largely determine how long and how well they persist. Whether an institution is public or private, two-year or four-year, or small versus large, plays a role in overall drop-out rate. However, the climate of the institution and the support given to its students play a role in shaping the individual's integration into the academic community. In the final analysis, Tinto & Pusser (2006) concluded that the actions of the institution have as much to do with student retention as does the attributes of the students themselves.

An early study by Pascarella and Terenzini (1980) found that for freshmen, the quality of student-faculty interaction both in and out of the classroom was as significant of a predictor of attrition as was the quality of their peer relationships. Milem and Berger (1997) found that a student's involvement with peers as well as their interactions with faculty influenced their perception of the institution which, in turn, affected their decisions to stay in college. In a meta-analysis of the literature, Robbins et al. (2004) noted that the quality of students' relationship with peers and faculty were highly correlated with student persistence.

These studies, however, were conducted at four-year institutions where most of the students were enrolled full-time and resided on-campus. Community college students, on the other hand, possess different attributes than those that begin their

college careers at four-year institutions. Crisp and Mina (2012), in an analysis of a Beginning Postsecondary Students Longitudinal Study (BPS: 04/09) follow-up, found that community college students in general,

were more likely to be: African American or Hispanic; financially independent; first-generation college students; less academically prepared; working part- or full-time during college; having lower degree aspirations; attending college part-time; delaying enrollment into college following high school; receiving less financial aid; and earning a lower GPA during the first year of college. (p. 154)

Unfortunately, students attending a community college are more likely to require some form of remediation before entering a credit-bearing course. In examination of data from numerous sources, Bailey (2009) found that “two-thirds or more of community college students enter college with academic skills weak enough in at least one major subject area to threaten their ability to succeed in college level courses” (p.13).

Benchmarks for Success

According to the AACC (2016), 45 percent of all U.S. high school graduates are enrolled in community colleges. Of these, 41 percent are first-time freshmen, over half are women, and less than 50 percent are Caucasian. Unfortunately, the percentage of these students who persist and obtain a degree is staggeringly low. The U.S. Department of Education (USDOE) data, which consists only of first-time, full-time students, indicates that 21 percent of these students complete in three years. The National Student Clearinghouse (NSC) paints a somewhat rosier picture in that 57 percent of these same students complete in six years (Juszkiewicz, 2015). However, both the USDOE and the NSC report that part-time attendees have a completion rate of less than 25 percent. The inability to retain and complete students is a source of concern for the community colleges.

A multitude of markers have been used in the study of student persistence and retention. Student readiness, student engagement, psychometric measurements, economic variables, and academic performance are some of the indicators studied to better predict the likelihood of student retention and completion at the college level. This study will focus on the following: High school grade point average, gender, race/ethnicity, Pell status, full-time/part-time status, first-semester and first-year college grade point average, and gateway/gatekeeper courses.

High School Grade Point Average (GPA)

Cumulative high school GPA has been linked to first-year college persistence (Astin & Oseguera, 2012; Bean & Metzner, 1985; Ishitani, 2006). Ishitani (2006) used national, longitudinal data sets to study the attrition and completion rates of 4,427 students at four-year institutions. He found that high school class rank was significantly linked to student persistence. Additionally, Ishitani (2006) found that departure rate was linked to the class rank quintile with more students in the lowest quintile (bottom 25 percent) leaving their second year while students in the third lowest quintile (bottom 50 percent) left more often during the third year of college (p. 876).

Jackson & Kurlaender (2014) found that high school GPA was a useful predictor for college success over other measures of readiness such as a need for remediation. In a study of 1,140 first-time community college students, Feldman (1993) found that high school GPA was the strongest predictor of dropping out. Zajacova et al., (2005) reported that students who enrolled for their second year of college had high school GPAs that averaged 0.4 points higher than those who dropped out.

A recent report on postsecondary readiness and attainment (Balfanz, DePaoli, Ingram, Bridgeland, & Fox, 2016) utilized data from the NCES's Educational

Longitudinal Study of 2002 (ELS:2002) to examine the correlation between HS GPA and student success. The study found that more than 76 percent of students with a HS GPA of 3.50 or greater (A average) had earned a bachelor's degree or higher by 2013. Fifty percent of those with a HS GPA between 3.00 and 3.49 (B average) held a bachelor's degree or higher. The percentages decreased to 27.6 percent (2.50 to 2.99 HS GPA), 12.4 percent (2.00 to 2.49 HS GPA), and a mere 3.3 percent for those with a HS GPA less than 2.00 (p. 28).

Gender

Gender has been studied extensively in conjunction with student retention rates. Early studies by Bean (1980) found that gender was significant in retention at four-year institutions. Subsequent studies by Pascarella, Smart and Ethington (1986), Voorhees (1987), and Feldman (1993) all reported that gender was a significant factor in community college student retention with females being retained at higher rates than males. However, later research has muddled the impact of gender on retention. Bailey et al. (2006) found that in community colleges where women comprised over 50 percent of the student body, women were retained at lower rates than men. Laskey and Hetzel (2011) found no significant effect of gender on retention in a study of at-risk students entering higher education at a private, four-year institution. Likewise, a study of 1,800 college students by DeNicco et al. (2015) found no significant relationship between gender and first-year retention at a community college. These latter studies have, however, shown that there is a significant relationship between gender plus ethnicity and college persistence/completion.

Race/Ethnicity

The relationship between ethnicity and college attainment has been shown to be significant. Both Adelman (2006) and Bowen, Chingos, and McPherson (2009) noted that higher numbers of whites and Asians entered college when compared to Blacks, Hispanics, and American Indians. An analysis of degrees conferred between 2002 and 2013 by the National Center for Education Statistics (NCES) showed that Blacks and Hispanics had seen an increase in the share of both associated degrees and bachelor's degrees earned. Blacks increased from 12 to 14 percent and 10 to 11 percent, respectively. Hispanics had increased from 11 to 16 percent and 7 to 11 percent, respectively. Whites, on the other hand had seen a decrease in their total shares of degrees: 71 to 62 percent and 76 to 69 percent, respectively. (National Center for Education Statistics [NCES], 2016b, para. 4-5) However, the gap between the races continues to be large.

Pell Status

Low-socioeconomic status (SES) is most often correlated with students who come from low-income or poverty-level backgrounds. Low-income is considered 200 percent of the federal poverty level, and poor is defined as 100 percent of the poverty level (National Center for Children in Poverty, 2014). In the 48 contiguous states, a family of four making less than \$24,600 in 2017 is considered at the federal poverty level, and \$49,200 is considered low-income (Health and Human Services Department, 2017). To be eligible for Pell grants the total family income must be \$50,000 or less for the 2017-2018 school year. However, most Pell money goes to those with a total family income of less than \$20,000 (Scholarships.com, 2017).

Research has consistently found a positive association between grant aid and student persistence (Bettinger, 2004; DesJardins & McCall, 2010; Dynarski, 1999). In studies of low-income students, Pell Grant receipt had the greatest impact on continued enrollment (Alon, 2011; U.S. Department of Education, 2011). A study of Louisiana colleges between 2006 to 2009 found that students with Pell Grants were retained at comparable rates to wealthier students (Crockett, Heffron & Schneider, 2011). Additionally, Pell status was found to be the most significant determinant of student persistence of first-time full-time undergraduates during both the first and second years of enrollment (Khuong, 2014).

In 2012, Congress enacted several policy changes for Pell Grant eligibility (HR 3671). Two of these: 1) lowered lifetime maximum number of hours or semesters, and 2) reduction in maximum Estimated Family Contribution, contributed to a negative effect on enrollment in three states with high rural populations (Katsinas, Davis, Friedel, Koh, & Grant, 2013). Students in Alabama, Arkansas, and Mississippi who lost their Pell eligibility were faced with a tuition bill they could not pay. This resulted in many of them dropping out rather than completing their AA degree (Katsinas, et al., 2013).

Full-time vs. Part-time Status

Research has demonstrated that full-time status is correlated with higher levels of retention and completion (Adelman, 1999; Bailey, Calcagno, Jenkins, Kienzl, & Leinbach, 2005). Feldman (1993) noted that first-time in college students who were enrolled part-time were 2.23 times more likely to drop out during their first year at the community college. A study conducted by Rodriguez (2013) found that the type of first semester enrollment had a significant effect on continued academic success. Part-time

students were almost two times less likely to complete their two-year degree as compared to their full-time counterparts (Rodriquez, 2013).

Unlike the majority of undergraduates at four year institutions, only 40 percent of students attend full-time at two-year institutions (National Center for Education Statistics [NCES], 2016a). These students often have full-time jobs, a family or both which may negatively impact their college persistence (Fairchild, 2003; Schmid and Abel, 2003) Forman (2009) found that success as a part-time student was influenced more by age than by external factors. Her study showed that for every year of delayed enrollment (up to four years) at a community college, the participants were two and a half times more likely to receive their AA degree than their younger counterparts. Analysis of NCES data, however, showed that only 4.6 percent of first-time-in-college students over the age of twenty-five who attend part-time obtained an AA degree within three years (Complete College America [CCA], 2011).

First-semester and First-year College GPA

First-semester and first-year college GPA have also been shown to influence student retention rates (DeNicco, Harrington, & Fogg, 2015; Nora & Crisp, 2012; Zajacova, Lynch, & Espenshade, 2005). The importance of the first-year college GPA in student retention has been well-documented for 4-year institutions (Attewell, Heil, & Reisel, 2011; Hu, McCormick, & Gonyea, 2012; Reason, 2003). DeNicco, Harrington & Fogg (2015) tracked students who first enrolled in a community college in 2006 and followed their college career through 2011. They found that a one-point increase in a student's freshman-year GPA above the average GPA of all freshmen led to a nearly ten percent increase in student retention probability.

The literature on the importance of first-semester GPA is less robust but the findings have been significant. Stewart, Lim and Kim (2015) noted that the first-semester GPA was highly correlated with persistence. Gershenfeld, Hood and Zhan (2016) found that the first-semester GPA was a significant predictor of retention and completion, especially for underrepresented students. Students with a first-semester GPA of 2.33 or below were at a significant risk for dropping-out and were half as likely to graduate as students whose GPA's were between 3.68-4.0 (Gershenfeld, Hood, & Zhan, 2016). Research by Musoba and Krichevskiy (2014) found that first-semester GPA was a significant factor in deciding to drop out by Whites, but not by Blacks or Latinos.

Gateway/Gatekeeper Courses

Research concerning gateway, or gatekeeper, courses and their effect on retention has been sparse. Gateway courses are “first in series” courses which must be successfully completed to move forward in a given major. In some cases, gateway courses are developmental courses which do not count towards the student's intended major. Amongst the 2016 high school graduates that took the ACT, 61 percent are considered college-ready in English, 44 percent in reading, 41 percent in math, 36 percent in science and only 26 percent ready in all four areas. With the exception of science, the other three subject areas have decreased between 5 to 8 percent since 2012 (ACT, Inc., 2016, p. 4).

Adelman (2006), in an analysis of the data from the National Center for Education Statistics (NELS:88/2000) study, examined the success of completion of gateway courses by the end of their second year in college. He found that successful participation in these gateway courses directly impacted the odds of completing a

bachelor's degree by 3:1 in precalculus, 4:1 in general chemistry, and 6:1 in American literature. An interesting study by Musoba and Krichevskiy (2014) found that success in the first math course was significantly associated with continued college enrollment by Blacks and Latinos, whereas English composition was not. Math was more likely to determine drop-out status whereas English determined graduation status. Introductory science and mathematics courses are typically considered gateway courses and "serve as the initial roadblock to student persistence" (Eagan Jr. & Jaeger, 2008, p. 40). Poor performance in these courses may have a negative effect on self-confidence which may lead to an inability for students to progress through their degree requirements.

Unfortunately, students attending a community college are more likely to require some form of remediation before entering a credit-bearing course. In examination of data from numerous sources, Bailey (2009) found that "two-thirds or more of community college students enter college with academic skills weak enough in at least one major subject area to threaten their ability to succeed in college level courses" (p.13). A 2009 Virginia study examined gatekeeper (developmental) course success by first-time college students who required some form of remediation in either English, math, reading or some combination of the three subjects. The researchers found that students were more likely to enroll in math gatekeeper courses rather than English or reading. Over a third of those students whose placed in developmental courses failed to enroll in any gatekeeper courses for the semester. Additionally, over half the students who did enroll in gatekeeper courses failed their courses (Jenkins, Jaggars, & Roksa, 2009). In a Florida study, Calgano, Crosta, Bailey & Jenkins (2007)

found that students who passed their college-level writing course the first time, after successful remediation, were twice as likely to graduate than those who did not.

In 2013, the Florida legislature passed Fla. Stat. 1008 § 30 which restructured developmental education and provided an “opt-out” provision for “students who entered 9th grade in a Florida public school in 2003-2004 or thereafter and who earned a standard Florida high school diploma; or students who are serving as active duty members of the United States Armed Services” (Common Placement Testing for Public Postsecondary Education, 2013). For the Florida state colleges who primarily serve these students, the opt-out provision may increase the risk of high attrition rates in gatekeeper courses such as Intermediate Algebra and English Composition I.

The Rural Community College

The term “rural” has many different connotations and definitions. The U.S. Census Bureau defines rural as that which is left after defining the urban areas (Ratcliffe, Burd, Holder, & Fields, 2016) whereas the U.S. Department of Agriculture considers it to be a combination of open countryside, towns with less than 2,500 people, and urban areas whose populations range from 2,500 to 50,000 but are not part of a metropolitan area (2016, para. 1). In 2005, the Carnegie Foundation for the Advancement of Teaching classified rural-serving institutions into three categories: 1) small, less than 2,500 students; 2) medium, 2,500-7,500 students; and 3) large, greater than 7,500 students. In an analysis of the Carnegie Foundation’s data the Rural Community College Alliance found that rural community colleges served 37 percent of students enrolled in a two-year institution (2010).

Rural community colleges face unique problems when compared to larger, urban institutions. Most rural colleges serve small populations within a much larger geographic

area (Pennington, Williams, & Karvonen, 2006). Students often commute long distances, lack adequate high school preparation and have inconsistent access to technological resources which hampers their ability to persist (Katsinas & Moeck, 2002). Hardy & Katsinas (2007) noted that even rural community colleges differed from each other based on their size. Small rural colleges faced greater obstacles in diverse areas such as providing employment services, child-care services, and weekend courses to name a few. Several key challenges to small rural-serving institutions, according to their presidents, were: “effective utilization of resources, decreased state funding and depressed tax bases, slim margins for error, meeting the needs of diverse student populations and the recruitment and retention of quality employees” (Hicks & Jones (2011, p. 31). Nevertheless, all small rural institutions strive to offer both the courses necessary for continued academic success in a four-year program and the vocational training at the heart of their workforce programs. This task of “providing comprehensive programs to a relatively small student population” (Pennington et al., 2006, p. 642) is often hampered by the lack of adequate funding. The disparity is often linked to the lack of a “fiscally even playing field” (Hardy & Katsinas, 2007, p. 15) as well as a lack of understanding of the unique needs of rural institutions.

Even with the pressures, “Rural community colleges have been viewed by residents, state legislators, and policy makers, as catalysts for sustaining high-quality of life opportunities for rural America” (Miller & Tuttle, 2007, p. 118). These institutions provide access to educational advancement and cultural enrichment for a population who may not obtain them otherwise. “The rural-serving community college enjoys both the challenge and the unique calling to serve its community by providing opportunities to

all learners to improve their lives through access to responsive, local higher education.”
(Blanchard, Casados, & Sheski, 2009, p. 27)

Theoretical/Conceptual Frameworks

Historical Frameworks

In 1975, Vincent Tinto introduced the interactionist theory of student departure in which he described how a student's characteristics upon entrance to an institution, coupled with their commitment to said institution, greatly influence the decision to remain or leave. Tinto (1993) later proposed that the quality of faculty-student interaction, student integration into the institution, and the institution's commitment to students were instrumental in retaining students until graduation.

Tinto developed his theory based on full-time, residential student behavior at four-year institutions. Bean and Metzner (1985) developed a model based on the nontraditional student attending a four-year institution. According to their model, nontraditional students are older than twenty-four years, commuters, and/or enrolled part-time. Attrition decisions by these students "were based on four sets of variables: (a) academic; (b) background; (c) psychological; and (d) environmental. They emphasized that environmental variables were the most influential in dropout decisions for nontraditional students." (Morrison & Silverman, 2012, p. 74) According to the model, environmental variables such as finances, number of hours worked, and family could either be positive or negative influences on remaining in college. Even in the face of positive academic success, negative environmental variables would inevitably lead to the student dropping out of college (Bean & Metzner, 1985).

Braxton, Hirschy, and McClendon (as cited by Braxton, 2014) developed the theory of student persistence in commuter institutions which blends Tinto's theory with

other previously developed models such as that of Bean and Metzner. In this model, student persistence is affected first by the student's entry characteristics, such as motivation and self-efficacy. The interaction of these characteristics with the institutional environment have a direct effect on academic development whereas the external environment has no effect on academic development but does have a direct effect on persistence (Braxton, 2014, p. 111). While Braxton, Hirschy, and McClendon come closer to mirroring the attributes of community college students in their model, all of these aforementioned researchers used either the four-year institution exclusively or utilized both four-year and two-year institutions in the development of their theories. None of these models focus solely on the community college student.

What is also lacking in these models is the effect of course-taking behaviors on student persistence and ultimately completion. Adelman (1999, 2006) examined demographic characteristics, high school performance, and postsecondary performance of a high school cohort from graduation in 1982 through 1993 to determine the likelihood of completion of a four-year degree. With this cohort, Adelman (1999) noted that "academic preparation, continuous enrollment, and early academic performance...prove to be what counts" (p. 83). Adelman (2006) replicated his study with a cohort that graduated in 1992 and were tracked through 2000. Even though the cohort was from a different decade and had supposedly benefitted from education reform efforts, the results of his second study mirrored those of the first. Adelman (2006) found that students with low first-year college GPAs and low number of college credits failed to retain academic momentum.

Academic Momentum Framework

The academic momentum perspective posits that earning college-level credits quickly fuels persistence which ultimately ends in completion. Adelman (1999, 2006) defined a student's academic momentum by their level of academic preparation during high school, the rate of withdrawals/repeats, and the number of college-level credits earned per semester. Students who earned twenty or more credit hours within the first year, had few withdrawals/repeats, and remained enrolled without interruption were more likely to graduate than those did not. Of all these factors, however, credit-hour accrual was the most important in student retention and completion.

Several studies have shown that the completion of coursework during the first year form the core of the academic momentum principle. Adelman's (2006) research showed that earning less than 20 credits in the first year of college reduced "the probability of completing a bachelor's degree by a third" (p. 48). Doyle (2009) found a positive correlation between the number of first-semester credit-bearing hours and transfer rates from the community college to a four-year institution. In his study, students with 12 or more credits the first-semester had higher transfer rates than did those taking a lower number of credit hours. Likewise, Freeman (2008) noted that first-year credit hour attainment, as well as withdrawals/repeats and continuous enrollment, were accurate measures of academic momentum at a historically Black college.

Attewell, Heil, and Reisel (2012) found that students at either a 2-year or 4-year institution who attempted more credit-hour courses their first semester of college had the greatest level of academic momentum even without successfully passing said courses. Recently, Attewell and Monaghan (2016) found that students (who worked less than 30 hours per week) who attempted 15 credit hours from the onset, or those

who increased from less than fifteen to fifteen or more during their second semester were more likely to complete a degree within six years which is the current benchmark for student success. In all cases, accumulation of credit hours indicates positive academic momentum which reduces the likelihood of dropping-out.

The theories of Tinto, Bean & Metzner, and Braxton, Hirschy, and McClendon include measures of student engagement/integration in their models as well as institutional attributes which may contribute to student retention. The framework of academic momentum does not discount the importance of these measures, but focuses on specific measures of academic achievement and student demographics. This study takes advantage of a small overlap of the measures often used to examine student retention to explore the relationship of high-risk courses to first-year drop-out risk (Figure 2-1).

Summary of Existing Research

The lack of student retention/persistence in higher education has been studied extensively with many plausible reasons given as to why students drop-out of college. The often-unique demographics of rural community colleges and the behaviors of their student population has been underrepresented in the literature and provides the basis for the focus of this study. The theoretical concept of academic momentum fits well with this researcher's topic, since failure in high-risk courses impedes the accumulation of credits which may lead to a student's attrition from college.

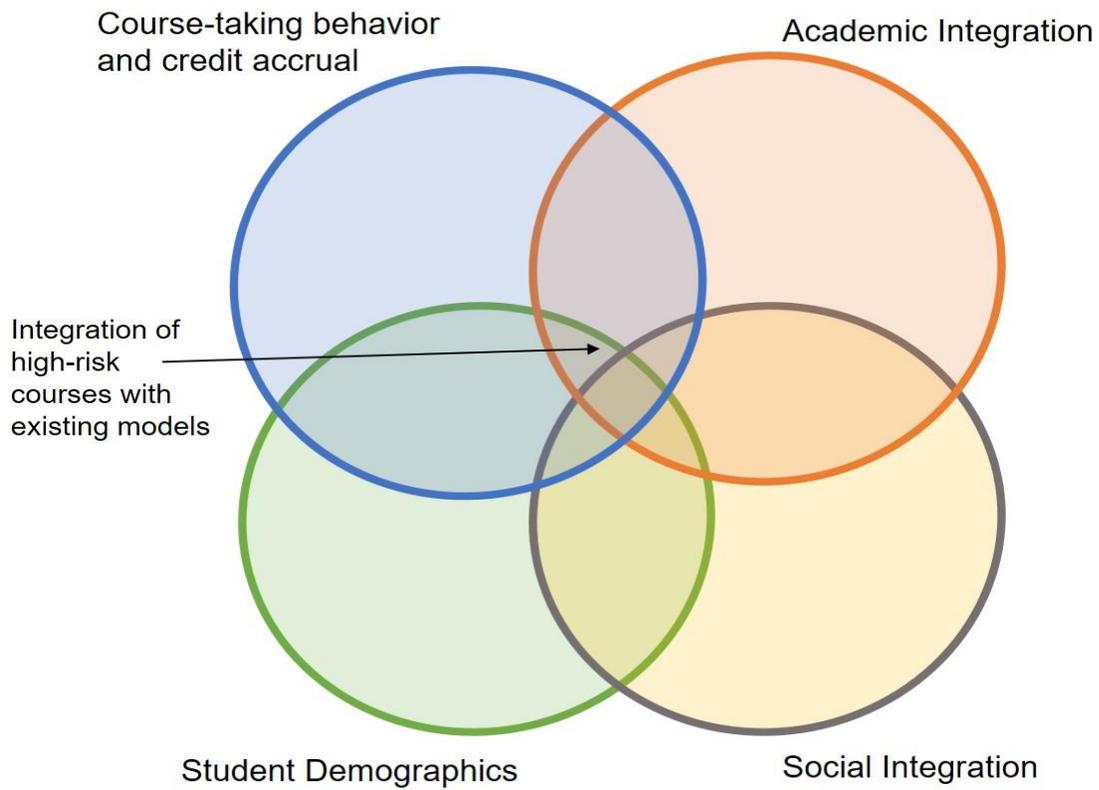


Figure 2-1. Relationship of high-risk courses and first-year drop-outs within the existing theoretical frameworks

CHAPTER 3 METHODOLOGY

. The purpose of this study was to develop a better understanding of the relationship of high-risk courses to first year drop-outs for incoming first-time-in-college AA and AS degree-seeking students at the College by correlating the number of high-risk courses attempted with student retention. This chapter revisits the research questions and then describes the setting, data collection, sample population, and the variable utilized in the study.

Research Questions

This study utilized the following research questions to better understand factors associated with first-year drop-out risk at a rural community college:

- 1a. Is there a relationship between the number of high-risk courses attempted and first-semester student retention, after controlling for gender, race, Pell status, and/or full-time/part time status?
- 1b. Is this relationship robust to the inclusion of students' high school preparation as measured via high school GPA?
- 2a. Is there a relationship between the number of high-risk courses attempted and first-year student retention, after controlling for gender, race, Pell status, first-semester GPA, and/or full-time/part time status?
- 2b. Is this relationship robust to the inclusion of students' high school preparation as measured via high school GPA?
3. Is there a relationship between the number of cumulative high-risk courses attempted and first-year academic success as measured via first-year college GPA?

Setting

The study was conducted with data from a rural, public FCS College (henceforth referred to as the College) located in the Florida Panhandle. The College serves a five county, 3,382 square mile district, as well as the border counties of Alabama and Georgia. The total population of the five-county area is estimated to be 89,250 (U.S. Census Bureau, 2017). The five county population demographics mirror that of the College, with 80 percent being white, 16 percent being black, and the remaining 4 percent being mostly Hispanic. These demographics are not comparable to the state demographics, nor are they representative of all 28 state colleges (Table 3-1).

Twenty-three percent of the College's service-area population lives at or below poverty level. While three-quarters of the residents are high school graduates, less than twelve percent hold a bachelor's degree or higher. According to the College website, agriculture and forestry are the major industries within the five-county area. The next largest employment sector is corrections, with four state prisons and a federal correctional facility being found within the service area.

The College, like other state colleges in Florida, is an open-admission institution. Of the 28 colleges that comprise the Florida College System (FCS), only six classify as rural-serving colleges with these being a mix of the small, medium, and large Carnegie designations (Carnegie Foundation, 2005). The majority of students who attend the College are natives of this five-county district. In contrast with most urban community colleges, 61 percent of the student body are between 17 to 24 years old. The remaining age groups are represented as follows: 11 percent ages 25 to 29, 24 percent ages 30 to 49, and 4 percent ages 50 and above (College website).

The College has a successful TRIO program for first-generation college students. The College also has an award-winning tutoring center onsite to provide one-on-one assistance to students as well as group study sessions for selected classes. The College has recently partnered with CareerSource to provide an onsite career resource center which offers career assessments, resume and interview preparation, and even training funds for specific populations of individuals.

While the College is ranked highly for completion rates within three years, retention rankings have not been as successful. Overall fall-to-fall retention rates for first-time-in-college AA or AS degree-seeking students fell ten percentage points between 2011 to 2015 (M. Hughes, personal communication, November, 2015). Understanding the variables which have the greatest impact on retention rates is important to the College as it works to reverse the trends previously noted.

Data Collection

Archival data was provided by the Dean of Assessment, Compliance & Grants at the College for all information other than high school GPA. The decision as to which information was collected was a collaborative effort between the researcher and the Dean after studying in-house data covering a period of three years which indicated high withdrawal/failure rates for certain classes. The other information, high school GPA, gender, race, Pell status and college GPA, are measures often used when studying retention. Inclusion of full-time versus part-time enrollment for each semester was necessary since over 50 percent of the students at the College are now classified as part-time. Any differences that are due to this status will be of great interest to the College. The data set also included whether the student was seeking an AA degree or an AS degree. AA degree seeking students are used in determination of performance

funding levels for the measures of retention and completion. A comparison of their retention levels versus those of AS degree-seeking students may provide additional information when comparing classes attempted.

Sample Population

The sample population for this study were first-time-in-college freshmen entering the College in the Fall of 2013 (n=410). The 2013 cohort was selected for exploring the impact of high-risk courses on student attrition because they did not have the choice to “opt-out” of developmental classes as entering freshmen. Transfer students not required to take the Freshmen orientation course were omitted from the data set.

Due to the nature of record keeping at the College, this researcher accessed the database to retrieve the high school GPAs of the participants. During the retrieval process it was discovered that five students were coded incorrectly, four were international students with no equivalent HS GPAs on record, and thirty-seven held GEDs which also have no equivalent HS GPAs. These forty-six individuals were removed from the data set which left a sample population of n=364. After visually cross-checking names and identification numbers to confirm data accrual was correct, all identifying information (name, social security number and/or college ID number) was removed.

High-Risk Courses

Classes included in the data were designated as high-risk courses either due to a high D/F/W rate and/or by their first-in-series designation. The D/F/W rate for these courses was 20 percent or higher. These rates are consistently above the average D/F/W rates for all general education courses at the College (Figure 3-1). The courses were:

- BSC 1005 – Introduction to Biology
- BSC 2085 – Anatomy & Physiology I
- BSC 2010 – Integrated Principles of Biology I
- CHM 1030 – Introduction to Chemistry
- CHM 1045 – Chemistry I
- ENC 1101 – English Composition I
- ESC 1000 – Earth Science
- MAT 1033 – Intermediate Algebra
- MAC 1105 – College Algebra
- MUL 2010 – Music Appreciation

BSC 1005, ESC 1000, ENC 1101, MAT 1033, MAC 1105 and MUL 2010 are general education courses which have traditionally high failure rates. Successful completion of MAT1033 is required for all students who have taken developmental math courses before being admitted to MAC 1105. CHM 1030 is a precursor to CHM 1045. For students lacking high school chemistry, CHM 1030 must be passed to enter CHM 1045. BSC 2085 is high risk for the students seeking the AS Nursing degree. BSC 2085 is also a first in series course as are BSC 2010 and CHM 1045 for STEM students to progress in their chosen degree fields.

Measures

Dependent Variables

The dependent variables (Table 3-2) are fall-to-spring retention and fall-to-fall retention for research questions one and two. The variable was operationalized to reflect either as enrolled in Spring of 2014 or not-enrolled for the first model. The variable was also operationalized to reflect as enrolled in Fall of 2014 or not enrolled for

the second model. Enrollment status was included in the data set provided by the College.

The dependent variable for research question three was first-year college GPA. The variable was operationalized to reflect GPA on a scale of 0.00 to 4.00.

Independent Variables

The number of high-risk courses attempted during the Fall semester served as the independent variable (Table 3-3) for research question one. The number of high-risk courses attempted in the first year served as the independent variable for research question two. For research question three the total number of high-risk courses served as the independent variable.

For research questions one and two, the independent variables were operationalized as enrolled in none, one, or two plus high-risk courses. For research question three, these were operationalized as none, one, two, or three-plus high-risk courses.

Covariates

The inclusion of high school GPA, gender, race, Pell status, and part-time/full-time status (Table 3-4) allowed for examining the bivariate relationship between each characteristic and course-taking behavior. Additionally, descriptive statistics of each characteristic provided a complete picture as to the population being examined. Detailed reasons for including these characteristics were provided in Chapter 2, but a brief overview is presented here.

High school GPA has been shown to be a strong predictor of college persistence (Hoffman & Lowitizi, 2005; Stewart, Lim, & Kim, 2015) as well as being a reliable

measure of academic achievement in college (Habley et al., 2012). Inclusion of high school GPA in the analysis increased the reliability and validity of the instrument.

The effect of gender and race on persistence in higher education has been ambiguous. Some researchers have found that both gender and race are linked to college persistence (Keels, 2013;) while others have found gender but not race to be significant (Windham, Rehfuss, Williams, Pugh, & Tincher-Ladner, 2014). Analysis of these characteristics determined their usefulness in predicting student drop-out risk at the College.

The effect of full-time enrollment on persistence has been shown to be positive (Bailey, Calcagno, Jenkins, Kienzl, & Leinbach, 2005; Brooks-Leonard, 1991). In comparison, part-time enrollment has been found to negatively impact student retention (Schmid and Abell, 2003) Since the College now has more part-time students than full-time students, analysis of these two characteristics was useful in identifying trends within the college population.

Analysis Methods

Descriptive statistics were utilized to understand the characteristics of the data as well as to locate any missing values. No missing values, other than the aforementioned HS GPAs, were encountered. Due to the low overall percentage of minorities in general, and very low percentage of individual minority groups, all minorities were analyzed as a single entity. The software package, STATA, was used for all analytical methods.

Logistic regression, which focuses on “prediction of a discrete, categorical outcome variable from one or more explanatory variables” (French, Immekus, & Yen, 2013, p. 145), was used for research questions one and two to examine the relationship between retention and high-risk courses. The categorical (dependent) variable for this

study was retention. Logistic regression was the suitable choice for this study since the dependent variable was dichotomous with only two outcomes possible: retained or not retained. Additionally, logistic regression examines the influence of additional variables on the outcomes by estimating the probability of the event's occurrence. The basic assumptions that must be met for logistic regression include:

- Independence of errors – no duplicate responses between sample groups exist.
- Linearity in the logit for continuous variables – continuous variables and their outcomes are linear.
- Absence of multicollinearity – no redundancy amongst the independent variables.
- Lack of strongly influential outliers – the predicted outcome should be close to the actual outcome. (Stoltzfus, 2011, p. 1101)

Odds ratios (i.e., the change in the odds of an event occurring versus not occurring given a one-unit change in an independent variable) were used for ease of interpretation of the logistic regression models (STATA14, 2015). Cohort-level robust standard errors were utilized to address the potential problem of errors that are not independent and identically distributed (Williams, 2015).

For research question three linear regression was utilized. Linear regression, according to Cohen (2013), “shows the relationship between two variables for a particular group of people” (p. 319). Since the purpose of this research question was to examine the relationship between first-year college GPA and total number of high-risk classes attempted, linear regression was the suitable choice for the analysis. Several assumptions must be made when using linear regression if the results are to be generalized for a larger population of students other than those at the College. These assumptions, as laid out by Cohen (2013) are:

- Independence: The residuals are statistically independent of each other.

- Linearity: The relationship between variable can be graphically represented by a straight line.
- Normal distribution: Variables must have equal distribution in the population.
- Homoscedasticity: The residuals have constant variance.

The Breusch-Pagan/Cook-Weisberg test, which tests the null hypothesis that the variance of the residuals is homogenous, was utilized to check for heteroskedasticity of the first-year college GPAs. If the p-value is very small, the null hypothesis must be rejected and the alternative hypothesis, that the variance is not homogenous, must be accepted (IDRE, 2017). Variables for the test were the fitted values of the cumulative college GPA. Results of the test were $\chi^2(1) = 40.98$ and the p value was 0.000 therefore the null hypothesis was rejected. The variance inflation factor (VIF) was used to check for multicollinearity. The VIF estimates how much the “variance of a coefficient is “inflated” because of linear dependence with other predictors” (Allison, 2012). The mean VIF for all variables was 1.56 which indicates a lack of multicollinearity. These results provide assurance that linear regression is the appropriate model for research question three.

Additional Considerations. An analysis of the ratio of high-risk course hours versus total hours enrolled (risk ratio) was run to determine whether this would have an effect on the model being studied. The analysis showed that greater than 50 percent of the students were carrying high-risk course hours at less than 25 percent of their entire load for both the fall semester and for the entire year (Tables 3-5 and 3-6). Inclusion of the risk ratio in the logistic regression models did not effect changes in the models, therefore the risk ratio was determined to be unnecessary for inclusion.

An analysis of accrued credit was also performed to test the validity of the academic momentum framework guiding this study. Accrued credit was operationalized as a percentage of the total hours attempted versus the total hours earned for the first year of attendance. Inclusion of this variable into the model for research question three had a significant effect on the model and thus was added into the additional findings.

Limitations of the Study

The primary limitation of this study was the small sample size of the cohort used for this analysis. A larger sample size might yield a better picture of the effect high-risk courses have on student retention. Applying the model to larger college populations could alter which demographics are most salient in determining risk.

A second limitation was choosing to analyze only one year's cohort. The addition of cohorts who could utilize the opt-out provision may paint a very different picture as compared to the cohort in this pilot study. Analysis of several years' worth of incoming, first-time-in-college freshmen may provide a more robust model.

Summary of Methodology

This chapter provides an overview of the statistical methodologies to be utilized to address the proposed research questions. The purpose of this study was to develop a better understanding of the relationship of high-risk courses to first year drop-out risk. This chapter also addresses the data source, the data collection methods, and the variables of interest for this study. Finally, the chapter concludes with potential limitations that may result in this study.

Table 3-1. Ethnic representation of Florida and its state colleges

Location	Ethnicity			
	White	Black	Hispanic	Other
State College #1	69.2%	10.8%	11.5%	8.6%
State College #2	20.3%	34.1%	35.5%	10.1%
State College #3	59.9%	12.7%	14.6%	12.9%
State College #4	77.8%	14.8%	3.8%	3.7%
State College #5	65.4%	12.6%	14.7%	7.3%
State College #6	51.8%	11.4%	28.1%	8.6%
State College #7	49.3%	23.6%	7.6%	19.6%
State College #8	71.1%	7.7%	0.0%	21.2%
State College #9	71.0%	11.8%	5.8%	11.4%
State College #10	35.3%	17.2%	26.6%	20.9%
State College #11	56.6%	14.6%	20.0%	8.9%
State College #12	82.1%	11.5%	4.9%	1.6%
State College #13	66.1%	9.6%	8.0%	16.4%
State College #14	66.9%	8.4%	14.6%	10.1%
State College #15	6.8%	15.6%	72.9%	4.7%
State College #16	75.2%	17.7%	6.2%	0.9%
State College #17	72.0%	7.4%	8.8%	11.8%
State College #18	37.0%	24.4%	29.0%	9.6%
State College #19	68.2%	4.4%	19.1%	8.3%
State College #20	70.3%	13.5%	5.6%	10.6%
State College #21	53.9%	15.8%	20.7%	9.7%
State College #22	73.8%	7.6%	8.9%	9.7%
State College #23	64.9%	12.5%	12.0%	10.5%
State College #24	58.2%	13.5%	19.3%	9.0%
State College #25	50.4%	15.4%	26.0%	8.1%
State College #26	52.4%	9.3%	32.8%	5.5%
State College #27	53.1%	28.0%	12.4%	6.5%
State College #28	29.5%	16.7%	33.7%	20.1%
State of Florida	54.9%	16.8%	24.9%	5.6%

Note: Percentages for state colleges represent the most recently available data (2014-2015) as reported by the Florida College System. Percentages for the state of Florida are 2016 estimates from the U.S. Census Bureau. The category of “Other” includes Asian, Neither Hispanic nor Latino, 2 or more races, Pacific Islander, American Indian, or Not-Reported.

Table 3-2. Summary table of dependent variables

Dependent Variables	Variable Type	Value
Fall-to-Spring Retention	Dichotomous	0 = Not Retained; 1 = Retained
Fall-to-Fall Retention	Dichotomous	0 = Not Retained; 1 = Retained
First-semester College GPA	Continuous	0.00 – 4.00
First-year College GPA	Continuous	0.00 – 4.00

Table 3-3. Summary table of independent variables

Independent Variables	Categories	Variable Type	Value
Number of High-risk Courses Attempted per Semester	Zero	Dichotomous	0 = No; 1 = Yes
	One		
	Two or More		
Number of Total High-risk Courses Attempted	Zero	Dichotomous	0 = No; 1 = Yes
	One		
	Two		
	Three or More		

Table 3-4. Summary table of covariates

Covariates	Variable Type	Value
Gender	Dichotomous	0 = Male; 1 = Female
Ethnicity	Dichotomous	0 = Minorities; 1 = White
Pell Recipient	Dichotomous	0 = No; 1 = Yes
Attendance	Dichotomous	0 = Part-time; 1 = Full-time
High School (HS) GPA	Continuous	0.00 – 4.00

Table 3-5. Risk ratio for students enrolled during Fall 2013

Risk Ratio	Number of Students	Percentage
0.00%	132	36.26%
0.01% – 24.99%	110	30.22%
25.00% – 49.99%	93	25.55%
50.00% – 100%	29	7.97%

Note: N=364.

Table 3-6. Cumulative risk ratio for students enrolled both Fall 2013 and Spring 2014

Risk Ratio	Number of Students	Percentage
0.00%	42	14.00%
0.01% – 24.99%	154	51.33%
25.00% – 49.99%	92	30.67%
50.00% – 100%	12	4.00%

Note: N=300.

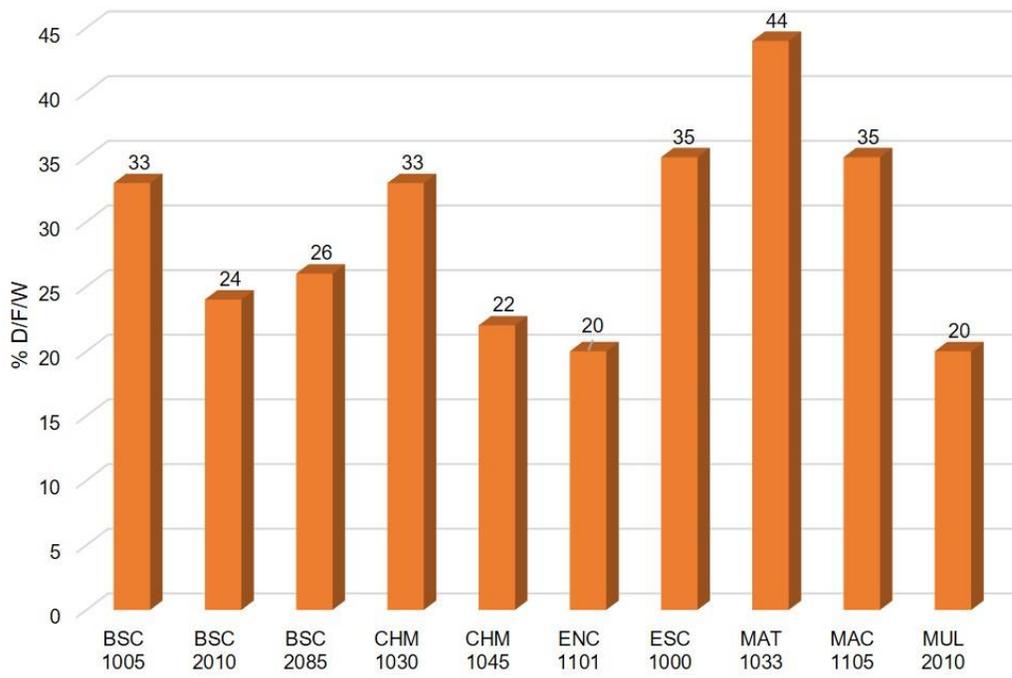


Figure 3-1. Gatekeeper/Gateway Courses with High D/F/W Rates

CHAPTER 4 RESULTS

This study evaluates the relationship between high-risk-courses and drop-out risk during the first year of college attendance. It also examines the significance of high-school GPA and the first-year college GPA as a measure of retention and student success. This chapter begins with the descriptive statistics of the student population, followed by the regression analyses for fall-to-spring retention (RQ1) and fall-to-fall retention (RQ2). Next, the analyses of first year college GPA and high risk courses are presented (RQ3). Additional findings as to the effect of credit accrual on academic success and retention are presented followed by summary of the results to conclude the chapter.

Descriptive Statistics: Gender, Ethnicity, Enrollment Status, Pell Status, HS GPA and High-Risk Course Enrollment

Gender. The Fall 2013 first-time-in-college cohort ($n=364$) had a greater percentage of females to males (Table 4-1). The study sample mirrors the sample populations described in the literature regarding community college students.

Ethnicity. The ethnic make-up of the sample population is reflective of the five-county area served by the college. The majority of the Fall 2013 cohort were white (74.18%). The remaining 39.29 percent were predominantly black (16.21%), with Hispanic (5.22), Mixed race (2.74%), Indian (0.82%) and non-Hispanic (0.82%) also represented (Table 4-1). This ethnic breakdown is unlike that of the literature, which has shown the community college population to have a greater percentage of minority students as compare to white students.

Enrollment Status. The majority of the Fall 2013 cohort were enrolled full-time (81.87%) as compared to part-time (18.13%) (Table 4-1). This pattern of enrollment is

an antithesis of the literature in which part-time enrollment is the rule, rather than the exception, in community colleges.

Pell Status. Over half of the sample population (57.14%) were Pell recipients (table 4-1). The literature suggests that financial need is high in community colleges therefore finding a majority of the Fall 2013 cohort were recipients of Pell grants was not unexpected.

HS GPA. High school grade point average (HS GPA) has been used extensively in determining potential college success. The Fall 2013 cohort had a range of HS GPAs From 1.46 to 4.00 (Table 4-1). The average HS GPA was 3.21 and the majority of the sample population (67.30%) earned HS GPAs between a 3.00 – 3.99.

High-Risk Course Enrollment. As seen in Table 4-2, over one-third of the students were not enrolled in any high-risk course during their first semester of college. An equal number of students (36.26%) were enrolled in one high-risk course. Slightly more than a quarter of the students (27.47%) were enrolled in two or more of these courses. By the end of the first year in college, the majority of students (81.59%) had taken a total of one, two, or three plus high-risk courses with the majority taking one high-risk course (Table 4-3).

Research Question 1: Effect of High-Risk Courses and other Factors on Fall-to-Spring Retention

This section examines the factors which had the greatest likelihood of affecting student retention after one semester of enrollment. An examination of the influence of each high-risk course (Tables 4-4; A-3 to A-11) on student retention revealed no individual course had a significant relationship with retention from Fall-to-Spring apart from Intermediate Algebra (MAT1033). As seen in Table 4-4, students enrolled in

MAT1033 during the fall semester, when controlling for all other factors, were less likely to return in the Spring ($p \leq .01$).

The number of high-risk courses taken during the Fall semester were not significant predictors of retention (Table 4-5). Only part-time attendance was shown to be significant ($p \leq .001$). The addition of HS GPA to the logistic regression model (Table 4-6), shows the two significant predictors of student retention from fall-to-spring are part-time attendance ($p \leq .001$) and HS GPA ($p \leq .01$). First-time-in-college students attending part-time the first semester are much less likely to return the following spring semester. For each unit increase in HS GPA, students are two times more likely to remain in college beyond the first semester.

Research Question 2: Effect of High-Risk Courses and Other Factors on Fall-to-Fall Retention

Fall-to-Fall Retention: Entering Cohort

Analysis of the 2013 cohort for potential return in the Fall of 2014 after finishing their first semester of college yields similar results to that for Fall-to-Spring retention with one notable exception. Part-time attendance was found to be significant indicator of retention ($p \leq .05$) when HS GPA was absent from the model (Table 4-7). The addition of HS GPA (Table 4-8) resulted in part-time attendance no longer having a significant effect. A one unit change in HS GPA ($p \leq .01$) indicates two times greater likelihood of returning after the first year for the entire 2013 cohort. In both models, the first-semester college GPA was the most significant predictor ($p \leq 0.001$) of fall-to-fall student retention after completion of one semester.

Fall-to-Fall Retention: Students with Continuous Enrollment

To examine the relationship of first-year course-taking behavior on fall-to-fall retention, only students who attended both fall and spring semesters were included in the analysis. As seen in Table 4-9, taking even one high-risk course ($p \leq .05$) triples the likelihood of retention versus that of a student who did not take a high-risk course. A total of two high risk courses ($p \leq 0.01$) or a total of three or more high risk courses ($p \leq 0.01$) had an even greater positive effect on student retention. Two or more high-risk courses quadruples the odds of retention while three or more high-risk courses yields a quintupling of the odds. Furthermore, the first-year college GPA becomes the most significant predictor of retention ($p \leq .001$) with each unit increase in college GPA nearly tripling the likelihood of retention. For students who attended both semesters, HS GPA is no longer a significant predictor of retention.

Research Question 3: First-Year College GPA and High-Risk Courses as a Measure of Academic Success

This section examines the relationship of high-risk courses on academic success as measured by the first-year college GPA. The regression function for first-year college GPA indicated that taking a total of three or more high risk courses ($p \leq .01$) during the first year had a significant impact on academic success (Table 4-10). The negative coefficient indicates that poorer performance in these classes results in a lower overall GPA. Both HS GPA and Pell status were highly significant ($p \leq .001$) as to their relationship with student achievement. However, HS GPA had a positive relationship whereas Pell status resulted in a negative relationship.

Table 4-11 provides a more detailed picture of the interaction between Pell and first-year college GPA. Thirty-six percent of the Pell recipients who attended both

semesters earned GPA's below a 2.50 which is 2.4 times that of the non-recipients. More than half the Pell recipients fell below a GPA of 3.00 whereas over half the non-recipients were at or above a 3.00 GPA. Ethnicity and part-time attendance were less significant ($p \leq .05$) indicators of first-year success.

Table 4-12 demonstrates the relationship of first-year college GPA on first-year retention. Of the 364 students who entered in Fall of 2013, 39.84 percent did not return the following year. Of the students who did not return, over half (52.41%) had first-year college GPA scores below a 2.50 and 64.13 percent had scores below a 3.00. Over half (54.79%) of the returning students had GPAs at or above 3.00 and a total of 82.19 percent of all returning students had GPAs at or above a 2.50.

Additional Findings

To fully explore the concept of academic momentum, an examination of the number of credit hours earned in relation to retention as well as the relationship between earned hours, first-year GPA and student retention was needed. Additionally, the percent of total credit earned in relationship to both first-year GPA and high-risk courses could provide a clearer picture of the interaction of these variables.

Figures 4-1 and 4-2 show the effect of college GPA on retention and the relationship of college GPA to accumulated credit hours. For students who attended in both Fall 2013 and Spring 2014 semesters (Figure 4-1), those that took a total of 15 hours or more between the two semesters have GPAs that are greater than 2.00 with few exceptions. Students with less than 15 hours total have a wide range of GPAs and as the total hours decrease, the range of GPAs increases. When compared with Figure 4-2, one can observe the lack of returning students with GPAs below 2.00. Additionally, more returning students have a total number of credit hours at 15 hours or above.

An examination of course-taking success yielded unexpected effects. Measured in terms of percentage of accrued credit, i.e. how many hours earned versus enrolled (or what was the percentage of course-taking success per student), the percentages ranged from zero to one hundred percent accrual. A total of 165 students accrued 20 or more credit hours between the two semesters with 34 credit hours being the maximum earned. One hundred twenty-five of these students were 100 percent successful in earning the credit hours they originally attempted and only 14 of these students accrued less than 20 hours. The remaining 54 students with 20 or more hours exhibited a wide range of successful accrual with a high of 96 percent to a low of 60 percent (Table A-12). Figure 4-3 shows the ratio of earned credit hours as compared to the percentage of successful credit-hour accrual.

The likelihood of student retention is much greater for those students who earn a higher number of credit hours and attain a higher percentage of successful credit-hour accrual. As seen in Table 4-13, students with greater than 20 hours of earned credit and greater than 75 percent credit-hour accrual success were more likely to be retained. Of the 212 students who returned in the Fall of 2014, 64.6 percent had credit hours totaling more than 20 hours.

The addition of percentage of accrued credit to the regression analysis of first-year college GPA to determine its relationship to retention (Table 4-13) further solidifies the importance of successfully earning credit in a timely manner. Percentage of accrued credit ($p \leq .001$) correlated to a significant positive relationship with GPA whereas enrolling in three or more total high risk courses ($p \leq .001$) presented a significantly negative relationship with GPA. Enrolling in two or more high risk courses ($p \leq .01$) was

also correlated to a significant negative relationship with GPA. These results indicate that students taking high risk courses are less likely to successfully accrue credit and are more likely to earn lower college GPAs.

Summary Of Results

The data analyses presented in this chapter are designed to evaluate high-risk course-taking behavior and their impact on student retention of first-time-in-college students in correlation with other significant attributes such as gender, ethnicity, and enrollment status. Additionally, the impact of high-school and college-level grade-point averages on student retention are examined. The results from the regression models indicated that neither individual high-risk courses or combinations of those were solely responsible for student retention beyond the first semester. Part-time status was shown to have a negative correlation with retention in all instances. Both HS GPA and the first-semester college GPA were shown to have a positive correlation with retention. The total number of high-risk courses taken, in conjunction with first-year college GPA, demonstrated a negative correlation for retention beyond the first year. The successful accrual of credit hours was also shown to have a positive impact on student retention. These findings, their implications, and recommendations for future studies will be discussed in the following chapter.

Table 4-1. Descriptive statistics: Fall 2013 cohort

Covariates	Subdivisions	Frequency	Percentage
Gender	Female	221	60.71
	Male	143	39.29
Ethnicity	White		
	Minority	270	74.18
	<i>Black</i>	94	25.82
	<i>Hispanic</i>	59	16.21
	<i>Mixed</i>	19	5.22
	<i>Indian</i>	10	2.74
Enrollment status	Full-time	298	81.87
	Part-time	86	18.13
Pell recipient	Yes	208	57.14
	No	156	42.86
HS GPA	1.46-1.99	7	1.92
	2.00-2.49	29	7.97
	2.50-2.99	70	19.23
	3.00-3.49	134	36.81
	3.50-3.99	111	30.49
	4.00	13	3.57

Note: N=364.

Table 4-2. First-semester high-risk course-taking behavior

High-Risk Courses Attempted	Number of Students	Percentage
Zero	132	36.26%
One	132	36.26%
Two or more	100	27.47%

Note: N=364

Table 4-3. First-year high-risk course-taking behavior

Total High-Risk Courses Attempted	Number of Students	Percentage
Zero	67	18.41%
One	108	29.67%
Two	98	26.92%
Three or more	91	25.00%

Note: N=364

Table 4-4. Effect of MAT1033 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.723	0.228	-1.03	0.304
White	0.588	0.215	-1.45	0.147
Part-time	0.259	0.088	-3.97	0.000***
Pell recipient	1.143	0.354	0.43	0.667
MAT1033	0.260	0.125	-2.80	0.005**
HS GPA	2.018	0.575	2.46	0.014*
Constant	1.414	1.400	-0.35	0.727

Note: N=364. * $p \leq .05$, *** $p \leq .001$

Table 4-5. Logistic regression analysis for Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.815	0.253	-0.66	0.511
White	0.716	0.245	-0.97	0.330
Part-time	0.211	0.066	-4.98	0.000***
Pell recipient	0.974	0.287	-0.09	0.930
One high risk course	0.977	0.324	-0.07	0.943
Two or more high risk courses	0.946	0.351	-0.15	0.881
Constant	10.682	4.898	5.17	0.000***

Note: N=364. *** $p \leq .001$

Table 4-6. Logistic regression analysis for Fall-to-Spring retention with inclusion of HS GPA

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.740	0.232	-0.96	0.336
White	0.650	0.229	-1.22	0.221
Part-time	0.265	0.091	-3.88	0.000***
Pell recipient	1.084	0.331	0.26	0.793
One high risk course	0.901	0.305	-0.31	0.759
Two or more high risk courses	0.843	0.314	-0.46	0.646
HS GPA	2.057	0.570	2.60	0.009**
Constant	1.194	1.166	0.18	0.856

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table 4-7. Logistic regression analysis for likelihood of Fall-to-Fall retention after one semester of attendance

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	1.392	0.324	1.42	0.155
White	1.335	0.351	1.10	0.271
Part-time	0.519	0.158	-2.15	0.031*
Pell recipient	0.717	0.171	-1.40	0.162
One high risk course	0.877	0.241	-0.48	0.633
Two or more high risk courses	1.440	0.430	1.22	0.222
First-semester GPA	1.695	0.196	4.56	0.000***
Constant	0.288	0.142	-2.52	0.012*

Note: N=364. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4-8. Logistic regression analysis for likelihood of Fall-to-Fall retention after one semester of attendance with inclusion of HS GPA

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	1.287	0.304	1.07	0.286
White	1.206	0.325	0.70	0.486
Part-time	0.654	0.203	-1.37	0.172
Pell recipient	0.784	0.189	-1.01	0.314
One high risk course	0.827	0.231	-0.68	0.497
Two or more high risk courses	1.317	0.397	0.91	0.361
First-semester GPA	1.624	0.193	4.07	0.000***
HS GPA	2.014	0.467	3.02	0.003**
Constant	0.038	0.032	-3.86	0.000***

Note: N=364. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4-9. Logistic regression analysis for Fall-to-Fall retention with attendance both semesters

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	1.551	0.451	1.51	0.131
White	1.221	0.372	0.66	0.511
Part-time	1.546	0.732	0.92	0.358
Pell recipient	0.771	0.243	-0.82	0.411
One total high risk course	3.400	1.693	2.46	0.014*
Two total high risk courses	4.382	2.098	3.09	0.002**
Three or more total high risk courses	5.048	2.413	3.39	0.001**
HS GPA	1.470	0.422	1.34	0.179
First-year college GPA	2.915	0.626	4.98	0.000***
Constant	0.008	0.010	-4.23	0.000***

Note: N=300. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4-10. Results of Regression Function for First-Year College GPA

Variables	Coef.	Robust Standard Error	t	Sig.
Female	0.124	0.088	1.41	0.159
White	0.203	0.100	2.03	0.044*
Part-time	0.272	0.137	1.99	0.048*
Pell recipient	-0.301	0.081	-3.72	0.000***
One total high risk course	-0.128	0.151	-0.85	0.397
Two or more total high risk courses	-0.293	0.166	-1.77	0.078
Three or more total high risk courses	-0.493	0.161	-3.07	0.002**
HS GPA	0.594	0.107	5.56	0.000***
Constant	1.071	0.424	2.53	0.012*

Note: N=300. $F(8,291) = 14.77$. $Prob > F = 0.000***$. $R\text{-squared} = 0.283$. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 4-11. Pell status and first-year college GPA for students attending Fall 2013 and Spring 2014

First year cumulative college GPA range	Did not receive Pell funding	Did receive Pell funding
0.00-1.99	5 (3.94%)	36 (20.81%)
2.00-2.49	14(11.02%)	27 (15.61%)
2.50-2.99	30 (23.62%)	42 (24.28%)
3.00-3.49	41 (32.28%)	41 (23.70%)
3.50-3.99	27(21.26%)	18 (10.40%)
4.00	10 (7.87%)	9 (5.20%)
Total # of students	127 (100%)	173 (100%)

Note: N=300.

Table 4-12. Fall 2013 cohort retention by first-year college GPA

First year cumulative college GPA range	Fall 2013 to Fall 2014 Student Retention		
	Did Not Return	Did Return	Total
0.00-1.99	52 (35.86%)	10 (4.57%)	62 (17.03%)
2.00-2.49	24 (16.55%)	29 (13.24%)	53 (14.56%)
2.50-2.99	17 (11.72%)	60 (27.40%)	77 (21.15%)
3.00-3.49	26 (17.93%)	68 (31.05%)	94 (25.82%)
3.50-3.99	13 (8.97%)	35 (15.98%)	48 (13.19%)
4.00	13 (8.97%)	17 (7.76%)	30 (8.24%)
Total # of students	145 (100%)	219 (100%)	364 (100%)

Table 4-13. Student retention as a function of credit hours earned versus success of credit accrual

Percentage of Credit Earned vs Attempted	Total Credit Hours Earned			
	≥20hours	Number of Students		<20 hours
	Number of Students Retained	Not Retained	Number of Students Retained	Number of Students Not Retained
100%	92 (43.39%)	19 (21.59%)	11 (5.19%)	3 (3.41%)
75-99%	41 (19.34%)	7 (7.96%)	8 (3.77%)	5 (5.68%)
50-74%	4 (1.89%)	2 (2.27%)	39 (18.40%)	13 (14.77%)
25-49%	0 (0.00%)	0 (0.00%)	14 (6.60%)	20 (22.73%)
0-24%	0 (0.00%)	0 (0.00%)	3 (1.42%)	19 (21.59%)
Total # of students	137 (64.62%)	28 (31.82%)	75 (35.38%)	60 (68.18%)

Note: N (Retained)=212; N (Not Retained) = 88. Students must have attended two consecutive semesters to earn 20 or more hours of credit.

Table 4-14. Results of regression function for first-year college GPA with inclusion of percentage of accrued credit.

Variables	Coef.	Robust Standard Error	t	Sig.
Female	0.110	0.074	1.49	0.138
White	0.064	0.094	0.68	0.494
Part-time	0.096	0.128	0.75	0.455
Pell recipient	-0.121	0.069	-1.76	0.080
One total high risk course	-0.267	0.148	-1.81	0.072
Two total high risk courses	-0.440	0.155	-2.84	0.005**
Three or more total high risk courses	-0.618	0.150	-4.12	0.000***
Percentage of accrued credit	0.017	0.002	7.13	0.000***
HS GPA	0.135	0.097	1.39	0.167
Constant	1.414	0.342	4.13	0.000***

Note: N=300. F (9,290) =27.29. Prob>F=0.000***. R-squared=0.489.

** p ≤ .01, *** p ≤ .001

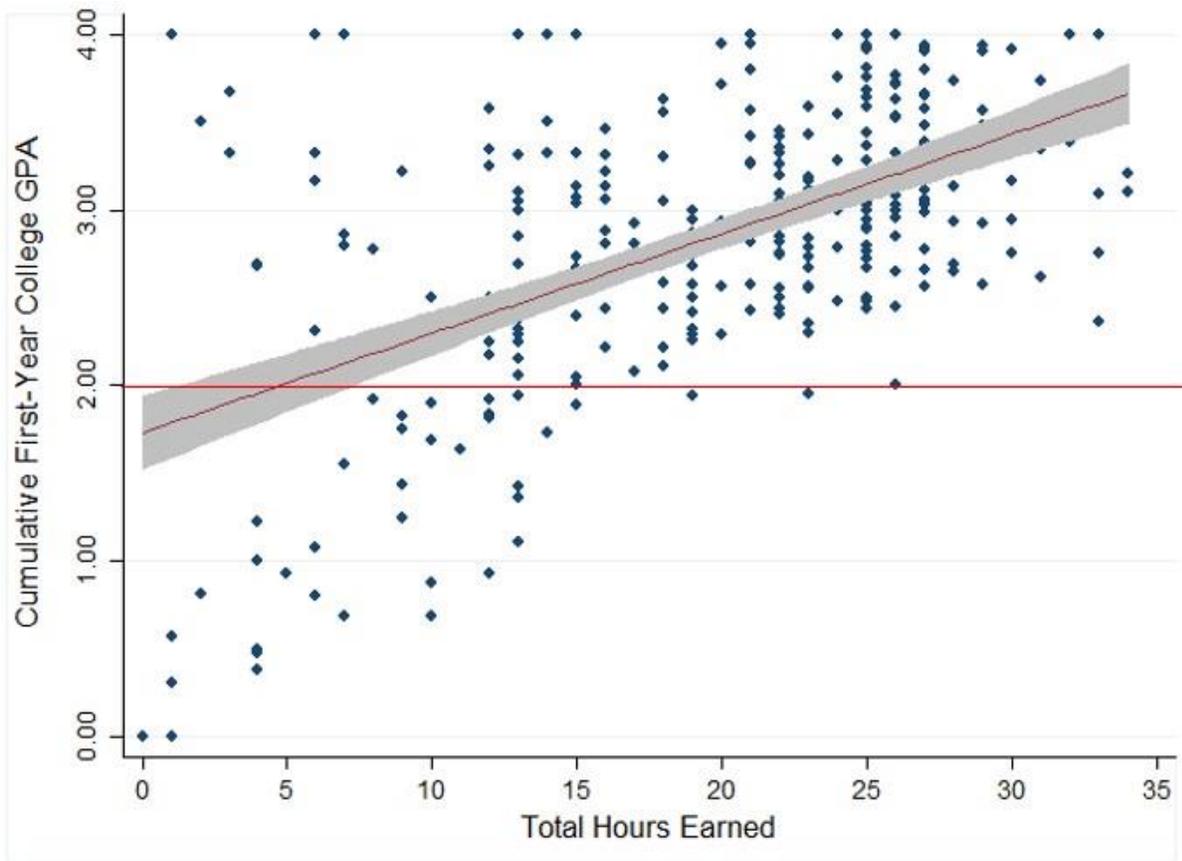


Figure 4-1. Total hours earned by college GPA for students attending both semesters

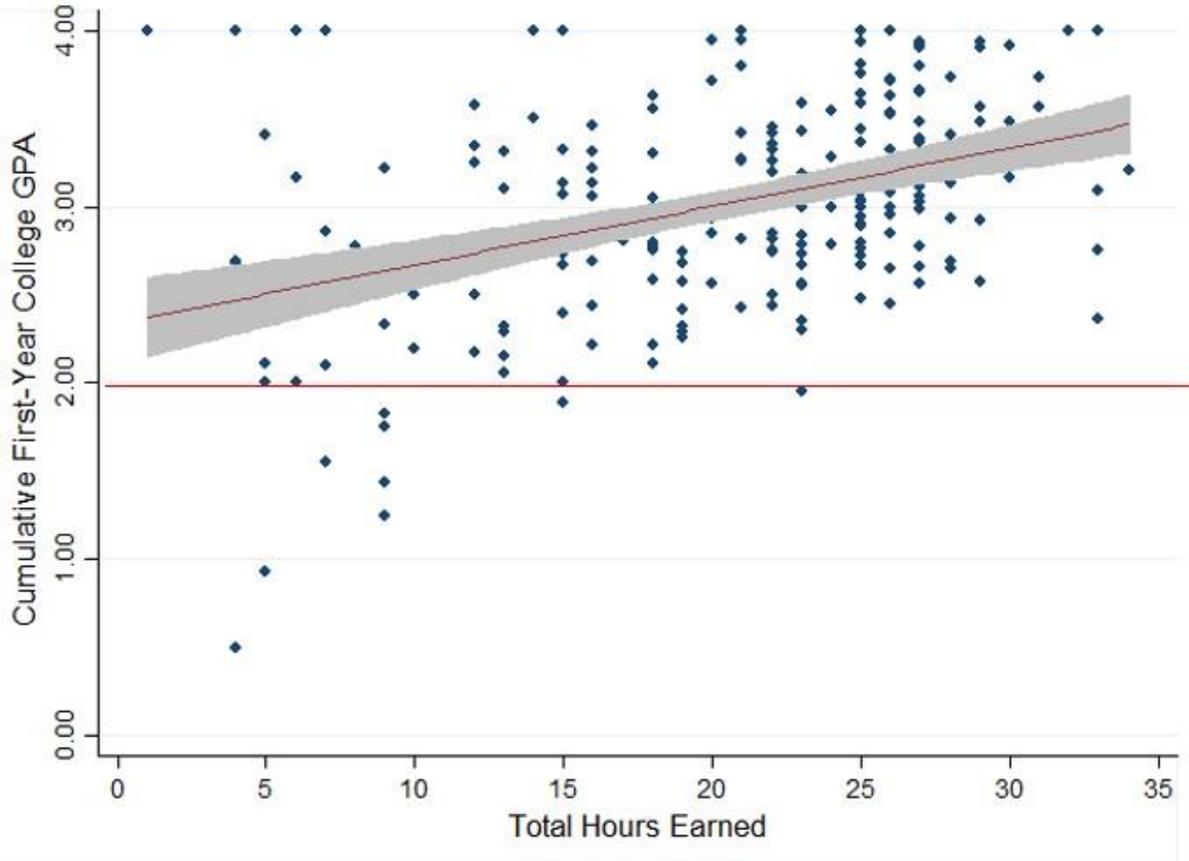


Figure 4-2. Total hours earned by college GPA for students retained Fall 2014

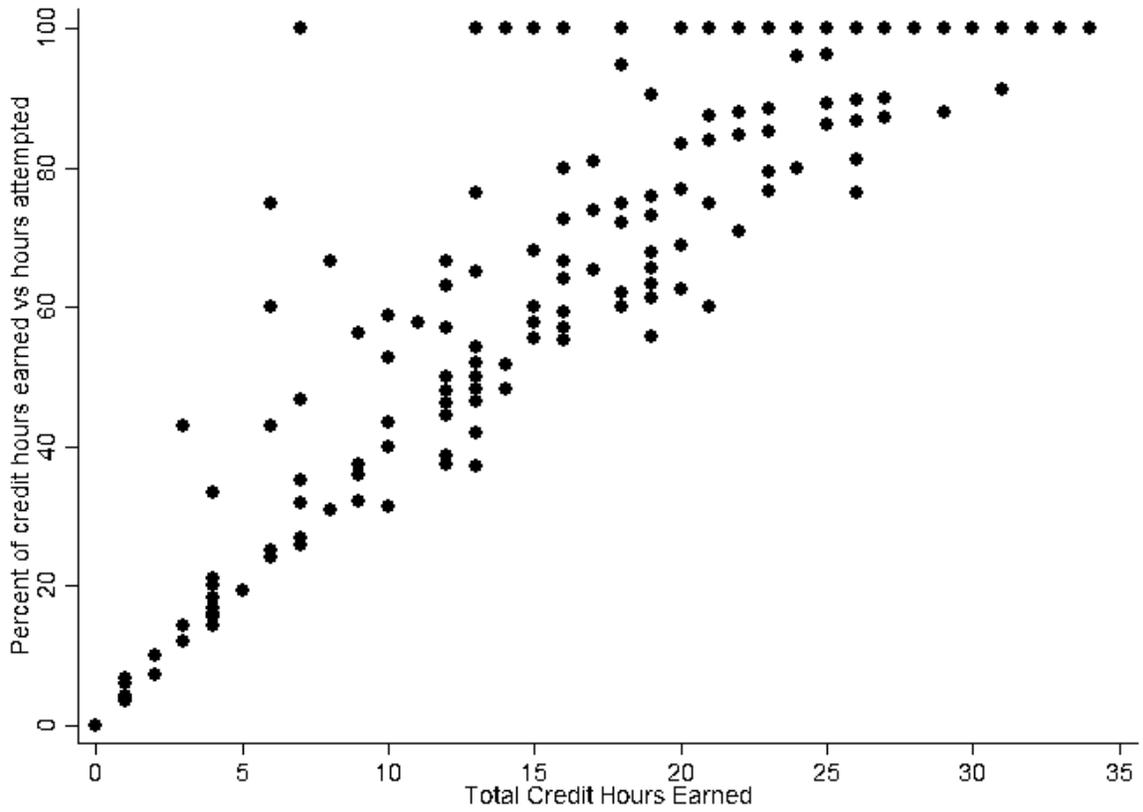


Figure 4-3. Percentage of successful credit-hour accrual versus total credit hours earned.

CHAPTER 5 DISCUSSION AND CONCLUSION

In this chapter the purpose of the study and the analytical results which address the research questions are reviewed. Next, the findings regarding characteristics most likely to predict drop-out risk of first-time-in-college (FTIC) community college students, as framed by the current research literature, are discussed. The next section discusses implications for institutional practice followed by recommendations for future research. Finally, the limitations of the study are addressed with concluding remarks ending this chapter.

Purpose of Study Reviewed

Rural community colleges, like most other higher education institutions in the United States, are under pressure to increase retention rates. Numerous reasons, such as lack of on-campus integration (Barnett, 2011), low GPA's (Gershenfeld et al., 2016), and unmitigated financial pressures (Kuh et al., 2006), have been identified as causes for the lack of persistence in the community college setting. Gatekeeper/gateway courses (Dougherty et al., 2009; Gainen, 1995; Leinbach & Jenkins, 2008) have been identified as potential stumbling blocks for continued success in chosen academic pathways. These courses can inhibit continuous accrual of credit hours which has been implicated in affecting student retention (Adelman, 1999, 2006; Goldrick-Rab, 2007). However, observations regarding how the number of these high-risk courses taken at one time and their effect on first-year retention has not been examined. The purpose of this quantitative study was to develop a better understanding of the relationship of high-risk courses to first year drop-out risk for incoming FTIC AA and AS degree-seeking students. This study sought to answer three questions. The first was to what

extent does taking high-risk courses in the first semester affect student retention. The second question examined the effect of high-risk courses on continued retention after one-year of college attendance. The final question sought to determine the relationship between high-risk courses and first-year academic success as measured by college GPA. Descriptive statistics and regression analyses were utilized for data analysis. Findings are discussed in the following section.

Discussion of Results

Course-taking behavior and retention. The analysis of the relationship between high-risk courses and the likelihood of student retention after the first semester provided unexpected results. Individual high-risk courses, except for Intermediate Algebra (MAT 1033), showed no significant relationship with student retention. MAT 1033 is both an introductory mathematics course and a gateway course. It has been shown that gateway courses such as MAT 1033 can be a barrier to student success (Gainen, 1995; Musoba & Krichevskiy, 2014; Offenstein, Moore, & Shulock, 2010). For underprepared students, there is an even greater likelihood of failure in gateway courses. Adelman (1999) showed that the most likely courses to be either failed, repeated, or withdrawn from were mathematics courses. Inability to progress through these courses impedes academic momentum and potentially sets the stage for student attrition.

While MAT 1033 does not satisfy any general education requirement for graduation, it is required for students who do not meet the standards for entry into College Algebra (MAC 1105) and may serve as an elective as well. Students who take developmental math must successfully pass MAT 1033 before entering MAC 1105. Studies have shown that of students who start in a developmental or remedial math

class only 31 percent will complete the required math series (Bailey, 2009).

Additionally, the more developmental classes required, the more likely the student is to drop-out of college. By the time a student reaches MAT 1033, they may have spent a year in developmental classes, and will have not gained any college-level credit towards the math requirements for graduation. Many of these students will experience frustration and burn-out which impacts their continued college success.

The impact of MAT 1033 on student retention for the Fall 2013 cohort carries even greater weight considering the developmental education legislation enacted in Florida in 2013. As previously mentioned, students who graduated from a public Florida high school, after 2008, or active duty military personnel, have the option to skip developmental education courses even if their entrance scores or high school transcripts indicate otherwise. MAT 1033 is the course in which all opt-out math students are enrolled. An analysis of the FCS FTIC 2014 cohort who chose to opt-out of developmental math revealed a 12.5 percent drop in passing rates for MAT 1033 (Park et al., 2016). Institutions facing decreasing success in a gateway course are also facing a potential reduction in performance funding monies if these increased failures also decrease the overall retention rate.

Enrollment in one or more high-risk courses during each semester had no significant relationship with overall retention. However, the aggregated effect of taking a total of one or more high-risk courses did have a significant impact on student retention. This suggests that students taking high-risk courses and passing those courses are attaining academic momentum. As discussed in Chapter 2, academic momentum (Adelman, 1999) emphasizes the timely accrual of college credit, especially during the

first year of attendance. Adelman (1999, 2006) found, regardless of incoming student academic achievement, socio-economic status, and other student-related covariates, that attaining 20 credit hours or more during the first year increased the likelihood of graduation. Doyle (2011) specifically examined credit accrual at the community college level and found a linear relationship between credits earned and probability of transfer to a four-year institution. Adelman (2006) noted that for community college students, a 20 percent failure or withdrawal rate reduced the transfer probability by 39 percent. Additionally, Moore and Shulock (2009) found that as the percentage of dropped courses increased, the likelihood of continued enrollment decreased, even when controlling for all other factors like part-time attendance and ethnicity.

Significant Characteristics of Drop-Out Risk

Part-time vs Full-time Enrollment

Part-time enrollment is a significant roadblock to retention, even when the overall percentage of part-time students is low. The College reports a greater than 50 percent part-time attendance rate annually yet the FTIC incoming cohort analyzed for this study was less than 20 percent part-time. The disparity in these numbers indicates a need for further evaluation of this factor. Nevertheless, part-time enrollment, especially in the first semester of college, presents a potentially serious impediment to student retention. The absence of part-time enrollment as a significant indicator of retention beyond the first semester is most likely attributable to the low percentage of incoming students in this category. Forty-one percent of the part-time students failed to return after one semester leaving a very small number of part-time students remaining within the cohort. The attrition rate of the part-time students at the College mirrors that cited in the literature for community college students in general.

Full-time attendance would be preferable for all college students. In Florida, where performance-based funding (PBF) is in effect, retention and completion rates are only measured for full-time students. Not only is student retention necessary, but the time to completion for both a two-year and a four-year degree is also extraordinarily important to institutional funding. Higher education institutions would prefer higher numbers of successful full-time students to boost their retention and completion rates. In a study of community college students, Yu (2017) found that full-time attendance increased the likelihood of persistence and completion. The time it takes to complete a degree is reduced, accrual of credit happens at a faster rate, and external pressures may be lessened. Attewell and Monaghan (2016) found that for full-time students, increased credit loads had a positive effect on student academic momentum.

Pell Status

Receiving a Pell grant was not found to be significant for either first semester or first year retention for the 2013 cohort. This is in opposition to much of the existing literature which has found Pell awards being related to increased student persistence and retention (Adelman, 1999; Bettinger, 2004; Cabrera, Nora, & Castenada, 1992). However, in an analysis of first-year community college students, Hawley & Harris (2006) found that receipt of a Pell grant was not a strong motivator for either retention nor attrition.

If one examines the rules regarding Pell eligibility, these findings are not so unusual. To continue receiving Pell funding, a student must maintain satisfactory academic progress (as determined by the individual institution) which includes credit accrual and maintaining a cumulative GPA in line with the hours attempted. However, a 2.00 GPA must be maintained after the second year of college (U.S.DOE, 2017). At the

College, students wishing to continue receiving Pell must pass 67 percent of their coursework each semester as well as maintain a minimum GPA of 2.00.

In the regression analysis of first-year GPA, Pell was one of the most highly significant indicators of academic success. Nearly 21 percent of the Pell recipients who attended both semesters the first year had a college GPA below a 2.00 as compared to less than 4 percent of non-Pell recipients. Sixty-one percent of Pell recipients had a GPA below 3.00 whereas 39 percent of the non-Pell recipients were below a 3.00 GPA.

When one looks at total number of students who returned in Fall of 2014, ninety-one Pell recipients (44 percent of the incoming Fall 2013 cohort) did not return for their second year of college as compared to fifty-four non-Pell recipients (34 percent). Pell eligibility cannot account for all the attrition of these students based on their college GPA but lack of funding can certainly be attributed to part of the reason for not returning the second year. Prior research of low-income students (to which Pell is applicable) has found that they are more likely to earn fewer credit hours and earn lower GPA's than those in higher socio-economic strata (Chen & Carroll, 2005).

Gender

Student gender was not found to have a significant relationship with student retention. Adelman (1999) found that gender played no role in student retention and completion in early analyses of the data prior to investigation of credit-hour accrual. This lack of significance remained when Adelman (2006) "Revisited the Toolbox" to review whether the variables of interest in 1999 were still of interest after several educational reforms had been introduced. Gender, by itself, does not significantly contribute to determining likelihood of retention.

Ethnicity

Ethnicity was not found to have a significant impact on student retention; however, there was a slight significance ($p \leq 0.5$) in the correlation of first-year college GPA and minority status with white students being more likely to have a higher GPA. That significance, however, disappeared with the addition of successful credit accrual. Adelman (1999) also found that minority status had a slightly negative association with later degree attainment until actual student performance, i.e. credit accrual, was taken into account. The addition of credit accrual to Adelman's model negated the effect of ethnicity, which is also seen in this researcher's findings. While the literature consistently shows that ethnicity influences retention (DeNicco et al., 2015; Pascarella, Smart & Ethington, 1986), credit accrual was not an included variable for those researchers.

Academic Preparedness via HS GPA and Retention

High-school GPA has been used as one of the selective measures for entrance into four-year institutions for decades. It has been less scrutinized at the community college since they are open-access institutions. However, a student's HS GPA is often indicative of how successful a student is likely to be in college. Therefore, the significance of HS GPA in relationship with retention for the Fall 2013 cohort was not surprising. As expected, HS GPA was a significant predictor of cohort retention based on both individual high-risk class effects as well as first-semester outcomes. Moreover, there was a high correlation between HS GPA and first-year college GPA. Many researchers (Adelman, 1999; DesJardins et al., 2002; Feldman, 1993; Ishitani, 2006) have found that high school performance was directly related to college success. A recent study of FTIC students entering the University of Alaska found HS GPA "had the

most positive and significant relationship with students' college course success" (Hodara & Cox, 2016, p. 10). Furthermore, the researchers noted that a "one-unit" increase in HS GPAs (moving from a 2.0 to a 3.0, for example) increased the likelihood of passing college-level English and math by more than 25 percentage points.

The decreased relationship between HS GPA and retention is notable in this study for the students that remained enrolled for back-to-back semesters. DesJardins et al., (2002) noted that the effect of high school performance decreased with each subsequent semester of college enrollment. Their research indicated that once "actual college performance is controlled for, the strength of pre-college academic measures decline" (DesJardins, et al., 2002, p.109). At this point, a student's college GPA becomes the most significant indicator for continued college retention. For the FTIC Fall 2013 cohort, the college GPA becomes a better measure of retention after the first year of enrollment.

Academic success via college GPA and Retention

The impact of college GPA on retention was not unexpected. The first-semester GPA is the first indication of long-term success in college and was the most significant indicator of retention over all other indicators, including HS GPA. The average first-semester GPA was a 2.88. For students attending two consecutive semesters, the average GPA at the end of the first year was a 2.82. However, the average GPA for students returning the second year was a 3.03. This correlates with Leinbach & Jenkins (2008) study which found that students with a GPA of 3.0 or higher were more likely to be retained. For members of the Fall 2013 cohort with GPAs below a 2.00, the rate of return was less than five percent. Overall, 45.21 percent of the returning Fall 2013 FTIC

cohort had GPAs below a 3.00, but well over half of those returning earned a GPA between 2.50 and 2.99.

Accruing Credit

The results of this study clearly demonstrate the correlation between accruing credit hours and student retention. A larger percentage of students with greater than 20 credit hours (64.62%) returned for the second year of college as opposed to only 35.38 percent of the students who earned less than 20 credit hours the first two semesters. The success rate (percentage of credit hours earned versus credit hours completed) with which students achieved their credit accrual is very telling in the student retention rates. Students who achieved between 75 percent to 100 percent of their attempted hours accounted for 71.69 percent of the total number of FTIC students returning for a second year. Of those 152 students, 103 were 100 percent successful in their attempted classes and 92 of the 103 earned more than 20 hours.

An examination of success rate in correlation with first-year GPA also shows that most students who returned the second year had GPAs above a 2.00. Moreover, a greater number of these had earned 20 or more credit hours. There were a few students with high GPAs and low credit hour accrual that remained for the second year which is expected of part-time students. However, those with both low credit hours earned and low GPAs were, for the most part, absent at the beginning of the second year. This pattern of retention or attrition aligns with the concept of academic momentum. Students who accrue credit at a steady pace will, for the most part, remain in college whereas those who are less successful will drop-out.

Implications for Institutional Practice

Sixty percent of the Fall 2013 FTIC cohort remained at the College after the first year. While this is laudable, the loss of forty percent of the cohort is not. Some of these non-returning students may have transferred to other institutions and some may have decided that their career pathway did not involve an AA/AS degree. The students who dropped-out because of poor performance, however, are the ones that can best be served by the information gleaned from this study.

There have been numerous studies identifying gateway/gatekeeper courses as direct impediments to student success in college (Buchanan, 2006; Calcagno et al., 2007; Kuh, 2001; Roksa et al., 2009) One of the most difficult subject areas in which to accrue credit is mathematics, especially in developmental math and introductory algebra. Kuh (2001) reported that 30-40 percent of students enrolled in a gateway mathematics course at a four-year residential university either earned a D, an F or withdrew from the course. For the College, MAT 1033 is a very high-risk gateway course which inevitably has large percentages of students in the D/F/W category. The developmental education opt-out clause for Florida public high school graduates and military personnel poses a significant challenge in providing interventions to prevent dropping-out from MAT 1033, which may then prevent attrition from the College. Providing a complete picture of the risks associated with taking MAT 1033, especially for those students with low HS GPAs and/or part-time enrollment, could assist them in making better decisions regarding scheduling of classes. For FTIC students who need developmental math but choose to opt-out, additional ammunition in the toolbox can only help student advisors. Oftentimes FTIC students are unaware of their deficiencies in classes like MAT 1033 even when placement scores are in front of them. Park et al.,

(2016) posit that FTIC students may not be able to accurately self-place themselves in the correct courses which leads to failure in the gateway course. The College could take advantage of the results of this study to better serve a population of FTIC students who have lofty ideas of their abilities but have low probabilities of succeeding.

For STEM students, course-taking behavior and their successful accrual of credit is vitally important. Crisp et al., (2009) noted that the additional challenges posed by introductory math and science gatekeeper courses may lead to disillusionment with STEM courses and subsequently deterring students from that pathway. In an analysis of transcript data from the Postsecondary Education Transcript Study (PETS:09) coupled with data from the Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Wang (2016) examined the course-taking patterns of community college students and their subsequent transfers to four-year colleges as it related to STEM. One of the outcomes of this analysis was that first-semester and first-year course-taking choices were instrumental in continued enrollment in a STEM pathway. Lack of forward momentum in the math and science courses, or delay in taking gateway math and science courses, led to students leaving the STEM pathway or being unsuccessful in their chosen STEM field of study after transferring to a four-year university. The College should monitor these students closely, especially in the first semester, so that needed interventions can be encouraged by advisors and faculty.

Part-time attendance is a necessity for some students. However, starting college as a part-time attendee poses a problem. Part-time attendance has both a negative effect on retention and degree completion (Adelman, 1999, 2006; Byun, Irvin, & Meece, 2012). Attwell et al., (2012) noted that first-time students who enroll part-time tend to be

weaker academically and come from a lower SES background. These students tend to consistently lag behind their peers throughout their academic careers and are less likely to persist. A study of course completion and time-to-degree by Kress (2007) found that a majority of part-time FTIC students were unsuccessful in nearly 40 percent of their coursework. This inability to successfully complete credits extends the time to degree even further and greatly increases the likelihood of dropping-out.

For the College, focusing on the incoming part-time FTIC students during their first semester could be advantageous for student retention. A study by MacCann, Fogarty, & Roberts (2011) found that time-management was extraordinarily important for part-time community college students to be successful in college. Since many part-time students are juggling jobs, families and coursework, the College could institute strategies to help these students better manage their study time.

The College currently does not utilize HS GPAs as a measure of student ability during the advising process. The outcomes of this research indicate that the College may want to use HS GPA as an additional piece of information to better assist student scheduling. Students with lower HS GPAs may need to be tracked more closely during their first semester so that interventions can be undertaken before course failure occurs. Tucker and McKnight (2017) found that students with HS GPA below a 2.3 were more likely to have a low college GPA and be less likely to be successful academically. Likewise, Yu (2017) noted that college completion in a timely manner was positively correlated with high school GPA.

There are concerns, however, as to the veracity of HS GPAs due to grade inflation. A recently released study cited by Jaschik (2017), in which HS GPAs were

examined between the years of 1998 and 2016, found the average HS GPA to have risen from 3.27 to 3.38. However, these grade inflations were not uniformly disbursed. Wealthier schools, with a greater percentage of whites enrolled, were found to have larger increases than lower income, higher minority schools. While the College is in an area of low minority populations, the income of the rural population is most certainly not high. Grade inflation may not be an issue within this defined rural area but caution would be advisable. If the College were to use student HS GPAs as indicators of potential ability in gateway classes, advisors would need to balance it with other available information.

The correlation between first-semester college GPA and student retention has been well-documented and the results of this study align with the literature. Kahn and Nauta (2001) found that first-semester GPA was the strongest predictor of student persistence into the sophomore year in their study of 400 freshmen students whose gender and ethnicity make-up were very similar to the students at the College. Gershenfeld et al., (2016) noted that a first-semester GPA of 2.33 or below reduced the odds of graduating by nearly half. Identifying students with low first-semester GPAs and discussing strategies to assist them in obtaining better outcomes could benefit both the students and the College. Early intervention may reduce D/F/W rates as well as increase student retention rates.

An analysis of data from BPS:04/09 found that regardless of the type of four-year institution (urban, suburban, or rural), first-time college students with a first-year GPA of 3.5 were 47 percent more likely to continue their college education than those with a GPA below 3.5 (Sparks and Nunez, 2014). DesJardins and McCall (2010) noted for

each full-grade increase in a student's college GPA the chance of continued enrollment increased by nearly 30 percent. Achieving a strong college GPA in the first-semester is a positive experience for students which encourages them to continue their college career. Moreover, a high GPA is indicative of successfully passing courses and accruing credits which is a hallmark of academic momentum.

The College in this study has recently added a service called Dropout Detective™ (personal knowledge) which tracks student performance in their classes. Advisors are alerted when students have low class performance (as measured by grade inputs and class attendance), and faculty can alert advisors as well. However, the success of the program is dependent on timely grade and attendance inputs by faculty and continuous monitoring by advisors. Even with the addition of Dropout Detective™, higher than desired D/F/W rates are still occurring.

By using the information from this study, the College could implement a multi-pronged strategy involving pre-semester advising, in-semester tracking with Dropout Detective™, and post-semester follow-up with students who fall below a 2.50 GPA or have a percentage accrual of credit below the 74 percent range. Pre-semester advising for FTIC students should include a discussion of HS GPA as a measure of academic readiness and how it relates to first-semester success. Tracking students during the semester can allow for timely interventions which may prevent student withdrawals or failures which slow progress and, in cases of low grades, lower their college GPA which may impact their standing with financial aid. Finally, students who are not maintaining a 2.50 GPA are at greater risk, based on the results of both this study and prior research, of dropping-out of college. Failure to maintain a 75 percent or greater credit accrual

rate, whether full-time or part-time, diminishes the likelihood of student persistence and ultimately completion of their college degrees. These strategies could increase both student achievement in the classroom and student retention rates for the College. As Witteveen & Attewell (2016) so succinctly say,

For average American college students, academic momentum may partially emerge from the “right” course-taking pattern in the first couple of semesters. This emphasizes the importance of careful course selection early on in student’s college career—a responsibility of students themselves, but also of administrators, faculty, and counselors. (pp.463-464)

Recommendations for Further Research

This study provides insight into characteristics of students at a small, rural community college which can directly impact student retention. The use of a single cohort at one institution cannot be generalized for all rural institutions much less for large urban community colleges. Utilizing data from several different cohorts can potentially paint a fuller picture as to the impact course-taking behavior has on student success. Additionally, the study did not disaggregate FTIC from first-generation-in-college (FGIC) students. Research into FGIC students has shown these students do exhibit specific needs that may impact their college success over and above those discussed within this study.

Credit accrual and the methods by which it can be accrued is an area which could be addressed as well. This study does not differentiate between courses which were delivered online versus face-to-face, nor does it investigate the impact of dual-enrollment credit on student success. Adelman (2006) insisted that “academic advisors and counselors have to target every first-time student for at least 20 additive credits by the end of the first calendar year of enrollment.” (p. 109). In his opinion, even six hours

of dual-enrollment credit prior to entering college would alleviate the problems of part-time attendees lack of timely credit accrual the first year. These areas are ripe for future research since more students are taking advantage of both dual-enrollment opportunities and online availability of credit-bearing courses.

This study focused on a small subset of data to which the researcher had access. Previous research has shown that social integration plays a significant role in student retention. Addition of student engagement variables, such as participation in college activities, utilizing tutoring services and family characteristics, would add to the richness of the study and provide insight into both non-cognitive and non-demographic factors which do have an impact on student retention. These factors, especially within the rural context, would be of great assistance to institutions in deciding how best to address their student retention activities to minimize drop-out risk.

Limitations

This study is marked by several limitations. The population studied, while mirroring the communities the College serves, has several differences when compared to the national norms for community colleges. The small number of minority students, for example, does not allow for the results of this study to be generalized to a larger population, especially one whose demographics are markedly different from those of the College's service area. Furthermore, disaggregation of the data by gender plus ethnicity could provide greater insight into patterns of retention not examined by this study.

Variables such as age and SES status were not used in this study. The average age of the College's students is much closer to that of residential, four-year universities rather than the higher averages seen in most community colleges. Age has been shown

to play a role in much of the research but was purposefully omitted in this study. Family income (SES) was not readily available to this researcher due to the way records were kept at the College prior to 2016.

Remedial, or developmental, coursework was not included in this study. The cohort in this study would have been required to take developmental education courses if their incoming test scores warranted it. However, the legislative changes in determining who was required to take developmental education courses, instituted in the state of Florida in 2014, significantly reduced the enrollment of students in these classes which has reduced the impact of these courses on retention statewide. Inclusion of these courses would not have assisted in determination of drop-out risk for the institution utilized in this study.

Additionally, non-academic factors were not included as they were beyond the scope of the study. Measures of student engagement which often include work/family obligations, available institutional support services, interactions with faculty, and student participation in campus activities are unaccounted in this limited study.

Summary of Discussion

Research on rural institutions in general has been underrepresented in the literature with small rural colleges being investigated even less. Rural demographics have been shown to be, in many cases, markedly different than those found in urban areas. Generalizations as to drop-out behavior, based on research at large urban institutions, may not be applicable to the rural institutions, especially those that are small. The objective of this study was to explore the relationship of high-risk courses to first-year drop-out risk for incoming first-time-in-college students at a small rural community college. The focus of the model was the impact of high-risk courses, and the

way they are taken, as sources of drop-out risk. Overall, high-risk courses cannot be identified as the source of student attrition. They do, however, contribute to student performance which ultimately determines success in college.

APPENDIX A
ADDITIONAL RESULTS

Table A-1. Effect of BSC1005 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.746	0.235	-0.93	0.353
White	0.621	0.222	-1.33	0.183
Part-time	0.266	0.090	-3.90	0.000***
Pell recipient	1.100	0.338	0.31	0.756
BSC1005	1.757	1.172	0.85	0.398
HS GPA	2.022	0.559	2.55	0.011*
Constant	1.133	1.086	0.13	0.896

Note: N=364. * $p \leq .05$, *** $p \leq .001$

Table A-2. Effect of BSC2010 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.733	0.230	-0.99	0.321
White	0.661	0.235	-1.16	0.245
Part-time	0.263	0.090	-3.90	0.000***
Pell recipient	1.075	0.329	0.23	0.815
BSC2010	0.505	0.339	-1.02	0.309
HS GPA	2.081	0.580	2.63	0.008**
Constant	1.094	1.045	0.09	0.925

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table A-3. Effect of MAC1105 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.739	0.232	-0.96	0.335
White	0.642	0.226	-1.26	0.208
Part-time	0.273	0.094	-3.76	0.000***
Pell recipient	1.092	0.337	0.29	0.776
MAC1105	1.021	0.398	0.05	0.958
HS GPA	2.015	0.548	2.58	0.010**
Constant	1.165	1.114	0.16	0.873

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table A-4. Effect of ENC1101 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.727	0.228	-1.02	0.309
White	0.641	0.226	-1.26	0.207
Part-time	0.276	0.094	-3.79	0.000***
Pell recipient	1.097	0.335	0.30	0.763
ENC1101	1.254	0.396	0.72	0.474
HS GPA	2.034	0.561	2.57	0.010**
Constant	1.055	1.023	0.06	0.956

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table A-5. Effect of MUL2010 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.744	0.235	-0.94	0.349
White	0.639	0.227	-1.26	0.207
Part-time	0.274	0.093	-3.80	0.000***
Pell recipient	1.107	0.340	0.33	0.741
MUL2010	1.213	0.703	0.33	0.739
HS GPA	2.004	0.556	2.50	0.012*
Constant	1.161	1.119	0.16	0.877

Note: N=364. * $p \leq .05$, *** $p \leq .001$

Table A-6. Effect of CHM1030 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.734	0.232	-0.98	0.329
White	0.647	0.229	-1.23	0.217
Part-time	0.269	0.092	-3.86	0.000***
Pell recipient	1.080	0.331	0.25	0.802
CHM1030	0.591	0.670	-0.46	0.643
HS GPA	2.039	0.563	2.58	0.010**
Constant	1.147	1.100	0.14	0.886

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table A-7. Effect of CHM1045 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.711	0.226	-1.07	0.284
White	0.653	0.231	-1.21	0.228
Part-time	0.265	0.091	-3.87	0.000***
Pell recipient	1.088	0.335	0.27	0.785
CHM1045	0.585	0.350	-0.90	0.370
HS GPA	2.147	0.619	2.65	0.008**
Constant	1.019	0.992	0.02	0.985

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table A-8. Effect of ESC1000 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.739	0.231	-0.97	0.334
White	0.642	0.226	-1.26	0.208
Part-time	0.272	0.092	-3.84	0.000***
Pell recipient	1.091	0.335	0.28	0.777
ESC1000	1.033	0.633	0.05	0.957
HS GPA	2.019	0.559	2.54	0.011*
Constant	1.162	1.115	0.16	0.875

Note: N=364. * $p \leq .05$, *** $p \leq .001$

Table A-9. Effect of BSC2093 on Fall-to-Spring retention

Variables	Odds Ratio	Robust Standard Error	z	Sig.
Female	0.748	0.236	-0.92	0.357
White	0.642	0.226	-1.26	0.208
Part-time	0.270	0.091	-3.87	0.000***
Pell recipient	1.089	0.333	0.28	0.781
BSC2093	0.619	0.452	-0.66	0.511
HS GPA	2.060	0.576	2.58	0.010**
Constant	1.106	1.067	0.10	0.917

Note: N=364. ** $p \leq .01$, *** $p \leq .001$

Table A-10. Retention vs percentage of successful credit accrual

Percentage Successful Credit Accrual	Total Credit Hours Earned			
	≥20 hours		<20 hours	
	Number Students Retained	Number Students Not Retained	Number Students Retained	Number Students Not Retained
100%	92	19	10	3
75-99%	41	7	8	5
50-74%	4	2	39	13
25-49%	0	0	14	20
0-24%	0	0	3	19

Note: N=364.

APPENDIX B
INSTITUTIONAL IRB APPROVALS



Behavioral/NonMedical Institutional Review Board
FWA00005790

PO Box 112250
Gainesville FL 32611-2250
Telephone: (352) 392-0433
Facsimile: (352) 392-9234
Email: irb2@ufl.edu

DATE: 1/13/2017

TO: Terolyn Lay

FROM: Ira Fischler, Ph.D., Professor Emeritus
Chair IRB-02

IRB#: IRB201700051

TITLE: A Predictive Model of First Year Drop-out Risk at a Rural Community College

Approved as Exempt

You have received IRB approval to conduct the above-listed research project. Approval of this project was granted on 1/12/2017 by IRB-02. This study is approved as exempt because it poses minimal risk and is approved under the following exempt category/categories:

4. Research involving the collection or study of existing data, documents, records, pathological specimens or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. ("Existing" means already collected and/or stored before your study starts, not that collection will occur as part of routine care.)

Should the nature of the study change or you need to revise the protocol in any manner please contact this office prior to implementation.

Study Team:

Dale Campbell Co-Investigator

The Foundation for The Gator Nation

An Equal Opportunity Institution

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ACTION RECORD – Second Submission
Institutional Review Board (IRB)

Actions Regarding IRB Review Request from Researcher/Principal Investigator: Terrilyn Lay

PI Supervisor/Administrator/Faculty Investigator: Verifying Signature Waived

Title of Proposal: A Predictive Model for Drop-out Risk

Receipt of Application: 10.30.16

Distribution to the IRB: 11.1.16

IRB Approval Date: 11.1.16

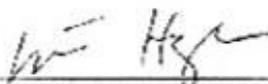
IRB Reviewers: Dr. Jayne Roberts, Dr. Sarah Clemmons, Dr. Matthew Hughes

Decision of the IRB: Exempt from IRB review

Notification of the Applicant: Copies of the IRB Protocol Submission Form were retained for IRB records. The approved, stamped document was scanned and e-mailed to PI on 11/16/17 (date).

Conditions of Approval:

1. The researcher/investigator shall submit to the IRB a status summary of the project no later than one year after the IRB approval date if the project is ongoing at that time.
2. The researcher/investigator shall receive IRB approval prior to implementing changes in IRB-approved methodologies, project participants, and planned activities.
3. The researcher/investigator shall notify the IRB of risks to project participants that were not anticipated in the Chipola College IRB application for human subjects research project; IRB approval is required for continuation of the project involving Chipola College participants.
4. The researcher shall notify the IRB upon project completion.


Matthew Hughes, IRB Chair

11/16/17
Date



LIST OF REFERENCES

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BIOGRAPHICAL SKETCH

Terolyn Lay was born in Huntsville, Alabama. She holds a Bachelor of Science degree in microbiology from the University of Louisiana, a Master of Science degree in biology from Texas Woman's University, and a Doctor of Education degree in higher education administration from the University of Florida. She has held positions in both industry and academia. She is currently an Assistant Professor of biology at Chipola College in Marianna, Florida where she recently served as the chair of the Quality Enhancement Plan team for SACSCOC reaffirmation. While a doctoral student, Ms. Lay was awarded the James L. Wattenbarger scholarship from the University of Florida College of Education. She was also a recipient of a SACSCOC Travel Grant from SACSCOC to attend the 2016 SACSCOC annual meeting.