Noncognitive Predictors of Academic Performance and Persistence in Horizontal and Vertical Transfer Students By Academic Level

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NONCOGNITIVE PREDICTORS OF ACADEMIC PERFORMANCE

AND PERSISTENCE IN HORIZONTAL AND VERTICAL TRANSFER STUDENTS

BY ACADEMIC LEVEL

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ABSTRACT

NONCOGNITIVE PREDICTORS OF ACADEMIC PERFORMANCE AND

PERSISTENCE IN HORIZONTAL AND VERTICAL TRANSFER STUDENTS BY

ACADEMIC LEVEL

Christopher A. Davis
Old Dominion University, 2010
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College students increasingly are transferring among institutions of higher education in pursuit of their educational goals. The existing research on transfer students, however, does not adequately explore the unique characteristics of this heterogeneous population. The literature on transfer students suggests that transfer students are at-risk for experiencing academic difficulty and attrition. Research indicates that degree attainment is associated with the success of the student and their parents. Furthermore, attrition negatively impacts higher education finances, so colleges and universities that focus on helping students be successful and persist to graduation maintain revenue streams.

Many studies have focused on cognitive measures of academic performance and persistence; however, research has shown that cognitive measures alone are not the best predictors of academic performance and persistence (Duggan & Pickering, 2008; Pickering, Calliotte, & McAuliffe, 1992). Researchers have explored various noncognitive and cognitive measures of academic performance and persistence, but the literature has not controlled for the unique characteristics of the transfer student population. Research needs to focus on examining transfer students as subpopulations with common characteristics. The purpose of this research was to analyze noncognitive,

cognitive, and demographic variables to determine if incorporating the transfer history of students would result in better predictions of academic performance and persistence.

The population examined in this study included first-time transfer students who most resemble the traditional college student characteristics which excluded distance learners, international students, military students, and students over the age of 29. Transfer students were divided into six subpopulations: first-year vertical transfers ($n = 143$), sophomore vertical transfers ($n = 469$), upper-division vertical transfer ($n = 554$), first-year horizontal transfers ($n = 166$), sophomore horizontal transfers ($n = 306$), and upper-division horizontal transfers ($n = 77$). Logistical regressions were used to answer four research questions.

Results of the analysis revealed that a noncognitive index (TSS Index) based on student attitudes, behaviors, and experiences, was a significant predictor of academic difficulty for each of the subpopulations of transfer students. First semester cumulative GPA at the target institution was predictive of attrition for each subpopulation of transfer students. The findings also revealed that the other predictors vary in significance among the subpopulations which supports the need for additional research on the uniqueness of transfer students.

Findings from this study justify the need for additional research on transfer students that further examine the characteristics of unique subpopulations of these students. College administrators in areas of student services and enrollment management can use the results to gain a better understanding of the transfer student population and identify and develop resources to assist these students with their academic endeavors.

In memory of my father,

Melvin Leon Davis

January 20, 1945 - May 13, 2004

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INTRODUCTION

College students have established a common practice of transferring among

colleges and universities as they attempt to complete their academic goals (Borden,

2004). According to McCormick and Carroll (1997), approximately one in three students

will transfer within a five year period. Many of these college students discover they can

transfer coursework to other institutions without losing much, if any, progress toward a

degree (McCormick, 2003). The portability of credits, along with other factors, has

resulted in approximately 40% of the college student population attending multiple

institutions on their path to degree attainment (NCES, 2005). This introduces some

important considerations for institutions of higher education. First, why do these students

transfer to other institutions? What barriers do transfer students face that could result in

them transferring out to a different institution? How can institutions identify and help

students who might be at-risk for encountering some of the barriers? Can institutions

identify specific at-risk populations of students by gender, age, race, academic level, or

transfer type? Because institutions of higher education are expected to function with

fewer resources despite an increasing demand to provide affordable tuition and more

accountability for student outcomes, those that meet these challenges by improving

student success will gain a competitive advantage over other colleges and universities

(Levitz, Noel, & Richter, 1999). More importantly, they will help students achieve their

educational goals, equipping them with credentials to be more marketable to employers,

earn more money, and become more effective contributors to society. Institutions that do

not focus on improving student success could experience a decrease in their retention

rates, resulting in negative implications for both the student and the institution (Schuh, 2005).

Background

In fall 2007, 18.7 million undergraduate and graduate students were enrolled in Title IV colleges or universities in the United States. About 62% of those students were enrolled in four-year institutions, 36% in two-year institutions, and 2% in less-than-two-year institutions (NCES, 2009). Because approximately 40% of these students will attend or have attended multiple institutions (NCES, 2005), college leaders need to better understand how to help retain these students and assist them in being academically successful.

Research studies suggest that recruiting new students costs more than retaining existing students (Astin, 1993; Pascarella & Terenzini, 1991; Schuh, 2005; Tinto, 1993). Because funding for higher education continues to decrease (Zumeta, 2006), it is important for college leaders to understand the impacts of student attrition on the institution and the students. They also need to identify methods of increasing retention rates, which could sustain or even improve revenue while reducing expenses. Because attrition negatively impacts institutions' revenue, identifying students who are at-risk for attrition could allow the institutions the opportunity to develop targeted programs to improve student success while also improving the institution's financial standing. In addition to generating revenue related to tuition, fees, books, and auxiliary services, students who are successful at an institution are more likely to speak highly of the institution, recommend the institution to family and friends, and make financial contributions as alumni (Schuh, 2005).

Transfer Student Populations

The transfer population is a heterogeneous group with students arriving at institutions with different backgrounds, experiences, attitudes, aspirations, expectations, and obligations. While a first-year transfer student who has completed fewer than 26 credit hours in college courses might change institutions due to poor academic performance during the first semester at the initial institution, a junior or senior student might transfer to continue his or her education beyond earning an Associate's degree or to pursue a major of choice. This diversity increases the difficulty of predicting which students are at-risk for experiencing academic difficulty or attrition (Jacobs, 2004). This task is further complicated by a growing transfer student population (Wellman, 2002). Despite the increasing numbers of transfer students, research on transfer students has mostly focused on community college transfers to four-year institutions, omitting several other populations. Little research, for example, has examined horizontal transfer students who move from one four-year institution to another four-year institution (Jacobs, 2004). Furthermore, much of the existing research examines barriers to success after students encounter academic difficulty instead of trying to identify predictors of success or difficulty which could be used to develop proactive programs to help students avoid academic difficulty and persist to graduation. Colleges and universities need to consider unique subpopulations within the transfer population to identify those who might be at-risk for encountering academic difficulty and better assist these groups of students in achieving their academic goals while also improving the marketability and finances of the institution.

Funding for Higher Education

The financial resources of higher education are closely related to the U.S. economy (Zumeta, 2008). The National Education Association (NEA) (2006) reported a 4% decrease in higher education funding between 2002 and 2004. Zumeta (2008) reported that, on average, funding for higher education increased in 2007. However, the economic downturn in 2008 has negatively impacted funding for higher education (Knecht, 2009; Wolverton, 2008). As states experience budget shortfalls, public higher education will be forced to absorb some of the cuts, making management of costs a priority for higher education leaders.

Research studies have suggested that attrition can be a major contributor to higher costs in higher education (Braxton, Hirshy, & McClendon, 2004; Schuh, 2005). Attrition results in lost revenue from student fees, tuition, financial aid, on-campus housing, and indirect costs, including time of faculty and staff. A student who was recruited and does not persist not only wastes the initial investment in recruiting money but also creates additional expenses because the institution must then recruit a new student to fill that spot. Schuh (2005) indicated that recruitment costs are a major part of institutional expenses. However, strategically admitting transfer students can help offset some of this lost revenue (Cheslock, 2005). Recruiting transfers can be less expensive, and these students can be strategically admitted to fill vacated spots of native students who did not persist. For strategies like these to succeed, institutional leaders must realize that transfer students are at higher risk for attrition than native students (Al-Sunbul, 1987; Congdon, 1932; Horn & Berger, 2004; McCormick, 1997). Therefore, college leaders need to ensure transfer students receive the support necessary to persist because while strategic

admissions practices could help offset the financial losses associated with attrition, the goal of institutions should be to help students achieve their educational goals. While the financial implications of attrition for the institutions are great, the cost to the student is even greater. By not persisting, students are faced with the potential of earning less over their lifetime and possibly not being able to repay debts, including student loans and financial obligations to the institution (Cheslock, 2005). Additionally, a student's persistence to degree attainment can influence the lives of his or her offspring. Studies have shown a positive relationship between the degree attainment of parents and their offspring's educational and career success (Astin, 1993; Pascarella & Terenzini, 2005). Therefore, college leaders need to consider the importance of admitting transfer students, while also focusing on identifying at-risk students and helping them be academically successful and persist to graduation.

College Degree Importance

For many transfer students, earning a college degree is a necessity for improving their career and livelihood. In the United States, approximately six out of every ten jobs requires a college degree or some advanced skills training (Carnevale & Desrochers, 2003). According to a report from the Office of Occupational Statistics and Employment Projections in the United States Department of Labor's Bureau of Labor Statistics (Crosby & Moncarz, 2006), college graduates have experienced growth in weekly median earnings, whereas high school dropout median weekly salaries have declined by approximately 20%. Furthermore, earnings of high school graduates and workers with some college or an associate's degree changed very little between 1979 and 2005. College students who earn at least a bachelor's degree, however, can earn over 60% more

than those who only have a high school diploma (Dohm & Wyatt, 2002; United States Department of Labor, 1999). In addition to higher earning potential, Dohm and Wyatt (2002) reported that college graduates benefit from having more career options, promotion opportunities, and lower unemployment. The combination of these benefits with employer demand for a more educated workforce increases the importance of earning a college degree.

Student Retention and Persistence Interventions

According to Tinto (1999), institutions of higher education place more focus on recruitment of new students than efforts to retain existing students. More importantly, institutions that develop interventions targeted at improving retention often do not evaluate or revise those programs to improve effectiveness (Hossler, 2005). Fike and Fike (2008) indicated that these programs need to be customized to fit the needs of the students at each institution. Because recruiting new students is more expensive than retaining existing students (Schuh, 2005), and the average attrition rate of first to second year students is 41% (ACT, 2007), identifying predictors of college student success and retention is paramount.

Many institutions offer various interventions and student support services to help improve student success and retention of first-year native students. These programs range in focus and can include academic assistance, social integration, and adjustment to the culture of the institution. Colleges and universities promote these types of interventions because studies have shown that students who do not adjust academically or socially are more likely to have poor academic performance and less likely to persist (Astin, 1993; Braxton, Sullivan, & Johnston, 1997; Evans, Forney, & Guido-DiBrito, 1998; Tinto,

1993). Unfortunately, most interventions and studies are designed for native first-year students. The persistence of transfer students is a more complex issue considering findings from several studies showing transfer students tend to have lower GPAs, lower degree completion rates, and higher attrition than native students (Al-Sunbul, 1987; Congdon, 1932; Horn & Berger, 2004; McCormick, 1997).

Theories and Models of Retention and Persistence

Traditionally, academic performance of college students has been measured using cognitive variables, including grade point average (GPA) and standardized tests such as the American College Test (ACT) and the SAT. These same variables have also been used to predict student retention; however, research on native students has suggested that cognitive variables relate only moderately to persistence (Lotkowski, Robbins, & Noeth, 2004). Researchers found more accurate predictors by considering both academic (cognitive) and non-academic (noncognitive) variables of native students (Braxton at al., 2004; Lotkowski et al., 2004; Pickering, Calliotte, & McAuliffe, 1992; Tinto, 1993) and transfer students (Duggan & Pickering, 2008; Sedlacek, 2004).

Early research on student retention and attrition of first-year native college students resulted in the development of several models and theories. Astin's (1962, 1970a, 1970b, 1977, 1991, 1993) I-E-O model explored persistence by examining the *inputs, experiences,* and *outputs* of the student. The inputs include student's pre-college characteristics, experiences include all the services and the environment of the institution, and the outputs refer to the experiences after being in the environment of the institution. Astin (1993) found that first-year students who became engaged in academic and social experiences were more likely to persist at the institution.

Bean's (1980) causal model of student attrition explored the backgrounds of first-year native students and interactions within the college environment and implications for retention. The model includes demographic background information and organizational determinants, which were hypothesized to have a positive correlation with satisfaction and institutional commitment and ultimately increase likelihood of persistence. Bean initially developed the model for analyzing first-year native students; however, the model has also been used to examine student persistence of non-traditional students (Bean & Metzner, 1985; Braxton & Hirschy, 2005).

Tinto's (1993) model of individual student departure includes three dimensions which have been shown to impact retention of first-year native students. The dimensions include pre-college variables, goals and commitments, and institutional experiences. The pre-college factors include noncognitive variables such as background and demographic information. It also includes high school GPA and college entrance exam scores as cognitive factors. The second dimension, goals and commitments, includes measures of dedication to reaching educational goals and commitment to the institution. The third dimension, institutional experiences, involves social interactions at the institution, external commitments, and academic performance. Tinto's analysis revealed that the combination of the first two dimensions impacted the third.

Much research has explored the models and theories of Astin, Bean, and Tinto; however, most of the focus is on first-year native students' experiences. Limited research examines the impact of background, commitment, and experiences to persistence of transfer students. Regardless of students' backgrounds, once students decide to pursue a college education, institutions of higher education need to provide adequate services to

support success and persistence to degree completion. Transfer students tend to have lower GPAs after transferring, lower degree completion rates, and higher attrition than native students (Al-Sunbul, 1987; Congdon, 1932; Horn & Berger, 2004; McCormick, 1997). To improve transfer student success, colleges and universities need to look beyond GPA and standardized test scores, like SAT and ACT, to identify students who might be at-risk for academic difficulty, rather than waiting and trying to salvage students after they experience academic difficulty.

Weidman (1985) found that college GPA along with three demographic variables (financial aid, age, matriculation status) accounted for 25% of variance in predicting persistence. Other researchers have suggested that examining combinations of cognitive and noncognitive variables best predicts academic performance and persistence of first-year native college students (Pickering et al., 1992; Sedlacek, 2004). To test the same hypothesis for transfer students, Duggan and Pickering (2008) modified a noncognitive measure for first-year native students, the Transition to College Inventory (TCI) (Pickering et al., 1992), to be more applicable to the transfer student population. The resulting Transfer Student Survey (TSS) more accurately predicted academic performance and persistence of transfer students (Duggan & Pickering, 2008). Duggan and Pickering focused on the on-campus and distance learning transfer student population. The current study expanded the research by Duggan and Pickering while focusing on the on-campus vertical and horizontal transfer students who more closely resemble the traditional native student.

Theoretical Concept for the TSS

The TSS was based on the TCI, originally developed to measure noncognitive variables related to academic performance and persistence of first-year native students. The items in the TCI were selected based on other instruments developed to measure academic performance and persistence, results of other academic performance and persistence/retention studies, and input from student development professionals (Pickering et al., 1992). The variables in the TCI measured student's attitudes, behaviors, traits, and experiences that have been linked to academic performance and persistence. These noncognitive variables alone were shown to be better predictors of academic performance and persistence than cognitive or demographic variables alone. However, Pickering et al. found the combination of noncognitive, cognitive, and demographic variables was the best predictor. Because the TCI was developed for first-year native students, Duggan and Pickering (2008) modified and expanded the measure to create an instrument that was more predictive of transfer students' academic performance and persistence. Items were changed to focus on previous college experiences rather than experiences in the last year of high school. Items were also added to measure attitudes about being a college student, rating of abilities, estimates of involvement in social and/or academic activities, rating of degree importance, and rating the transfer experience.

Duggan and Pickering's (2008) study revealed differences in the relationships of the predictor variables when considering the academic level of the transfer students. Based on those findings, the target institution of this study reviewed the responses from the TSS to create three indices by transfer students' academic level (first-year, sophomore, and upper-division). The indices were used to classify students as being

academically successful (having a GPA of 2.0 or better), or at-risk of academic difficulty (earning below a 2.0 GPA). The TSS Indices were determined using the same logic as Pickering et al. (1992). They discovered that a disproportionate number of students who encountered academic difficulty had provided certain responses to questions. Those questions were included in the index calculation. Refer to Appendix B for the rubric and instructions used by the institution's Office of Institutional Research and Assessment (IRA) to determine which items contributed to each TSS Index. The target institution verified the reliability of the TSS Index by using a correlation coefficient, Cronbach's Alpha.

Statement of the Problem

This study explored cognitive and noncognitive barriers to persistence and academic performance of transfer students based on their academic level (first-year, sophomore, and upper division) and transfer type (horizontal and vertical). Studies have shown academic performance is a predictor of student persistence, and noncognitive variables can predict academic performance and persistence better than solely relying on cognitive measures (Pickering et al., 1992). However, previous studies do not control for the diversity of the academic backgrounds of transfer students. Duggan and Pickering (2008) analyzed the transfer student population by location (on-campus or distance learning) and found that barriers to success varied among first-year, sophomore, and upper division transfer students. This study examined whether demographic, noncognitive, and cognitive variables can better predict academic performance and persistence of vertical and horizontal transfer students by academic level. The findings from this study could allow college leaders to better identify transfer students at-risk for

experiencing academic difficulty and develop interventions that could help them be academically successful.

The target institution was a large Carnegie Doctoral Research University with High Research Activity. The institution has approximately 24,000 students, of which almost 18,000 are undergraduate students and over 7,000 are transfer students. This study focused on transfer students who most resemble the traditional college student, defined as students who are enrolled at the main campus of the target institution and are not military students, international students, or over the age of 29. The transfer student population was also limited to vertical and horizontal transfers. Transfer students who transferred among multiple institutions were not included.

<div align="center">Definition of Terms</div>

The following terms are used throughout this study. The definitions provided are based on descriptions from other studies and should help minimize confusion of terminology.

1. *Academic difficulty:* Student status when his/her cumulative grade point average falls below 2.0 at the end of a semester at the target institution.

2. *Academic performance:* A general reference to whether students are academically successful or experiencing academic difficulty.

3. *Academic success:* Student status when his/her cumulative grade point average is above 2.0 at the end of a semester at the target institution.

4. *At-risk student:* Student with a cumulative grade point average below 2.0.

5. *Attrition*: Status when a student leaves an institution before completing a degree or program. For the purpose of this study, attrition was measured based on whether a student re-enrolled after one academic year (fall to fall).

6. *Cognitive predictors/factors/variables:* Academic skills variables such as grade point average (GPA) and standardized test scores like SAT and ACT.

7. *Cumulative grade point average (GPA):* The GPA calculated based on all courses completed at a higher education institution.

8. *Degree-seeking students:* Students enrolled in a program leading to a college degree.

9. *Demographic predictors/factors/variables:* Background characteristics for classification purposes such as age, gender, number of institutions attended, number of credits accepted, and degrees earned.

10. *First-year transfer:* A transfer student who has completed less than 26 credit hours.

11. *Four-year institution:* A college or university which offers four year bachelor's degree programs.

12. *Horizontal transfer students:* Students who have transferred only once from a four-year institution to another four-year institution, or from one two-year institution to another two-year institution (also known as lateral transfer students).

13. *Native students*: Students who attend only one institution while working on a particular degree or program.

14. *Noncognitive predictors/factors/variables:* Social, behavioral, or affective variables such as social integration, social adjustment, self-esteem, anxiety, and interests.

15. *Persistence:* Status when a student remains at an institutions and re-enrolls in a subsequent term. For the purpose of this study, persistence will refer to re-enrollment after one academic year (fall to fall).

16. *Sophomore transfer:* A transfer student who has between 26 and 57 credit hours.

17. *Swirling transfer students*: Students who have moved back-and-forth among two or more institutions (also known as roaming and gypsy transfer students) (de los Santos & Wright, 1990; Gose, 1995).

18. *TCI/TSS Index:* An index value calculated based on the percentage of students in academic difficulty who select a specific response to selected items on either the Transition to College Inventory (TCI) or the Transfer Student Survey (TSS).

19. *Transfer articulation:* The agreements between institutions concerning which courses offered at each institution are comparable.

20. *Transfer ecstasy*: A phenomenon that relates to a significant rise in GPA of transfer students who transitioned from a two-year college to a four-year institution.

21. *Transfer GPA*: Grade point average calculated by averaging the GPAs earned at all previous institutions.

22. *Transfer shock:* A phenomenon that involves a significant drop in GPA of transfer students transitioning from a two-year college to a four-year institution (Hill, 1965).

23. *Transfer students:* Students who move from one institution to another institution, with or without credit.

24. *Two-year institution*: An institution of higher education which primarily offers two-year degree programs and, in this study, refers to community colleges.

25. *Upper division transfer student:* Students who have transferred to an institution with enough college credits to be classified as a junior or senior, completing more than 57 credit hours at the target institution.

26. *Vertical transfer student:* Students who have transferred only once from a two-year institution to a four-year institution.

Research Questions

Numerous studies have focused on transfer students; however, most of the research focused on vertical transfer students and their persistence at four-year institutions (Congdon, 1932; DeRidder, 1951; Elliot, 1972; Hartman & Caple, 1969; Knoell, 1965; Laanan, 1995). Research has also focused on barriers to transfer student persistence (Graham & Hughes, 1994; House, 1989; Kinnick & Kempner, 1988; Laanan, 1995; Townsend, McNerny, & Arnold, 1993). Many studies compared transfer students success and persistence to native students based on grade point average (GPA) and drop-out rates (Al-Sunbul, 1987; Congdon, 1932; Diaz, 1992; House, 1989; Johnson, 1987). Differences in transfer and native student GPAs have led to researchers focusing on exploring transfer student adjustment (Laanan, 2001) and transfer shock (Cejda, 1997; Diaz, 1992; Hill, 1965; House, 1989) to determine what influences GPA change in transfer students when they arrive at the transfer institution. Gawley and McGowan (2006) examined academic and social experiences of college transfer students and found

that many transfer students select colleges based on the number of transfer credits accepted.

In an attempt to target certain transfer students and provide interventions, more researchers are focusing on identifying students who are at-risk for academic difficulty and subsequent attrition based on college GPA and standardized tests (Weidman, 1985), and using noncognitive variables (Duggan & Pickering, 2008; Pickering, Calliotte, & McAuliffe, 1992; Sedlacek, 2004). Identifying predictors of transfer student success and persistence will continue to be essential in helping higher education leaders identify at-risk students and develop interventions to help reduce attrition rates and improve academic performance of these students.

Students have many reasons for transferring to another institution. Tinto (1987, 1993) indicated that persistence depends on successful social and academic integration in the institutional setting. Tinto (1993) later found that external forces also impact student behavior which could influence transfer decisions. McCormick and Carroll (1997) mentioned institutional prestige as a reason some students transferred, especially among private colleges. They also found that some students transferred due to dissatisfaction with intellectual growth, student services, and academic support at their institution. However, many college students today indicated their reason for transfer was related to the location of the institution and program offerings (NSSE, 2005). With the numerous variables that can influence transfer student behavior, it is imperative that researchers focus on studying the different subpopulations of transfer students (Laanan, 2001) with the goal of improving their academic performance and persistence.

Therefore, four research questions guided this study:

1. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution?

2. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution?

3. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persisted to the next academic year at the target institution?

4. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persisted to the next academic year at the target institution?

Purpose of the Study

The goal of this study was to analyze and validate an existing transfer student survey instrument to determine if incorporating the transfer history of students would result in better predictions of academic performance and persistence. A related goal was to determine if other demographic, noncognitive, and cognitive factors could be paired with the results of the instrument to increase effectiveness of predicting academic performance and persistence of horizontal and vertical transfer students. The findings from this study could identify relationships and patterns of relationships among the variables for the different transfer student populations. It could also help institutional decision-makers better target and develop interventions to assist transfer students who might be at-risk for academic difficulty and attrition.

Significance of the Study

Because the primary goal of the study was to identify variables that predict academic performance and persistence of horizontal and vertical transfer students, analysis of these variables can permit institutions to better predict which students are at-risk for experiencing academic difficulty. By identifying transfer students who might experience academic difficulty, university leaders could presumably intervene and provide resources to help improve the probability of academic success and persistence to degree completion. This would result in improved retention rates and graduation rates which could improve institutional prestige, marketability, and finances.

Another goal of the research was to determine if noncognitive predictors vary depending on the transfer background of the student. Transfer students arrive from a variety of backgrounds and experiences. One of the major difficulties in researching

transfer students is the variation in the definition of a transfer student. Colleges and universities, research studies, and researchers have varying metrics for classifying transfer students (Cohen, 1994; Cohen & Brawer, 1996; Fredrickson, 1998; Hagedorn, 2005; Hirose, 1994; Peng, 1977; Piland, 1995). Jacobs (2004) indicated that transfer students can be classified into four categories. Students who first enroll at a community college and then transfer to a four-year institution are referred to as *vertical transfer students*. *Horizontal transfer students* are those who move between institutions of the same type. *Reverse transfer students* include those who move from a four-year institution to a two-year institution. Finally, *gypsy transfer students* (also called swirling transfer students) are those who transfer multiple times among multiple different institutions. Of these groups, most research has focused on vertical transfer students. Little focus has been placed on horizontal, reverse, and gypsy transfer students (Allen, 2007; Jacobs, 2004). Reverse transfer students could not be included in this study because the target institution is a four-year institution. Students who transfer multiple times were also excluded as they have more complex transfer patterns, experiences, and potential barriers than horizontal and vertical transfers who have only transferred once.

With an increase in the number of transfer students in institutions of higher education, college leaders need to focus on how to best meet the needs of this unique population. Transfer students have many different backgrounds and life experiences than traditional native students. These differences have been documented in studies which showed that transfer students are at higher risk of attrition and lower academic performance than native students (Al-Sunbul, 1987; Congdon, 1932; Horn & Berger, 2004; McCormick, 1997), so institutions need to focus on identifying transfer students

who may need assistance and provide services that meet the students' specific needs (Tinto, 1987).

Overview of the Methodology

This study examined existing records of horizontal and vertical transfer students who completed the Transfer Student Survey (TSS) (Duggan & Pickering, 2008) at a large Carnegie Doctoral Research University with High Research Activity. The population of transfer students was limited to those who most resembled the traditional on-campus college student. According to data collected by the College Board (2009), approximately 60% of the college student population is between the ages of 18 and 24. Students between the ages of 25 and 29 comprise approximately 16% of the total college student population. Therefore, in this study, narrowing the population to students who are less than 30 years of age was representative of approximately 76% of the national college student population. Additionally, the study excluded distance learners, military students, and international students because these groups represent unique populations which comprise a small percentage of the overall student population (NCES, 1997, 2008, 2009; SCHEV, 2009). According to the National Center for Education Statistics (NCES) (2009), active duty military represent about 1% of the national undergraduate student population. The State Council of Higher Education for Virginia (SCHEV, 2009) surveyed all public and private institutions of higher education in Virginia. The majority of colleges and universities reported having 5% or less international students enrolled at their institution in 2008. A report by the NCES (1997) indicated that distance learning students account for approximately 5% of the entire student population. Additionally, distance learning programs are not offered at all institutions and vary greatly based on

institution type (public or private, two-year or four-year). Approximately 34% of institutions of higher education do not offer any distance education courses or programs (NCES, 2008).

The study used a non-experimental, causal-comparative design to examine the four research questions. Logistic regression was used to analyze data addressing each question. The questions explored differences between noncognitive, cognitive, and demographic factors and the academic performance and persistence of the horizontal and vertical transfer students by academic level. Logistic regression procedures are appropriate when predicting dichotomous variables (academic success or academic difficulty, and persistence or attrition). Specific details about the methodology and data analysis procedures are discussed in Chapter 3.

Limitations and Delimitations

This study only examined transfer students at one university. Because the target institution requires all entering transfer students to complete the TSS, issues related to sample selection and response rates are limited. However, self-report surveys introduce other concerns. The students completing the measure were aware they were being evaluated, which could have influenced their responses, e.g., students may have selected responses based on how they want to be perceived. Some may not have read the questions and instead selected random responses in an effort to complete the survey quickly. Despite these potential pitfalls, studies using similar measures found the instruments still accurately predict the academic performance and persistence of students (Duggan & Pickering, 2008; Pickering et al., 1992). Next, this study only included horizontal and vertical transfer students who were enrolled at the main campus of the

target institution and are not military students, international students, or those over the age of 29. Limiting the population to transfer students who most closely resemble the traditional college student could allow college leaders to modify existing programs designed for the traditional college student to work more effectively with these transfer populations. However, this was a limitation because it prevents the findings from being generalizable to the entire transfer student population. Also, the analysis did not take into account students' career goals, subject areas of courses completed or enrolled, or the intended or declared major of each student. Each of the above mentioned limitations were potential threats to generalizability and the internal validity of this study.

Conclusion

Transferring among institutions has become a common practice among students in higher education. Students transfer between colleges for many different reasons, and higher education leaders must examine why students transfer and identify methods to best predict which of these students might be at risk for experiencing academic difficulty or attrition with the goal of better assisting this population meet their academic goals. Transfer students have diverse backgrounds and needs compared to the traditional native college student. While much research has addressed academic performance and retention of first-year native students, the literature on transfer students is still limited. Researchers have found that predicting academic performance and retention is a complex task for the traditional first-year native student population due to all the variables that could influence attitudes, behaviors, and experiences (Astin, 1984). The transfer student population adds more layers of complexity to predicting academic performance and persistence due to the heterogeneity of the individuals who comprise that population. However, higher

education leaders who are faced with reduced budgets need to identify methods of improving retention, which can help save money while also contributing to the improved reputation of the institution (Berger & Lyon, 2005) and the success of the student.

This study explored the methods of predicting academic performance and persistence of horizontal and vertical transfer students. Chapter 2 discusses the literature that provided the foundation for this study. Then, a detailed description of the methodology is presented in Chapter 3, followed by the results in Chapter 4. Chapter 5 provides a discussion of the findings, recommendations, and suggestions of areas for future research.

CHAPTER II

LITERATURE REVIEW

The goal of Chapter II is to provide a review of the literature on the transfer student population in higher education as it related to this study. The literature review begins by defining and describing the transfer student population and the at-risk student, which includes identifying barriers to success for transfer students. The review continues with an exploration of existing research on transfer students. Various barriers to and models of persistence and retention are identified and discussed.

Transfer Students: A Changing Population

One of the early definitions of transfer students described them as any student who did not begin his or her college career at the same institution (Eells, 1927). While this general definition is appropriate, over the years, the term "transfer student" has traditionally been used to refer to a college student who enrolled at a four-year institution after initially attending a community college (Jacobs, 2004). However, research has indicated the transfer student population is changing and the traditional definition is no longer accurate. Jacobs noted that students are more mobile, transfer multiple times among multiple institutions, and have varied backgrounds and experiences. She suggested that recognizing changes in the transfer student population and identifying methods of helping these students is critical to the success of institutions as well as students.

Vertical Transfers

Students who transfer from a community college to a four-year institution are often referred to as two- to four-year transfers or vertical transfers (Jacobs, 2004). Over

the past few decades, the number of students enrolled at community colleges has increased greatly, which is important because approximately half of all community college students transfer out to four-year institutions (Wellman, 2002). Some researchers have suggested that the increase in community college enrollment and the number of vertical transfers can partially be attributed to the rise in the number of new community colleges established in recent years. In 1915 there were 74 community colleges (Cohen & Brawer, 2003) compared to 1,045 in 2007 (NCES, 2008). Growth in community college enrollments have also be attributed to an increase in the number of high school graduates, an increase in the selectivity of four-year institutions, rising tuition costs, and an increase in the number of poor and minority students who want to go to college (Wellman, 2002). The National Center for Education Statistics (NCES, 2008) reported that approximately 35% of all college students enrolled during the 2006-2007 academic year had attended community colleges. This was slightly less than peak community college enrollment in fall 2002, but represented a growth of 741% from fall 1963.

Community college students are a very heterogeneous population, having varying backgrounds, experiences, and reasons for attending college. Community colleges attempt to meet the needs of individuals in their geographic area by offering a variety of programs, including job skills development, workforce training, and associate degree programs designed to transfer to four-year institutions (Jacobs, 2004). Transfer programs are an important aspect of community colleges because, based on data of community college students enrolled during the 2003-2004 academic year, 36% of community college students intended to transfer to a four-year institution, while 15% planned to transfer to another community or technical college (NCES, 2006). Among postsecondary

first-year students who initially attended a community college in 1995-1996, 47% had attended more than one institution of higher education by 2001 and of those students, the majority, 61%, had transferred vertically to a four-year institution (NCES, 2005).

Horizontal Transfers

College students who transfer from one four-year institution to another four-year institution, or one community college to another two-year institution, are referred to as horizontal or lateral transfers (Jacobs, 2004). While the traditional pattern of college transfer is for a student to begin at a community college and then transfer to a four-year institution, researchers have found that an increasing number of college students are moving between institutions of the same level. Analyzing NCES data tracking college students from 1995 to 2001, Berkner, He, and Cataldi (2002) found that approximately 23% of college students had transferred from one four-year institution to another four-year institution. This represented a seven percentage point increase from 1989-1990 NCES data which showed that 16% of students who transferred went from one four-year institution to another four-year institution (McCormick & Carroll, 1997). Despite the growth in the number of horizontal transfers, little research has been conducted on this population (Jacobs, 2004; Lanaan, 2001). Most of the research on transfer students focuses on vertical transfers who are likely pursuing their academic goal of earning a bachelor's degree. Students who transition from one four-year institution to another four-year institution would likely adjust differently than those who transfer from a community college to a four-year institution and may have other reasons for transferring (e.g., pursuing a program of study not available at the current institution, physical relocation, or academic difficulty).

Summary and Critique

The term transfer student has traditionally referred to students who transferred from a community college to a four-year institution. The literature on transfer students demonstrated that the transfer student population is growing and changing as students attempt to achieve their educational goals. College students now have the flexibility to transfer among multiple institutions in an effort to earn a college degree. More research is needed to identify why students transfer so institutions can attempt to develop retention strategies and programs to help support these students and improve academic success and persistence.

The At-Risk Student

The term at-risk student has been generically defined by researchers (Abrams & Jernigan, 1984; Heisserer & Parette, 2002) as a student who is more likely to experience academic difficulty, as measured by GPA (Abrams & Jernigan, 1984; Nagle, 1976; Nisbet, Ruble, & Schurr, 1982), or dropout (Levin & Levin, 1991). Researchers have found numerous characteristics and factors that can be used to identify at-risk college students. Demographic variables (e.g., race, age, and gender) are commonly used in research studies on at-risk students (Pickering at al., 1992; Braxton et al., 2004; Lotkowski et al., 2004). Heisserer and Parette (2002) identified at-risk students as those who are ethnic minorities, disabled, on academic probation, and of low socioeconomic status. Some researchers have suggested that the population of at-risk students include those who are academically disadvantaged (Heisserer & Parette, 2002) or those who are not adequately prepared for college (Levin & Levin, 1991). Studies also have indicated that transfer students are more at-risk for experiencing academic difficulty and attrition

than native college students (Al-Sunbul, 1987; Congdon, 1932; Horn & Berger, 2004; McCormick, 1997). Many of these students were at-risk because they encountered barriers to academic success. Institutional policies and procedures as well as student backgrounds, attitudes, and behaviors created barriers that resulted in populations of students being more at-risk for experiencing academic difficulty and attrition.

Barriers to Transfer Student Success

A college degree is essential for individuals who desire economic success (Carnevale & Desrochers, 2003). Unfortunately, college students who attempt to transfer among institutions encounter many barriers that hinder their progress in achieving their academic goals. In 2002, the American Association of Community Colleges (AACC) and the American Association of State Colleges and Universities (AASCU) created the "Access to the Baccalaureate" project to help identify and remove nonfinancial barriers to the baccalaureate degree. The two organizations developed a survey that was distributed to their members, which together represent the majority of U.S. public institutions of higher education and approximately 10 million students. The survey asked members to examine a list of barriers and rank order them by those believed to present the biggest obstacles to student success. Although there was some difference between the exact ordering, the responses were very similar. The top two obstacles were articulation agreements and reliable information for advising. Most of the identified obstacles were institutional-based and included cost of attendance, financial aid, course offerings at convenient times, and admissions requirements for specific programs. While institutional policies and procedures can create barriers to persistence, a student's background and characteristics can also present barriers to his or her academic future.

Research has suggested that students who initially enroll at community colleges encounter more barriers to persistence and success than those who begin at four-year institutions (Jacobs, 2004). Berkner et al. (2002) identified the following key factors that negatively impact persistence: part-time enrollment, delayed entry into college after high school, high school drop-out or having a GED, having a child or other dependents, single parenthood, financial independence from parents, and full-time employment while attending college. Many of these factors describe the average community college student (Jacobs, 2004), who is twenty-six years old, white, female, and works at least part-time (Carlan & Byxbe, 2000). Students who have these characteristics and decide to transfer to a new institution will still face these same barriers at the new institution (Jacobs, 2004), in addition to barriers related to adjusting to a new environment.

Transfer Student Adjustment

According to Lanaan (2001), understanding the academic experiences of transfer students is paramount to understanding how to help these students be successful. Rich (1979) described four issues that impact transfer students' views of the transfer process. First, many transfer students often arrive at the new institution with preconceived ideas about the campus and how well they will adjust. Next, the transfer students often assumed transferring to a new institution would resolve academic issues encountered at the previous institution. The third issue involved the transfer student's ability to socially adjust. Rich indicated this adjustment was dependent on the institution's ability to adequately instill a sense of belongingness. Finally, many transfer students believed they must adapt to aspects of the campus environment that they thought were better at the other institution. Much research has focused on how students adjust to the transition

between institutions of higher education and these studies suggested that the level of student involvement in their academic and social adjustment was critical to their academic success.

Student Involvement

A college student's level of involvement in academic and social activities at the institution is critical to his or her success at college (Pascarella & Terenzini, 1991). Researchers have found that students who become involved in the campus community have a stronger sense of connection with the institution and are more motivated to succeed (Bliming, 1995; Pascarella & Terenzini, 1991; Tinto, 1987). In an effort to determine the impact of the college environment on student development and success, Astin (1970a, 1970b, 1991, 1993) developed the input-environment-outcome (I-E-O) model. His approach evaluated student characteristics as *inputs* which were measured before the student was exposed to the college environment. He then examined college *environment* variables at numerous institutions across the country to identify people, policies, programs, and experiences a student could encounter at the institution. *Outcomes* included student characteristics after being exposed to the college environment. Realizing the difficulty in trying to change the college environment to suit the needs of the students, Astin (1968) focused on how students developed and changed (1984). He introduced a theory of student involvement, which suggests that the more involved students are in college, the more likely they are to learn and develop (Pascarella & Terenzini, 1991).

Astin's Theory of Student Involvement (1984) was based on the Freudian idea of cathexis, which refers to the investment of psychological energy on other people or

things. He also grounded the theory with the learning theory of time-on-task. Astin's

theory includes five assumptions:

1. Involvement refers to the commitment of psychological and physical exertion on

   objects, whether general or specific

2. Involvement is continuous, meaning students will be involved with different

   objects at various levels and times

3. Level of involvement can be measured both quantitatively and qualitatively

4. Student learning and development in a program is directly proportional to the

   quality and quantity of involvement

5. Effectiveness of an educational policy or practice is directly related to its ability

   to increase involvement

The postulates of this theory indicate that students have the primary role in their own

success and personal development. Their level of achievement has a positive correlation

with the quality of their involvement in programs and resources offered by the institution

(Pascarella & Terenzini, 1991).

Transfer Shock

While social adjustment to the institution is an important factor in students'

transition between colleges, academic adjustment is also important. Hill (1965) analyzed

studies conducted from 1928 to 1964 on college students who transitioned from junior

colleges to four-year institutions. He found that the majority of students who transferred

from a junior to senior college experienced a decline in GPA during their first semester at

the four-year institution. He referred to this phenomenon as *transfer shock* because after

the initial decline in the GPA, many students' grades improved as they persisted.

Additionally, when Hill (1965) compared the academic performance of the transfer students to native students at the four-year institutions, he found that the native students were performing better than the transfer students.

Recent studies have also supported the concept of transfer shock, suggesting that students who transferred from smaller institutions were more likely to experience academic difficulty and be placed on academic probation (Cejda, Kaylor, & Rewey, 1998; Lanaan, 2001). Cejda et al. (1998) reported that between 18% and 22% of community college transfer students not only experienced transfer shock, but were failing their first term at the four-year institutions. However, these researchers also found that transfer students who earned high GPAs at a community college also performed well at the four-year institution. Additionally, community college students who earned a minimum of 60 credits before transferring were more likely to perform at the same level as native students at the transfer institution. Cejda et al. suggested that these students were less susceptible to transfer shock because they had more academic experience and knowledge of campus resources.

Diaz (1992) found that transfer students, on average, experienced a half-point drop in GPA during the first semester of arrival at the new institution. However, researchers found that approximately 67% of students who experienced transfer shock improved their GPAs by the end of the first academic year (Diaz, 1992; Hill, 1965; Laanan, 2001). Mohammadi (1995) examined records of community college students at a two-year institution in Virginia who transferred to four-year institutions between fall 1990 and 1993. His research indicated that these transfer students earned an average GPA of 2.87 at the community college, but the average GPA at the end of the first semester at

the receiving institution was 2.46. By the end of the second semester, their GPAs had increased to an average of 2.62, which supported Hills (1965) findings.

While the phenomenon of transfer shock has been supported in several studies (Bricault, 1997; Cejda et al., 1998; Diaz, 1992; Laanan, 2001; Mohammadi, 1995), research also supports the opposite outcome. Some research has suggested that transfer students experienced an increase in GPA in the first semester at the receiving institution (Bricault, 1997; Cejda et al., 1998; Nickens, 1972). This phenomenon is referred to as *transfer ecstasy* (Nickens, 1972).

Transfer Ecstasy

Transfer ecstasy is a term coined by Nickens (1972) that refers to transfer students who experience a GPA increase during their first semester at a receiving institution. Diaz (1992) found that in Hill's (1965) research, there were several instances where transfer students experienced an increase in GPA during the first semester after transferring. Although Nickens (1972) coined the term transfer ecstasy, the purpose of his study was to disprove the idea of linking transfer shock as a cause-effect relationship between transfer and academic performance in the first term at a receiving institution. He found that declines in GPA in the first semester could be accounted for by other academic measures. Kuh (2003) suggested that these fluctuations could be the result of *transfer tremors*, where transfer students are faced with adjusting to a new environment with little to no support or resources from the institution.

Summary and Critique

Transfer students have been identified as a population at-risk for experiencing academic difficulty and attrition. However, the studies that identified transfer students as

being at-risk do not explain why they experienced difficulty. Hill's (1965) study revealed that many transfer students experienced drops in GPA during their first semester; however, his findings were based on reviews of transcripts and quantitative data that did not include qualitative analysis that could determine the cause of the declines. While cognitive data helped identify the transfer population as at-risk, the noncognitive data could help explain why.

Students' involvement at the institution and their ability to adjust socially and academically are important to their academic success. Astin's (1970a, 1970b, 1991, 1993) I-E-O theory examined how the college environment could impact student success, but his study was focused on the traditional college student and did not consider the needs of transfer students. Astin's (1984) Student Involvement theory was also based on the traditional college student, and although the concepts may still apply toward transfer students, college administrators need to consider the barriers facing transfer students that might limit their ability to be involved. Then, they could develop interventions that could help the students overcome the barriers and be more involved, which Astin suggested was positively correlated with persistence.

<center>Relevant Studies</center>

Early studies did not focus on characteristics of the transfer student population or why they performed a certain way at a receiving institution. Instead, the purpose of the early studies was to identify whether the originating institutions, the community colleges, were adequately preparing students for the rigorous academic studies that awaited them at the receiving four-year institutions (Congdon, 1932; DeRidder, 1951; Eells, 1927; Martorana & Williams, 1954; Showman, 1928; Siemens, 1943; Young, 1964). This

approach did not change until Knoell and Medsker's 1965 national study on transfer students.

Knoell and Medsker (1965) conducted one of the first nationwide studies on vertical transfer students. Their study included over 7,200 transfer students with sophomore or upper-division standing who arrived at one of 424 participating four-year institutions from a two-year institution. They compared academic performance of over 4,000 transfer students to approximately 3,300 native students and expected to find differences in characteristics, such as age of native students versus transfer students, but the results of the study did not support their hypothesis. At that time, transfer students typically enrolled at the community college immediately after graduating from high school. Therefore, when the community college students transferred to the four-year institutions as juniors, they were about the same age as native students with junior standing. Knoell and Medsker also found that transfer students were predominately white and included more men than women, even though women had better academic records in high school. They also reported that economic situations influenced many of the transfer students' decisions to attend a junior college. The researchers discovered that the parents of many transfer students had lower levels of education, worked as skilled or semi-skilled laborers and, therefore, had less income to support the educational endeavors of their children. When Knoell and Medsker compared the academic performance of transfer students to native students, they found that transfer students typically had lower GPAs, but the overall time in college and number of credits completed toward graduation after reaching upper-division standing was similar to native students. These findings helped

identify characteristics of transfer students and created a foundation to support future studies on the transfer student population.

Noncognitive Studies

In 1967, Roueche reviewed 16 research studies that examined reasons community college students dropped out of college. The results of his review suggested that cognitive ability measures (e.g., SAT) were not good predictors of persistence. Roueche also noticed noncognitive differences between community college students who persisted and those who dropped out. Some of these noncognitive variables included attitudes about college life and confidence levels in their academic ability.

Tracey and Sedlacek (1984, 1989) explored reasons why first-year minority students were not as academically successful as white college students. Their research identified seven variables considered important in the lives of minority students. These variables were used to guide the development of the Noncognitive Questionnaire (NCQ) which was created to predict grades, persistence, and graduation. The seven factors included self-confidence, realistic views of self, ability to deal with racism, community service involvement, focus on long-term goals, level of support from friends or family, and leadership experience. Additional research on the subject resulted in enhancing the NCQ to include an eighth variable, acquisition of nontraditional knowledge (Tracey & Sedlacek, 1984, 1985, 1987). Tracey and Sedlacek (1984) administered the NCQ to 894 first-year students at a large university in southeastern United States. Due to the sample size, the researchers only analyzed data for White students. They performed a factor analysis and found that persistence could be linked to courses taken in high school, extracurricular activities while in high school, and residing in a multicultural society. The

NCQ has been used in, and validated by, several other studies of different college student populations. It has successfully predicted academic performance and persistence of Asian Americans (Fuertes, Sedlacek, & Liu, 1994), African Americans (Boyer & Sedlacek, 1988; Sedlacek & Adams-Gaston, 1992), Hispanics (Fuertes & Sedlacek, 1995), and White and African American students (Tracey & Sedlacek, 1984, 1985, 1987).

Pickering et al. (1992) found that some institutions were using noncognitive assessments during the admissions process; however, they wanted to study first-year students who were already admitted because students might be less likely to respond honestly to questions if they believed it could impact their admission to the institution. In 1988, Pickering et al. (1992) developed a noncognitive assessment, the Transition to College Inventory (TCI), and administered it to 1,587 full-time first-year students. The researchers performed a factor analysis and identified 16 factors linked to academic performance and persistence. Responses to the questions on the instrument were analyzed to calculate an index value for each student. They found noncognitive measures were better predictors of academic performance and persistence than demographic or cognitive measures alone. Further, they indicated that using a combination of cognitive, noncognitive, and demographic variables was the best predictor.

Duggan and Pickering (2008) expanded on the research by Pickering et al. (1992) to develop an instrument that could be used to predict academic performance and persistence of transfer students. They administered a modified version of the TCI (Pickering et al., 1992) called the Transfer Student Survey (TSS; Duggan & Pickering, 2008) to 369 first-semester transfer students at the main campus of a mid-sized public doctoral university. An index value was calculated for each student based on their

responses to questions on the instrument. Duggan and Pickering (2008) found that there was a significant difference in results based on the number of credits completed prior to transferring to the new institution. They concluded that noncognitive variables were the best predictors of academic performance and persistence of first-semester transfer students.

Summary and Critique

The focus of research on transfer students has changed since the studies by Eells (1927), Showman (1928), and Congdon (1932). Early studies focused on evaluating the effectiveness of the junior colleges and did not consider the characteristics and abilities of the students who were transferring. Knoell and Medsker (1965) were some of the first researchers to link characteristics of the transfer student population to academic performance. They also looked beyond cognitive measures to gain a better understanding of the transfer student population, which was supported by Roueche (1967) who found that cognitive measures were not good predictors of persistence. Tracey and Sedlacek (1984) and Pickering et al. (1992) developed instruments for predicting the academic performance and persistence of first-year students. The predictive ability of these instruments was found to be better than solely using cognitive measures, and using a combination of cognitive and noncognitive measures was suggested as the best predictor. However, these studies focused on the traditional first-year native student population and did not account for differences in the attitudes, behaviors, backgrounds, and experiences of the transfer student population. Therefore, Duggan and Pickering (2002) modified an existing noncognitive measure to more accurately predict the academic performance and persistence of transfer students. Although Duggan and Pickering's study revealed that

noncognitive variables could be used to predict academic performance and persistence of transfer students, they indicated that the sample size was a limitation and may not have been representative of the transfer student population at the institution.

<div align="center">Models of Persistence</div>

Tinto (1975)

Tinto (1975) developed one of the most commonly cited models of persistence (see Figure 1). His model of college student dropout considered background demographics of traditional native students and their interactions at the institution that impact goals and commitments, which can influence persistence. According to Tinto's model, students enter college with various backgrounds, attributes, and experiences. He suggested that these variables are linked with student departure from college. He also indicated that students have varying levels of commitment toward achieving their goals and the level of commitment can be influenced by external and institutional sources. The model suggests that academic performance, interactions with faculty, participation in social activities, and interactions with other students contributed to integration at the institution. These interactions are suggested to impact goals and commitments which can influence persistence. Tinto found that the level of academic and social integration at the institution was directly proportionate to the level of commitment to the institution and persistence.

Bean and Metzner (1985)

While Tinto's (1975) research focused on traditional college students, Bean and Metzner (1985) suggested a model for persistence of nontraditional students (see Figure

Commitments   Academic System   Commitments
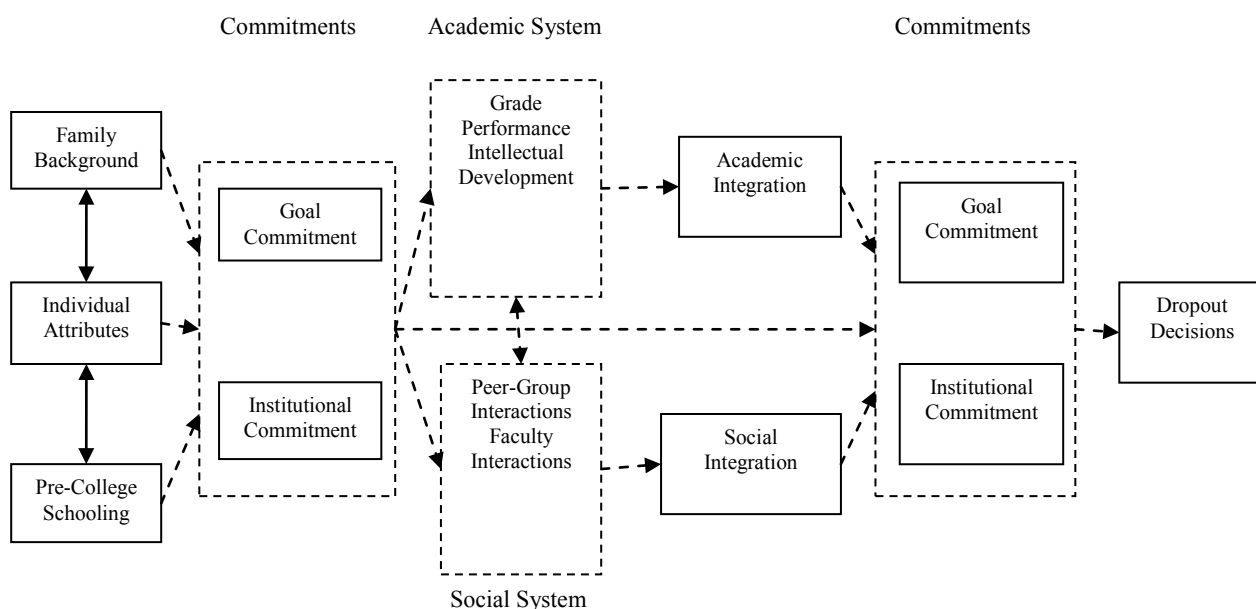
Figure 1. Tinto's (1975) model of dropout from college

2). Many non-traditional students live off-campus and have commitments that limit, or prevent, them from experiencing the same levels of academic and social integration as traditional college students. Therefore, Bean and Metzner introduced their model because it placed more emphasis on academic and environmental variables and less on social integration variables.

Defining and background variables comprise the first phase of Bean and Metzner's (1985) model of Nontraditional Student Attrition. The defining variables include demographic data such as age, residence, and enrollment status. Bean and Metzner suggested that background variables influence student interactions with the institution and identified these variables as educational goals, high school academic performance, ethnicity, and gender. Academic variables (study skills, study habits, academic advising, absenteeism, academic major, and course availability) were included

in the next stage. These variables were expected to indirectly impact persistence based on the academic outcome of GPA and influences on the psychological outcomes of satisfaction, goal commitment, and stress. Environmental variables (finances, work schedule, encouragement, family commitments, and ability to transfer) were also considered because they can directly influence the decision to dropout and indirectly influence persistence through psychological outcome variables. Academic outcome variables (e.g., GPA), can be directly linked to dropout because many institutions have academic continuance policies that suspend students who do not achieve an adequate GPA. Finally, psychological outcome variables (utility, satisfaction, goal commitment, and stress) were posited to indirectly impact dropout based on a strong direct link to students' intent to leave.

Chartrand (1992)

Chartrand (1992) expanded on Bean and Metzner's (1985) study to consider links between individual variables. Bean and Metzner's model linked sets of variables (e.g., background, academic, environmental, psychological outcomes) to other variable sets but they did not tie individual variables within each set to other individual variables (e.g., finances and stress). Chartrand (1992) wanted to bridge those gaps while also focusing on the impact of psychological adjustment of nontraditional students' persistence. Her model emphasized the links between background variables (e.g., high school GPA), academic variables (e.g., satisfaction with courses and advising), and environmental variables (e.g., family responsibilities) on psychological outcomes (e.g., institutional commitment, academic adjustments, and absence of psychological distress) and the impact on intent to continue at the same institution (see Figure 3). Another difference between Chartrand's model and Bean and Metzner's (1985) model was the removal of some of the links to

background variables. She suggested that the links between age and family responsibilities and between age and hours of employment were not always linear. Additionally, she tied educational goals directly to intent to persist rather than tying them together through the variable of students' certainty of major selection. She also operationalized the psychological outcome variables into three categories: institutional commitment, academic adjustment, and absence of psychological distress.
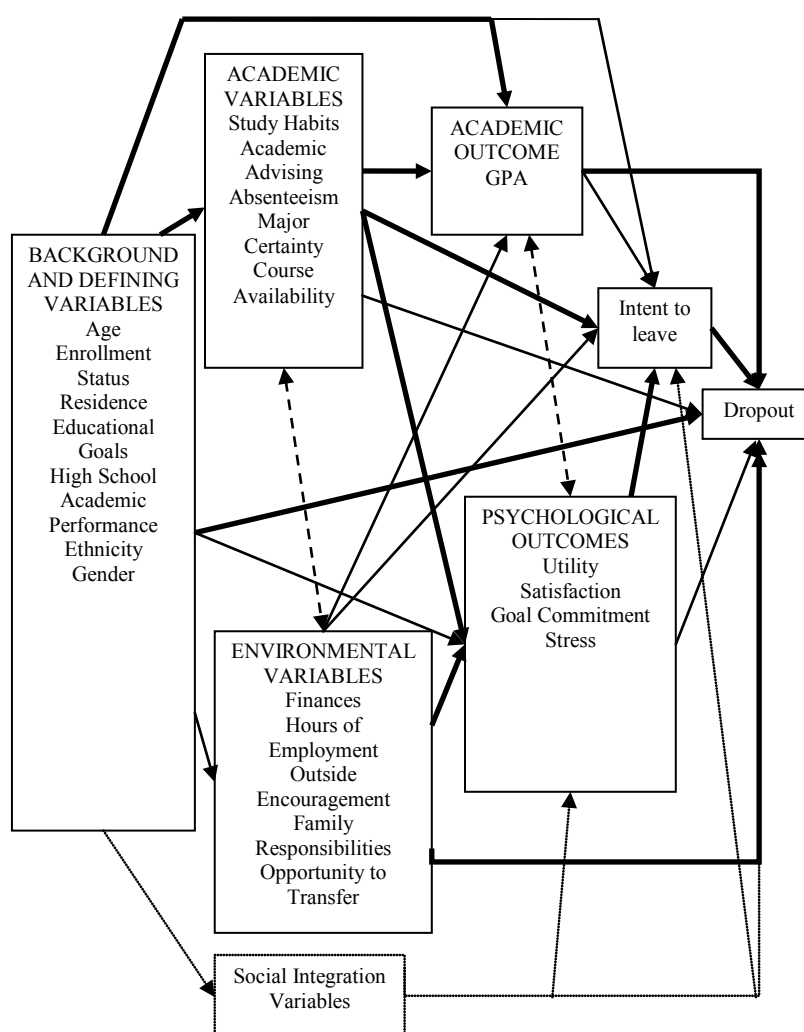
Figure 2. Bean & Metzner's (1985) Model of Non-traditional Student Attrition

Chartrand (1992) found that background variables were not a significant factor in her model when studying nontraditional students. Her study suggested that background variables (age, educational goals, and high school GPA) were not important predictors for academic adjustment or the intent to continue at the institution. However, she did confirm her prediction that academic variables (e.g., certainty of major) were significant predictors of persistence. Also, she noted that long-term educational goals were not significant in predicting a student's current intent to persist. Satisfaction with courses and advising had a strong link to institutional commitment, but did not have a strong effect on academic adjustment. However, perception of study skills ability was found to have a significant positive correlation with academic adjustment. The environmental variables had varying and inconsistent influence on psychological outcomes and persistence. While research has linked hours of employment and family responsibilities to student attrition, Chartrand's study did not find these variables to have the same influence for nontraditional students. Another important finding was the relationship between the psychological outcome variables. Institutional commitment and absence of psychological distress significantly influenced persistence; however, academic adjustment did not impact intent to continue.

Cabrera, Nora, and Castenada (1993)

Tinto's (1975) Student Integration Model and Bean and Metzner's (1985) Nontraditional Student Attrition Model both provided a comprehensive foundation for describing college student persistence. Over the last three decades, many researchers have used Tinto's model to examine persistence at different types of institutions and for different student populations (Boyle, 1989; Cabrera, Castaneda, Nora, & Hengstler, 1992;

Mallette & Cabrera, 1991; Nora, 1987; Nora, Attinasi, & Matonak, 1990; Pascarella & Terenzini, 1979; Pascarella, Terenzini, & Wolfle, 1986; Stage, 1988, 1991). Similarly, Bean and Metzner's (1985) model has been validated for explaining persistence at traditional higher education institutions (Bean, 1980, 1982, 1983, 1985; Cabrera et al., 1992) and for nontraditional students (Bean & Metzner, 1985; Metzner & Bean, 1987; Chartrand, 1992). Because both models examine college student persistence, Cabrera et al. (1993) merged the two theories to create an Integrated Model of Student Retention in an effort to better explain what influences students' decisions to persist (see Figure 4).

By comparing Tinto's (1975) and Bean and Metzner's (1985) models, Cabrera et al. (1993) were able to identify various commonalities, differences, and gaps. For example, Tinto's (1975) theory did not consider the role of external factors and their influence over students' commitments, preferences, and perceptions, whereas Bean and Metzner's (1985) model recognized variables outside the institution that can affect students' attitudes and decisions. Further, Tinto's (1975) Student Integration Model included academic performance as an indicator of academic integration, but the Bean and Metzner's (1985) model recognized academic performance (e.g., grades) as outcomes related to academic and social-psychological experiences (Cabrera et al., 1993). Cabrera et al. found that in the integrated model, the links between academic and social integration factors, and commitment factors supported the theoretical frameworks of Tinto's (1975) and Bean and Metzner's (1985) models. The results of combining the models also revealed support for including external factors in influencing academic integration, and family and friends support influencing institutional commitment.
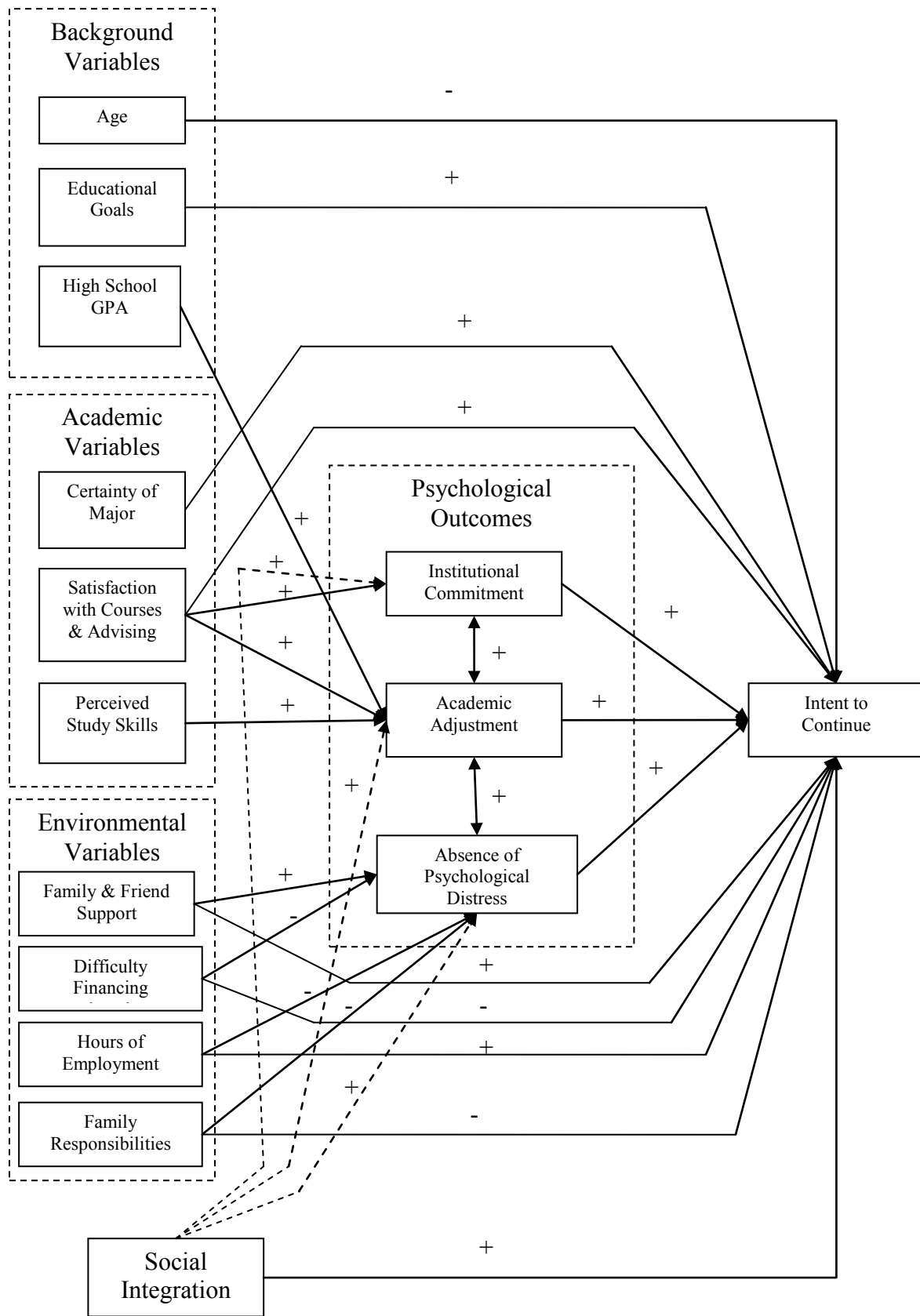
Figure 3. Chartrand's (1992) model of nontraditional student dropout, based on Bean and Metzner (1985)

Integrating the two models allowed researchers to account for 42% of the variance observed in intent to persist and 45% of the variance observed in persistence (Cabrera et al., 1993). Intent to persist accounted for the largest total effect on persistence. GPA and institutional commitment also contributed to the total effect on persistence. Cabrera et al. concluded that Tinto's (1975) Student Integration Model excluded external factors that were significant to the social and academic experiences of the students, which supported Bean and Metzner's (1985) theory that environmental variables help explain students' decisions to persist.
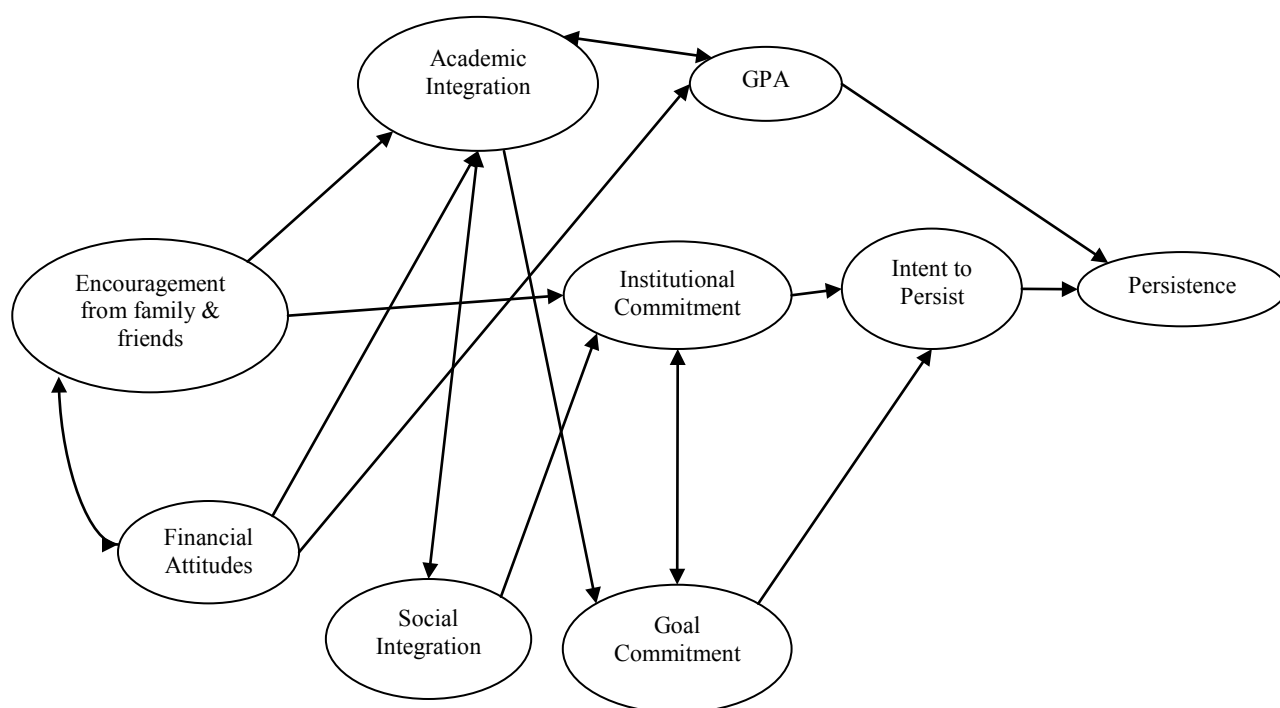
Figure 4. Cabrera, Nora, & Castenada's (1993) Integrated Model of Student Retention

Summary and Critique

The amount of research on college student persistence is evidence of the complex and critical nature of determining the causes of student attrition. With the increasing demand for an educated workforce and reductions in funding for institutions of higher education, college leaders must gain a better understanding of why students leave and strategically devote resources toward implementing the most efficient and effective methods of identifying and helping students who might be at-risk for attrition. Understanding and identifying why different populations of students leave would allow college administrators to develop interventions that could help these students persist to graduation. Although the models of persistence introduced by Tinto (1975), Bean and Metzner (1985), and Cabrera et al. (1992) help explain students attrition, these studies focused on the student populations of that time which may not be representative of the current college student population. None of these studies specifically targeted transfer students, and although Bean and Metzner (1985) and Chartrand (1992) considered nontraditional students, the transfer student population includes individuals with characteristics that resemble both the traditional and nontraditional student populations. Therefore, the generalizability of these persistence studies to the transfer student population would be questionable. With the growing number of students who transfer among institutions, college leaders should use the existing models of persistence as a foundation for identifying variables that can best predict persistence of the various student populations at their institution.

Conclusion

The college student population is continuously evolving and presenting new challenges and opportunities for higher education leaders to learn more about their constituents and develop strategies to help them succeed. One of the major changes in the college student population is the growth in the number of students who transfer. While numerous studies have explored the persisting vertical transfer students, there is limited literature on other transfer student subpopulations. However, a review of the literature on academic performance and persistence revealed many common factors that impact students' academic success and decisions to persist. While some of the barriers are controlled by the institution, many are related to a student's background, experiences, abilities, perceptions, behaviors, and attitudes. The transfer student population is not homogeneous, and these students have varying backgrounds, goals, and levels of commitment. With a growing number of college students transferring among different institutions and the fact that transfer students are considered an at-risk population, college leaders need to gain a better understanding of the unique needs of this population to better identify those who might be at-risk for experiencing academic difficulty and whether the needs vary by the different subpopulations. Administrators can then work towards developing interventions that can help these students be academically successful and persist to graduation.

A review of the literature on transfer students revealed numerous variables that impact academic performance and persistence. These barriers to success and persistence include cognitive, noncognitive, and demographic factors. The literature also revealed gaps in the research, especially related to the backgrounds of transfer students. While

much emphasis has been placed on studying vertical transfers, little research has focused on horizontal transfers. Therefore, the objective of this study will be to examine whether an existing survey can be used along with considerations of transfer background to more accurately predict academic performance and persistence of the horizontal and vertical transfer students when also considering their academic level.

CHAPTER III

METHOD

The goal of this study was to examine noncognitive variables in combination with cognitive and demographic variables to determine whether they could accurately predict the academic performance and persistence of horizontal and vertical transfer students by academic level at a large Carnegie Doctoral Research University with High Research Activity. To accomplish this goal, Transfer Student Survey (TSS) indices calculated by the target institution were used to identify transfer students at-risk for academic difficulty. The TSS is administered by the target institution every semester to all first-time incoming transfer students. This study analyzed transfer student data by transfer type (horizontal and vertical) and academic classification level (first-year, sophomore, and upper-division) of each transfer type to verify the predictive ability of the TSS indices. This helped determine if noncognitive, cognitive, and demographic variables could be used to better identify transfer students at-risk for experiencing academic difficulty and attrition when considering previous college experiences.

This study identified noncognitive, cognitive, and demographic variables that predicted academic performance of students who transferred to the target institution from a community college or another four-year university. The approach of this study was similar to Pickering et al. (1992), who developed and validated the Transition to College Inventory (TCI) to identify noncognitive predictors of academic performance and persistence for first-year native students. Duggan and Pickering (2008) reviewed and modified the TCI to create a measure that could more accurately predict academic performance and persistence of transfer students. The TSS was originally validated for

transfer students based on whether they enrolled on-campus or off-campus. The TSS has since been revised by the developers of the TCI to remove several questions and add others based on feedback received from student responses to open-ended questions on the survey and input from other student development researchers.

Sample

The sample for this study included all transfer students who most resembled the characteristics of the traditional native student population and entered the institution during the fall semesters of 2006 to 2008. The sample population was limited to fall cohorts because this study was measuring attrition based on fall to fall enrollment. Distance learners, military students, international students, and students over the age of 29 were excluded from the study in order to create a sample with characteristics similar to the traditional college student population. Additionally, the sample was limited to first-time horizontal and vertical transfer students. TSS data were collected on these students beginning in the summer term prior to their fall admission term. All transfer students were required to complete the TSS prior to enrolling for their second semester at the institution. Data regarding student's enrollment and academic performance (GPA) were collected by the IRA office from the target institution's student information system (SIS).

Research Methodology

This study used a quantitative approach for collecting and analyzing data about the horizontal and vertical transfer student population at a large Carnegie Doctoral Research University with High Research Activity. Specifically, logistic regression was conducted to confirm the predictive ability of the TSS Index, a noncognitive variable calculated by the target institution based on student responses to the TSS, cognitive

variables, and demographic variables to the academic performance and persistence of transfer students based on transfer type (horizontal or vertical) and academic level (first-year, sophomore, and upper-division).

Pickering et al. (1992) developed the TCI to determine if noncognitive variables could be used to predict academic performance and persistence of native first-year college students. Pickering et al. indicated the TCI has been used by the institution since 1988 to help identify first-year native students who might be at-risk for experiencing academic difficulty. This earlier research successfully identified at-risk first-year students, but the researchers did not focus on the transfer student population. In an effort to identify at-risk transfer students, Duggan and Pickering (2008) modified the TCI to more accurately predict the academic performance and persistence of transfer students. Since its original development, the TSS has been modified and retested for validity by the administrators in the institution's IRA office. Also, beginning in the fall semester of 2006, the TSS became a required assessment for all first-time incoming transfer students at the target institution.

Similar to the TCI, responses from the TSS were analyzed by the target institution to calculate indices. Duggan and Pickering (2008) found that fewer junior and seniors experienced academic difficulty as compared to first-year and sophomore students. Therefore, the researchers evaluated juniors and seniors together as upper-division students. Because the study by Duggan and Pickering suggested significant differences among first-year, sophomore, and upper-division transfer students, the institution calculated three TSS indices based on these academic levels. The TSS indices can be used as noncognitive predictors of risk for academic performance and persistence. The

indices can also be analyzed along with demographic, cognitive, and other noncognitive data collected from the University's student information systems (SIS). Research based on the TCI has suggested that the combination of these variables is more predictive of academic performance and persistence than only using cognitive variables (Pickering et al., 1992).

Due to the number of transfer students who enter the target institution each semester, the institution's use of a survey is a cost-effective, reliable, and efficient means of collecting data (Biemer & Lyberg, 2003; De Leeuw, 2008; McMillan, 2004; Punch, 1998). One of the typical drawbacks of using surveys is low response rate (De Leeuw, 2008). However, the target institution in this study requires all first-time incoming transfer students to complete the TSS, so the use of a survey and requiring the entire population to complete the assessment eliminates sampling error and reduces total sampling error (Biemer & Lyberg, 2003). Biemer and Lyberg also indicated that surveys allow researchers to provide subjects with a standardized set of questions about topics that subjects might normally be uncomfortable or unwilling to answer if the data collection were face-to-face. Using surveys can result in acquiring the data needed while removing interviewer influence and effects that could be associated with asking questions on sensitive issues (De Leeuw, 2008). Some researchers believe surveys are the best measure of attitudes and behaviors of students (Palomba & Banta, 1999).

The TSS measures student attitudes and behaviors which have been linked to predicting academic performance and persistence (Duggan & Pickering, 2008). Other studies of noncognitive variables have also been shown to predict academic performance (Pickering et al., 1992; Sedlacek, 2004). However, Pickering et al. (1992) added that the

combination of noncognitive variables with cognitive measures is the best predictor of academic performance and persistence. This study followed the approaches of these previous studies to identify whether noncognitive measures can be used in combination with cognitive and demographic variables to better identify horizontal and vertical transfer students by academic level (first-year, sophomore, and upper-division) who might be at-risk for academic difficulty and/or attrition.

Research Design

Logistic regression was used and included multiple criterion and predictor variables (Meyers, Gamst, & Guarino, 2006; McMillan & Wergin, 2002; Orcher, 2005). This type of analysis is appropriate in predictive studies where the purpose is to identify relationships among variables. Because the criterion, or dependent, variables were dichotomous, logistic regression analysis was conducted to measure the predictive power of different combinations of the predictor, or independent, variables (McMillan, 2004). Specifically, the criterion variables of interest were academic difficulty and persistence. For the purpose of this study, academic performance was measured as a dichotomous variable. Students were classified as being academically successful or in academic difficulty based on their GPA. Academic success was defined as having a cumulative grade point average (GPA) of 2.0 or greater, which was the minimum GPA required to remain in good standing at the target institution. Students earning below a 2.0 cumulative GPA were considered to be in academic difficulty. Persistence was also a dichotomous variable that was used to indicate whether the student enrolled in the subsequent academic year. The predictor variables consisted of the TSS Index, the percentage of

transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, and demographic variables (age, gender, and ethnicity).

Method of Analyzing the Research Questions

The research questions that guided this study were analyzed based on data collected from the target institution's student information system (SIS) and databases in the IRA office. Demographic data about the students was collected from the SIS. Noncognitive data and transfer history was collected from the institution's IRA office and the SIS. The first two research questions addressed whether noncognitive variables, cognitive variables, and demographic variables can be used to predict the academic performance of transfer students based on their transfer type (horizontal or vertical) by academic level (first-year, sophomore, and upper-division). Questions 3 and 4 measured the predictability of persistence using noncognitive variables, cognitive variables, and demographic variables used in the first two questions and also considering the cumulative GPA at the target institution.

Research Questions

Question 1: To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution? Vertical transfer students are defined as those who initially enrolled at a two-year institution and then transferred to the target institution. The vertical transfer students were categorized as first-year, sophomore, or upper division. First-year transfer students are

defined by the target institution as those who have completed fewer than 26 academic credits. Sophomore transfers are those who have completed 26 or more credits but fewer than 56 credits. Upper division transfer students are those who have 56 or more academic credits. The target institution calculated TSS indices based on the academic level of the students and their responses to the TSS. Academic performance was determined based on a student's cumulative GPA (less than 2.0 and greater than or equal to 2.0), which was collected from the institution's SIS. Logistic regression was used to measure the strength of the relationship between the criterion variables (TSS Index, percentage of transfer credits accepted, transfer GPA, age, gender, and ethnicity) and the categorical variable academic difficulty.

Question 2: To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution? For the purpose of this study, horizontal transfer students were defined as those who initially enrolled at a four-year institution and then transferred to the target institution. The horizontal transfer students were categorized by academic level and the predictor and criterion variables collected in the same manner as vertical transfer students. Logistic regression was used to measure the strength of the relationship between the criterion variables (TSS Index, percentage of transfer credits accepted, transfer GPA, age, gender, and ethnicity) and the categorical variable academic difficulty.

Question 3: To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persists to the next academic year at the target institution? This question expands on the first research question to determine if the same predictor variables can be analyzed along with the first semester cumulative GPA at the target institution to predict attrition of vertical transfer students by academic level (first-year, sophomore, or upper division). Persistence was determined based on enrollment data in the institution's SIS. Persistence was calculated as a dichotomous variable indicating whether or not the vertical transfer student returned and enrolled in the subsequent academic year. Logistic regression was used to measure the strength of the relationship between the criterion variables (TSS Index, percentage of transfer credits accepted, transfer GPA, age, gender, ethnicity, and cumulative GPA at the target institution) and the categorical variable persistence.

Question 4: To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persists to the next academic year at the target institution? This question expands on the second research question to determine if the same predictor variables can be analyzed along with the first semester cumulative GPA at the target institution to predict persistence of horizontal transfer

students by academic level (first-year, sophomore, or upper division). Student persistence and the predictor variables were determined in the same manner identified in question 3 for vertical transfer students. Logistic regression was used to measure the strength of the relationship between the criterion variables (TSS Index, percentage of transfer credits accepted, transfer GPA, age, gender, ethnicity, and cumulative GPA at the target institution) and the categorical variable persistence.

Transfer Student Survey

Duggan and Pickering (2008) developed the Transfer Student Survey (TSS) to help predict the academic performance of transfer students. The TSS is a modified version of the TCI, which was developed to predict academic performance of first-year native students (Pickering et al., 1992). Duggan and Pickering (2008) modified the instrument to be more relevant to transfer students.

Variables

Prediction studies use correlation coefficients to determine whether one variable can predict another variable (McMillan, 2004). Variables used to predict are referred to as predictor variables, and the dependent variables are called criterion variables. The predictor variables in this study included the TSS Index, percentage of transfer credits accepted at the receiving institution, transfer GPA, first semester cumulative GPA at the target institution, and demographic variables.

The first predictor variable in the study was TSS Index, a noncognitive variable based on transfer student responses to the TSS. The target institution developed three TSS Indices based on the findings of Duggan and Pickering (2008). Separate indices were calculated for each academic level based on responses to the TSS from transfer

students who most resembled the characteristics of the traditional college student population. The target institution then verified the reliability by testing the internal consistency of the TSS Index using Cronbach's Alpha. The Cronbach's Alpha method was an appropriate test of reliability because questions on the TSS do not have right or wrong answers. Cronbach's Alpha averages all correlations to measure the degree of homogeneity among all the items in the instrument (McMillan, 2004).

The next predictor variable, percentage of transfer credits accepted at the receiving institution, was calculated by dividing the number of transfer credits awarded at the target institution by the number of academic credits passed at the previous institution. Developmental and other non-transferrable courses taken at previous institutions were not factored into the calculations. Failed courses were excluded because those courses have no academic credit. Additionally students would have no expectation of receiving credit for a failed course. All other credits were factored into the percentage calculation. The target institution also calculated the transfer GPA for each student based on credits taken at all previous institutions. First semester cumulative GPA at the target institution was calculated by the target institution based on the academic credits completed during a student's first term at the institution. The demographic variables included age, gender, and ethnicity.

The first criterion variable in this study was academic performance. Students who earned a GPA of 2.0 or higher at the end of each semester were considered academically successful. Students earning below a 2.0 GPA were considered to be encountering academic difficulty. The definition of academic success and difficulty was based on the target institution's academic standing policy. Similar definitions were used in the original

TSS study by Duggan and Pickering (2008) and the original TCI study by Pickering et al.
(1992). The second criterion variable in the study was persistence and was also defined
based on the studies by Duggan and Pickering (2008), and Pickering et al (1992).
Persistence was defined as a dichotomous variable "persisted to the subsequent fall
semester" or "did not persist to the subsequent fall semester." So, a student who
originally enrolled during a fall term persisted if he or she re-enrolled for the fall term of
the next academic year. If the student did not re-enroll the following fall term, he or she
did not persist.

Threats to Internal Validity

Validity is referred to as the level to which the evidence supports the
appropriateness of any inferences (Hammersley, 2008; McMillan, 2004; Orcher, 2005).
McMillan (2004) identified internal validity as the level to which extraneous and
confounding variables are controlled to allow the independent variable to produce the
effect. In this correlational study, the primary threats to internal validity were the
selection of subjects, instrumentation, and subject effects of being aware they were
subjects.

Selection. Selection refers to the threat to validity associated with potential
differences of characteristics between subjects and whether those differences are related
to the dependent variable (McMillan, 2004). Random assignment of subjects to groups
helps alleviate the threat of selection to internal validity; however, in this study random
assignment was not possible. This study was not experimental and instead analyzed the
results of an assessment completed by the entire transfer student population at the
institution; therefore, there was no control group. Students could not be randomly

assigned as first-year, sophomore, or upper division transfer students. Additionally, students could not be randomly assigned as academically successful or persistent to the next academic year.

Instrumentation. Changes to measures or use of unreliable measures can result in threats to internal validity (McMillan, 2004). McMillan also indicated threats to internal validity related to instrumentation include the ability of the measure to reflect change based on the independent variable(s). In this study, the TSS measured student attitudes and behaviors which were not likely to vary much.

Subject effects. Subject effects refers to the threat to internal validity related to the subjects realizing they are being studied (McMillan, 2004). The TSS measures student attitudes and behaviors, and students may want to portray themselves as an ideal student. Other students may take the opposite approach and try to paint themselves as a rebel and respond to questions that would make them feel more popular. Because the TSS is administered online, students may complete the assessment in the presence of other people, which could influence their responses either positively or negatively. De Leeuw (2008) mentioned several disadvantages to using online surveys. One disadvantage is that there is no way to ensure the person completing the assessment is the intended subject. However, she also indicated that Internet surveys can have some advantages. For example, internet surveys can be completed most anywhere and allow the subject to control his or her environment and he or she may opt to seek privacy when completing the assessment. The instructions on the TSS indicate confidentiality will be maintained in the study and informs the subject the instrument is designed to help provide better services to assist them in completing their educational goals. Knowing that their

responses could help them be successful might impact their desire to respond honestly. However, because students were required to complete the survey and knew they were subjects, the use of self-reporting created the potential of subject effects as a threat to internal validity.

Threats to External Validity

External validity refers to the generalizability of the results of the study (McMillan, 2004). According to McMillan's definitions, there are three factors which could have impacted the generalizability of this study. The threats to external validity included the characteristics of the subjects, the environment or situation in which the data were collected, and time.

Subjects. The threat to external validity related to subjects includes the characteristics of the subjects used versus the representation of the entire population (McMillan, 2004). In this study, the subjects were the horizontal and vertical transfer students at the target institution. This excluded any transfer student who transferred multiple times. Additionally, the horizontal and vertical transfer student population at this one institution may not be representative of all horizontal and vertical transfer students. Therefore, the results of this study may only be generalizable to the horizontal and vertical transfer student population of the target institution.

Situation. The situation refers to the environment in which the data were collected (McMillan, 2004). In this study, the TSS was completed online and at the leisure of the student. The assessment could have been completed in any location, time, or environment where Internet access was available. The environment in which the assessment was completed could have impacted the validity of the study. Students in

distracting environments or situations might have been less likely to select the appropriate responses that reflected their true attitudes and behaviors. The lack of researcher control in the use of an online assessment was a threat to external validity.

Time. The threat to external validity associated with time refers to the change in results associated with the passing of time (McMillan, 2004). As the transfer student population increases and changes, their motivations for and attitudes about attending college might also change. Similarly, their needs and expectations may change. The potential for change in the population over time presents an issue in generalizability and therefore was considered a potential threat to external validity.

Reliability

Reliability refers to the consistency among scores of a measure and level to which those scores are free from error (McMillan, 2004). Orcher (2005) referred to reliability as the ability of the measure to consistently produce the same results. Numerous factors could influence the reliability of a measure; however, to be reliable, a measure must be able to consistently represent a subject's score regardless of when completed. Orcher indicated that reliability is improved by limiting subjectivity and including enough questions to increase consistency. To test the reliability of the TSS, Duggan and Pickering (2008) used a Cronbach's Alpha to test for reliability of the calculated TSS Indices. Duggan and Pickering also used pilot studies and triangulation of data using qualitative approaches as a method of increasing the reliability of the TSS. The institution's IRA office also calculated Cronbach's Alpha to test the reliability of the TSS Indices based on the revised TSS. The correlation coefficients for the first-year TSS

Index was α = .73, α = .77 for the sophomore TSS Index, and α = .74 for the upper-division TSS Index.

Instrumentation of the Survey

Duggan and Pickering (2008) developed the TSS based on another measure, the TCI, which is used to measure the academic performance and persistence of first-year students. Pickering et al. (1992) developed the TCI which was found to accurately predict the academic performance and persistence of first-year college students. More importantly, when the TCI Index scores were analyzed with demographic and cognitive measures, the results provided the most successful means of predicting academic performance and persistence of these students.

The original TSS developed by Duggan and Pickering (2008) included 152 questions, including 5 open-ended questions. However, researchers at the institution revised the measure to improve validity by removing several questions which did not significantly contribute to the analysis and adding questions based on feedback from the open-ended questions in the survey and input from other researchers. Further discussion about the modification to the original TSS instrument is described later in this section.

The current version of the TSS (see Appendix A) includes 133 questions of which 3 are open-ended. The majority of the questions use summative response scales, or Likert-type scales, which can be easily analyzed to calculate an individual's score on the inventory (Meyers, Gamst, & Guarino, 2006). The questions in the TSS were grouped into 10 related topics. The groupings covered the following subjects:

1. Reasons for the decision to attend college

    a. 8 items rated on a scale of 1 (not important) to 3 (very important)

    b. 1 open-ended question asking students to identify any other factors that impacted their reason to attend college

2. Reason for choosing the particular institution

    a. 11 items rated on a scale of 1 (not important) to 3 (very important)

    b. 1 open-ended question asking students to identify any other reasons for choosing to attend the particular institution

3. Extent to which activities negatively impacted previous college experience

    a. 21 items rated on a scale of 1 (not at all) to 4 (to a very great extent)

    b. 1 open-ended question asking students to identify any other activities which may have negatively impacted their most recent previous college experience

4. Self-rating of abilities and traits compared to average students in the same age group

    a. 15 items rated on a scale of 1 (lowest 10%) to 5 (top 10%)

5. Current attitudes about being a college student

    a. 9 items rated on a scale of 1 (strongly disagree) to 4 (strongly agree)

    b. 5 items rated on a scale of 1 (strongly disagree) to 6 (strong agree).

6. Prediction of academic success

    a. 1 categorical question asking students to select from a list what would most likely be the reason they would leave college before graduating

    b. 15 items rated on a scale of 1 (no chance) to 3 (very good chance)

7. Predictions of involvement in college life which included 1 categorical question to allow students to self-identify as a main campus, distance learning, or higher education center student. Based on the response to that question, students then receive one of the following sets of questions:

    a. Main campus students: 13 items rated on a scale of 0 (never) to 3 (very often).

    b. Off-campus students (distance learners and/or higher education center

       students): 20 items rated on a scale of 0 (never) to 3 (very often).

8. Work/Career Experiences

    a. 1 item categorizing career plans

    b. 1 dichotomous item indicating whether the student is currently working for

       pay

    c. 1 item indicating the number of hours worked each week

    d. 1 item indicating whether the student is on a career path.

9. Transfer Experience

    a. 1 item categorizing the student as a direct transfer from another institution or a

       delayed transfer student who has been away from college for a year or more

    b. 1 item rated on a scale of 1 (very poor) to 5 (excellent).

10. Demographic questions concerning the students educational background, transfer

    credit history, expected time to degree completion, time since last attendance at any

    college, and enrollment status at the last institution (full-time or part-time).

The TSS is completed in a web-based format and was developed by the target institution

using software by Inquisite, Inc. The TSS Indices were calculated by the target institution

using statistical analysis software from SAS Institute, Inc. The research questions were

tested by analyzing criterion variables, predictor variables, and demographic data using

statistical software called SPSS.

      Duggan and Pickering (2008) verified the content and face validity of the TSS by

asking the developers of the original Transition to College Inventory (TCI) to review the

instrument and provide feedback and recommendations. The instrument was also reviewed by various administrators, faculty, and staff to provide feedback and suggestions about the items on the survey. The feedback they received resulted in no changes to the items on the instrument. The target institution made modifications to the survey based on more recent feedback from the original developers of the TCI, responses to open-ended questions on the survey, and suggestions from other experts in the field of identifying noncognitive predictors of academic performance and persistence. The reliability of the TSS was measured by using a correlation coefficient, Cronbach's Alpha, and by triangulating data using a pilot study that involved interviews and open-ended questions.

Procedure

The target institution administers the TSS to all incoming undergraduate transfer students who are enrolling at the institution for the first time. The target institution's IRA office collects and stores the data on the university's secure network. When students register to attend a transfer orientation session, they receive information about how to complete the assessment prior to arriving for orientation. Students who chose not to attend a transfer orientation session receive email invitations sent to their university email accounts with instructions on how to complete the TSS. First-time transfer students who have not completed the assessment within the first two weeks after the start of the semester receive additional email reminders. A registration hold is also placed on the record of students who have not completed the assessment. The hold prevents registration for the next semester and is not removed until the assessment is completed.

Data Collection and Recording

TSS responses were collected by the target institution using the Inquisite Survey Software (Inquisite Inc., 2008). The data were collected and stored by the target institution's IRA office on a secure database server. Other data were retrieved from the institution's SIS. Permission from the IRA office and other required University officials were attained to gain access to the data for the purpose of this study. Permission to conduct the study was obtained from the Human Subject Research Committee for the Darden College of Education.

Data Analysis and Statistics

Descriptive data were analyzed from the data collected. Logistical regressions were used to evaluate the four research questions in this study. The logistical regression procedures examined which predictor variables (TSS Index, percentage of transfer credits accepted, transfer GPA, age, gender, and ethnicity) had the strongest relationship with academic performance and persistence, the criterion variables (Meyers et al., 2006). First semester cumulative GPA at the target institution was also included as a predictor variable when analyzing relationships with persistence. Logistic regression was an appropriate procedure for dichotomous variables (academic success or academic difficulty, and persistence or attrition) (Meyers et al., 2006). All statistical analyses were conducted using an alpha significance level of .05.

Conclusion

The original study conducted by Duggan and Pickering (2008) developed the groundwork for the TSS instrument that is presently used. Their study included quantitative and qualitative methods to gain a better understanding of the transfer student

population. Findings from the study resulted in the institution making several

modifications to the TSS to increase reliability and validity before requiring students to

complete the assessment. While the study shows the instrument is a good predictor of

academic performance and persistence of transfer students in general, the institution has

not examined whether the TSS can better predict academic performance and persistence

of transfer students when considering a student's transfer history. Students who

transferred to a four-year university from a two-year community college have different

experiences than those who transferred from another four-year institution. Identifying the

differences among the transfer population could assist the institution in better targeting

these transfer students with programs and support that could improve the likelihood of

academic success and persistence to graduation. With the increasing focus on enrollment

management and accountability, being able to accurately identify at-risk student

populations can allow institutions to better allocate resources to assist students who need

help being successful in college, which could lead to improved retention and graduation

rates, increased student satisfaction, and improve the overall marketability and financial

standing of the institution.

CHAPTER IV

DATA ANALYSIS AND RESULTS

The goal of this study was to investigate whether noncognitive, cognitive, and demographic variables could be used to predict the academic performance and persistence of transfer students by transfer type and academic level at a large Carnegie Doctoral Research University with High Research Activity. This chapter begins with a brief review of the data collection methodology. Next, a description of the study's population is presented along with demographic breakdowns for age, gender, and ethnicity. Then, a description of the variables is provided followed by a report of the findings for each research question along with the statistical procedures used. A summary of the results conclude this chapter and a discussion of the findings presented in chapter 5.

Review of the Data Collection Methodology

The data used in this study was collected by the target institution in the summer prior to students entering the institution in the fall semester but after being officially admitted to the university. The study included entering transfer students from the fall 2006, fall 2007, and fall 2008 academic terms. All entering transfer students were required to complete the Transfer Student Survey (TSS) before they were allowed to register for courses in subsequent terms. Transfer students who were admitted to the institution received an email invitation and instructions on how to access and complete the assessment online. Responses to the online assessment were collected and scored using the Inquisite (Catapult Systems, 2000) software. Responses to the TSS were analyzed by the target institution to calculate TSS Indices. The TSS Indices were

collected by the target institution's IRA office which also provided the demographic and cognitive variables from the institution's student information system (SIS).

Population

This study focused on first-semester transfer students at a large Carnegie Doctoral Research University with High Research Activity who entered in the fall 2006, 2007, and 2008 academic terms and most resembled the characteristics of the traditional native student population. Limiting the population to those who attended at the main campus, not affiliated with the military, only transferred once, and under the age of 30 resulted in a total population for the study of 1,715. Of these students, 23.91% encountered academic difficulty by the end of the fall term in which they initially enrolled, and 18.72% did not persist to the next fall term. Summary statistics of academic performance by academic level and persistence (attrition) are shown in Tables 1 and 2 respectively.

Table 1

Academic Difficulty Rates (%) by Level and Transfer Type

Category	Vertical Transfer Students			Horizontal Transfer Students		
	N	*n*	*%*	*N*	*n*	*%*
First-Year	143	53	37.06	166	47	28.31
Sophomore	469	149	31.77	306	60	19.61
Upper Division	554	89	16.06	77	12	15.58

Table 2

Attrition Rates (%) by Level and Transfer Type

Category	Vertical Transfer Students			Horizontal Transfer Students		
	N	*n*	%	*N*	*n*	%
First-Year	143	42	29.37	166	35	21.08
Sophomore	469	95	20.26	306	58	18.95
Upper Division	554	78	14.08	77	13	16.88

Population Demographics

  The total sample for this study included 1,715 transfer students. The age range of the population was limited to those 18 to 29, but the mean age of the sample population was 21. Summary statistics of selected demographics for the overall population and the subpopulations are presented in Tables 3 through 5.

Table 3

Age by Level and Transfer Type

Category	*n*	Vertical Transfer Students (*n* = 1166)			Horizontal Transfer Students (*n* = 549)		
		Range	*M*	*SD*	Range	*M*	*SD*
First-Year	309	18 - 26	19.99	1.58	18 – 28	19.54	1.29
Sophomore	775	18 – 29	21.23	2.00	18 – 29	19.94	1.47
Upper Division	631	18 – 29	22.56	2.42	19 – 29	21.81	2.19

Table 4

Gender by Level and Transfer Type

Category	First-Year		Sophomore		Upper Division	
	n	*%*	*n*	*%*	*n*	*%*
Vertical Transfer Students						
Male	67	46.85	203	43.28	217	39.17
Female	76	53.15	266	56.72	337	60.83
Horizontal Transfer Students						
Male	84	50.60	124	40.52	24	31.17
Female	82	49.40	182	59.48	53	78.48

Table 5

Ethnicity by Level and Transfer Type

Category	First-Year		Sophomore		Upper Division	
	n	*%*	*n*	*%*	*n*	*%*
Vertical Transfer Students						
Black	35	24.48	85	18.12	83	14.98
White	88	61.54	291	62.05	364	65.70
Other	20	13.99	93	19.83	107	19.32
Horizontal Transfer Students						
Black	56	33.74	111	36.28	16	20.78
White	85	51.20	161	52.61	48	62.34
Other	25	15.06	34	11.11	13	16.88

Variables

This study included noncognitive, cognitive, and demographic variables. The noncognitive variables, the TSS Indices, were calculated based on the percentage of transfer students overall and by each subpopulation who encountered academic difficulty and their responses to the questions on the TSS. A response on the TSS increased the TSS Index if a disproportionate number of students who encountered academic difficulty by the end of their first semester responded with a specific answer to an item. The cognitive variables included transfer GPA and the first semester cumulative GPA at the target institution. The transfer GPA was calculated by the IRA office at the target institution by taking the number of credits taken at the previous institution, multiplying that value by the standard grade value to get a total number of grade points. The transfer grade points total was then divided by the total number of transfer credits to determine the transfer GPA. The first semester cumulative GPA was retrieved from the target institution's SIS. Demographic variables included number of transfer credits accepted by the target institution, age, gender, and ethnicity. The percentage of transfer credits accepted was determined by summing the total number of transfer credits awarded by the target institution and dividing that number by the total number of credits passed at the previous institution. Gender (male or not male) and ethnicity (Black, White, and Not Black or White) were coded as dummy variables. Academic performance and persistence, criterion variables, were set up as dichotomous variables. Academic difficulty was analyzed to evaluate performance. Academic difficulty was defined as a GPA below 2.0 at the end of the first term at the target institution. Persistence was

evaluated as attrition which was defined as not enrolling the subsequent fall term at the target institution.

<div align="center">Research Questions and Hypotheses</div>

This study was guided by four research questions. The first two questions examined the ability of noncognitive, cognitive, and demographic variables to predict academic difficulty. Questions 3 and 4 examined the use of noncognitive, cognitive, and demographic variables as predictors of persistence to the next academic year. The data were analyzed separately for each cohort (first-year, sophomore, upper division) for each research question. The research questions are presented below along with the statistics used to test each question.

<div align="center">*Research Question 1*</div>

To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution?

This research question suggested a relationship between noncognitive, cognitive, and demographic variables and academic difficulty. Based on previous research by Duggan and Pickering (2008), three TSS Indices (first-year, sophomore, and upper-division) were calculated by the target institution and subsequently used in the analysis. Basic descriptive statistical measures are included in Table 6 for the vertical transfer student population.

Table 6

TSS Index: Basic Statistical Measures for Vertical Transfer Students

Level	*n*	*M*	*SD*	Mode	Range	Minimum	Maximum
First-Year	143	16.00	7.71	8	33	3	36
Sophomore	469	15.32	4.57	15	29	2	31
Upper Division	554	18.68	6.82	18	41	2	43

Because there were three different TSS Indices, which were based on academic level, and the criterion variable in this study was dichotomous (student in academic difficulty or not), three simultaneous logistic regressions were used to model students academic performance. The predictor variables in this study were gender, ethnicity, age, transfer GPA, percentage of transfer credits accepted, and TSS Index. Gender and ethnicity were dummy coded.

First-Year Vertical Transfer Students

Results of the logistic regression analysis for the first-year vertical transfer students indicated that the seven-predictor model provided a statistically significant improvement over the constant-only model, $\chi^2 (7, n = 143) = 52.15, p < .001$. The Hosmer and Lemeshow goodness-of-fit test was non-significant $\chi^2 (8, n = 143) = 9.27, p = .32$, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 41.7% of the total variance.

This suggests that the set of predictors discriminates between those students who encountered academic difficulty (GPA below 2.0) and those who were academically successful (GPA of 2.0 or higher). Prediction success for the cases used in the development of the model was moderately high, with an overall prediction success rate of 76.2% and correct prediction rate of 60.4% for students who encountered academic difficulty. Table 7 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that two predictors (TSS Index and transfer GPA) were statistically significant predictors of academic difficulty. For each single point increase in the TSS Index, there was a 1.16 times greater likelihood of encountering academic difficulty, controlling for the other predictor variables. Odds of a transfer student encountering academic difficulty were reduced by .164 for each single unit increase in transfer GPA. An odds ratio below 1 can also be calculated as an inverted odds ratio to analyze the impact in the other direction. In this case, calculating the reciprocal of the odds ratio ([*Exp(B)*] = .164) created an inverted odds ratio that indicated for each single point increase in TSS Index there was a 6.10 times increased likelihood that a student would not encounter academic difficulty, controlling for the other predictor variables. The sample size of the vertical first-year transfer students (*n* = 143), and the number of predictor variables used in the model may have affected the validity of this model because logistic regression analysis uses maximum likelihood estimations, which require large sample sizes. Large parameter estimates and standard errors may occur when combinations of variables result in too many outcomes with no cases (Tabachnick & Fidell, 2001). Researchers recommend

between 10 (Hosmer & Lemeshow, 1989) and 30 (Pedhazur, 1997) cases for each

predictor variable in a logistic regression model.

Table 7

Summary of Logistical Regression Analysis for Predicting Academic Difficulty in First-Year Vertical Transfer Students (n = 143)

Variable	B	Wald	df	Exp(B)	p
Age	-.23	2.36	1	.79	.124
Male	.03	.01	1	1.03	.944
Black	.57	.59	1	1.77	.444
White	.92	1.90	1	2.51	.168
TSS Index	.15	19.74*	1	1.16	.000
Transfer GPA	-1.81	12.66*	1	.16	.000
Transfer Credits %	-.51	.20	1	.60	.655

*Note: * p < .05.*

Sophomore Vertical Transfer Students

Results of the logistic regression analysis for the sophomore vertical transfer students indicated that the seven-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (7, n = 469) = 81.94, p < .001. However, the Hosmer and Lemeshow goodness-of-fit test was significant χ^2 (8, n = 469) = 17.84, p = .02, indicating the model was not good and rejected the null hypothesis that the observed and expected values were the same. Because the Hosmer and Lemeshow goodness-of-fit test was significant in the full model, a reduced model was analyzed. A backward stepwise logistic regression resulted in four steps removing all predictor variables except the TSS Index, transfer GPA, and percentage of transfer credits accepted. The last step in the analysis indicated the three-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (3, n = 469) = 79.60, p < .001. The Hosmer and Lemeshow goodness-of-fit test on the reduced model was non-significant χ^2 (8, n = 469) = 9.64, p = .291, indicating the model was good and failed to reject the null hypothesis that the observed and expected values were the same. The Nagelkerke pseudo R^2 indicated that the model accounted for 21.9% of the total variance. This suggests that the set of predictors discriminated between those students who encountered academic difficulty and those who were academically successful. The overall prediction success for the cases used in the development of the reduced model was 69.9% and 31.5% for correct predictions of academic difficulty. Table 8 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that two predictors (TSS Index and transfer GPA) were statistically significant predictors of academic difficulty. For each

single point increase in the TSS Index, there was a 1.14 times greater likelihood of encountering academic difficulty, controlling for the other predictor variables. Inverting the odds ratio for transfer GPA revealed that a single point increase in the transfer GPA resulted in a 5.88 times increased likelihood that a student will not encounter academic difficulty, controlling for the other predictor variables.

Table 8

Summary of the Reduced Model Logistical Regression Analysis for Predicting Academic Difficulty in Sophomore Vertical Transfer Students (n = 469)

Variable	B	Wald	df	Exp(B)	p
TSS Index	.13	24.55*	1	1.14	.000
Transfer GPA	-1.76	26.97*	1	.17	.000
Transfer Credits %	2.32	3.01	1	10.18	.083

*Note: * p < .05.*

Upper Division Vertical Transfer Students

Results of the logistic regression analysis for the upper division vertical transfer students indicated that the seven-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (7, n = 554) = 75.54, p < .001. The Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, n = 554) = 6.40, p = .60, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 21.8% of the total variance. This suggests that the set of predictors discriminated between those students who encountered academic difficulty and those who were academically successful. Prediction success for the cases used in the development of the model was moderately high for the overall prediction success (84.3%), but only 10.1% correct prediction rate for students who encountered academic difficulty. Table 9 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that three predictors (TSS Index, transfer GPA, and age) were statistically significant predictors of academic difficulty. For each single point increase in the TSS Index, there was a 1.10 times greater likelihood of encountering academic difficulty, controlling for the other predictor variables. Inverting the odds ratio of transfer GPA indicated a five times increased likelihood that the student would not encounter academic difficulty, controlling for the other predictor variables. Inverting the odds ratio for age revealed that for each single point increase in student age there was a 1.20 times increased likelihood that the student will not encounter academic difficulty, controlling for the other predictor variables.

Table 9

Summary of Logistical Regression Analysis for Predicting Academic Difficulty in Upper Division Vertical Transfer Students (n = 554)

Variable	B	Wald	df	Exp(B)	p
Age	-.18	8.10*	1	.83	.004
Male	-.28	1.12	1	.76	.758
Black	.49	1.42	1	1.64	.234
White	.02	.003	1	1.02	.959
TSS Index	.10	23.83*	1	1.10	.000
Transfer GPA	-1.62	18.15*	1	.20	.000
Transfer Credits %	-.63	6.16	1	.53	.725

*Note: * p < .05.*

Research Question 2

To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution?

This research question suggested a relationship between noncognitive, cognitive, and demographic variables, and academic difficulty among horizontal transfer students at various academic progress levels. Based on previous research by Duggan and Pickering (2008), three TSS Indices were used in the analysis (first-year, sophomore, and upper-

division). Basic descriptive statistical measures are included in Table 10 for the

horizontal transfer student population.

Because there are three different TSS Indices, which are based on academic level,

and the criterion variable in this study is dichotomous (student in academic difficulty or

not), three logistic regressions were used to model students academic performance. The

predictor variables in this study were gender, ethnicity, age, transfer GPA, percentage of

transfer credits accepted, and TSS Index. Gender and ethnicity were dummy coded.

Table 10

TSS Index: Basic Statistical Measures for Horizontal Transfer Students

Level	n	M	SD	Mode	Range	Minimum	Maximum
First-Year	166	15.98	7.12	17	31	3	34
Sophomore	306	14.31	4.34	15	24	3	27
Upper Division	77	16.84	5.90	10*	27	6	33

*Note: * Multiple modes exist. The smallest value is shown.*

First-Year Horizontal Transfer Students

   Results of the logistic regression analysis for the first-year horizontal transfer

students indicated that the seven-predictor model provided a statistically significant

improvement over the constant-only model, χ^2 (7, n = 166) = 21.50, p = .003. The

Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, n = 166) = 7.69, p

= .464, indicating the model was good and failed to reject the null hypothesis. The

Nagelkerke pseudo R^2 indicated that the model accounted for 17.4% of the total variance.

This suggests that the set of predictors discriminated between those students who

encountered academic difficulty and those who were academically successful. Prediction

of academic performance for the cases used in the development of the model was

moderately low, with an overall prediction success rate of 73.5% and correct prediction

rate of 23.4% for academic difficulty. Table 11 presents the regression coefficients (B),

the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The

Wald test reported that two predictors (TSS Index and transfer GPA) were statistically

significant predictors of academic difficulty. For each single point increase in the TSS

Index, there was a 1.09 times greater likelihood of encountering academic difficulty,

controlling for the other predictor variables. Inverting the odds ratio for transfer GPA

revealed that a single point increase in the transfer GPA increased the odds that a student

will not encounter academic difficulty by a multiplicative factor of 2.33, controlling for

the other predictor variables. The sample size of the horizontal first-year transfer students

(n = 166), and the number of predictor variables used in the model may have affected the

validity of this model.

Table 11

Summary of Logistical Regression Analysis for Predicting Academic Difficulty in First-Year Horizontal Transfer Students (n = 166)

Variable	B	Wald	df	Exp(B)	p
Age	.10	.50	1	1.11	.478
Male	.25	.44	1	1.28	.508
Black	.53	.81	1	1.70	.369
White	-.24	.18	1	.78	.669
TSS Index	.08	8.84*	1	1.09	.003
Transfer GPA	-.84	4.17*	1	.43	.041
Transfer Credits %	1.32	.95	1	.03	.331

*Note: * p < .05.*

Sophomore Horizontal Transfer Students

Results of the logistic regression analysis for the sophomore horizontal transfer students indicated that the seven-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (7, n = 306) = 81.29, p < .001. The Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, n = 306) = 4.49, p = .811, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 37.1% of the total variance. This suggests that the set of predictors discriminated between those students who encountered academic difficulty and those who were academically successful. The

overall prediction rate of academic performance for the cases used in the development of
the model was 83.3% and correct prediction rate of 36.7% for academic difficulty. Table
12 presents the regression coefficients (B), the Wald statistics, significance level, and the
odds ratio [Exp(B)] for each predictor. The Wald test reported that two predictors (TSS
Index and ethnicity: white) were statistically significant predictors of academic difficulty.
For each single point increase in the TSS Index, there was a 1.30 times greater likelihood
of encountering academic difficulty, controlling for the other predictor variables. Inverted
odds ratios for the dummy coded ethnicity predictor variables indicated that the odds of
non-black/non-white sophomore level horizontal transfer students encountering academic
difficulty was 3.70 times higher than white sophomore level horizontal transfer students,
when controlling for the other predictor variables.

Table 12

*Summary of Logistical Regression Analysis for Predicting Academic Difficulty in
Sophomore Horizontal Transfer Students (n = 306)*

Variable	B	Wald	df	Exp(B)	p
Age	.04	.07	1	1.04	.797
Male	.61	3.14	1	1.84	.076
Black	.13	.06	1	1.14	.804
White	-1.32	5.81*	1	.27	.016
TSS Index	.26	26.78*	1	1.30	.000
Transfer GPA	-.59	1.54	1	.55	.215
Transfer Credits %	-1.89	.91	1	.15	.339

*Note: * p < .05.*

Upper Division Horizontal Transfer Students

Results of the logistic regression analysis for the upper division horizontal transfer students indicated that the seven-predictor model provided a statistically significant improvement over the constant-only model, $\chi^2 (7, n = 77) = 21.32, p = .003$. The Hosmer and Lemeshow goodness-of-fit test was non-significant $\chi^2 (8, n = 77) = 4.41, p = .818$, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 41.8% of the total variance. This suggests that the set of predictors discriminated between those students who encountered academic difficulty and those who were academically successful. The overall prediction rate of academic performance for the cases used in the development of the model was 87.0% and correct prediction rate of 33.3% for academic difficulty. Table 13 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that TSS Index was a statistically significant predictor of academic difficulty. For each single point increase in the TSS Index, there was a 1.40 times greater likelihood of encountering academic difficulty, controlling for the other predictor variables. The sample size of the upper division horizontal transfer students ($n = 77$), and the number of predictor variables used in the model may have affected the validity of this model.

Table 13

Summary of Logistical Regression Analysis for Predicting Academic Difficulty in Upper Division Horizontal Transfer Students (n = 77)

Variable	B	Wald	df	Exp(B)	p
Age	-.30	.76	1	.74	.385
Male	.16	.03	1	1.18	.858
Black	.53	.14	1	1.70	.712
White	.47	.14	1	1.59	.710
TSS Index	.34	8.07*	1	1.40	.005
Transfer GPA	.46	.20	1	1.58	.659
Transfer Credits %	5.71	.45	1	303.06	.459

*Note: * p < .05.*

Research Question 3

To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persists to the next academic year at the target institution?

This research question suggested a relationship between noncognitive, cognitive, and demographic variables, and persistence to the next academic year among vertical transfer students at various academic progress levels. Based on previous research by

Duggan and Pickering (2008), three TSS Indices were used in the analysis (first-year,

sophomore, and upper-division). Refer to Table 6 for basic descriptive statistical

measures for the vertical transfer student population.

Because there are three different TSS Indices, which are based on academic level,

and the criterion variable in this study is dichotomous (student persists or not), three

logistic regressions were used to model student attrition. The predictor variables in this

study were gender, ethnicity, age, transfer GPA, percentage of transfer credits accepted,

TSS Index, and first semester cumulative GPA at the target institution. Gender and

ethnicity were dummy coded.

First-Year Vertical Transfer Students

Results of the logistic regression analysis for the first-year vertical transfer

students indicated that the eight-predictor model provided a statistically significant

improvement over the constant-only model, χ^2 (8, $n = 143) = 33.58$, $p < .000$. The

Hosmer and Lemeshow goodness-of-fit test was significant χ^2 (8, $n = 143) = 17.83$, $p =$

.023, indicating the model was not good and rejected the null hypothesis. Because the

Hosmer and Lemeshow goodness-of-fit test was significant in the full model, a reduced

model was analyzed. A backward stepwise logistic regression resulted in six steps

removing all predictor variables except the percentage of transfer credits accepted and

first semester cumulative GPA. The last step in the analysis indicated the two-predictor

model provided a statistically significant improvement over the constant-only model, χ^2

(2, $n = 143) = 28.86$, $p < .001$. The Hosmer and Lemeshow goodness-of-fit test on the

reduced model was non-significant χ^2 (8, $n = 143) = 5.68$, $p = .683$, indicating the model

was good and failed to reject the null hypothesis that the observed and expected values

were the same. The Nagelkerke pseudo R^2 indicated that the model accounted for 26% of the total variance. This suggests that the set of predictors discriminated between those students who did not persist and those who persisted. Overall prediction success for the cases used in the development of the reduced model was 77.6% and correct prediction rate of 42.9% for attrition. Table 14 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that both predictors in the reduced model (percentage of transfer credits accepted and first semester cumulative GPA) were statistically significant predictors of attrition. Inverting the odds ratio for the percentage of transfer credits accepted revealed that for each one point increase in percentage of transfer credits accepted there was a 8.77 times decreased likelihood of attrition when controlling for first semester cumulative GPA. Inverting the odds ratio for first semester cumulative GPA revealed that for a single point increase in the first semester cumulative GPA there was a 2.80 times decreased likelihood of attrition, controlling for percentage of transfer credits accepted.

Table 14

Summary of the Reduced Model Logistical Regression Analysis for Predicting Attrition in First-Year Vertical Transfer Students (n = 143)

Variable	B	Wald	df	Exp(B)	p
Semester GPA	-1.03	18.65*	1	.36	.000
Transfer Credits %	-2.17	3.91*	1	.11	.048

*Note: * p < .05.*

Sophomore Vertical Transfer Students

Results of the logistic regression analysis for the sophomore vertical transfer students indicated that the eight-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (8, n = 469) = 64.28, p < .000. The Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, n = 469) = 13.50, p = .096, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 20.2% of the total variance. This suggests that the set of predictors discriminated between those students who persisted and those who did not persist. The overall prediction rate of persistence for the cases used in the development of the model was 80.4% and correct prediction rate of 18.9% for attrition. Table 15 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that first semester cumulative GPA was a statistically significant predictor of persistence. Inverting the odds ratio of first semester cumulative GPA revealed that a single point increase in the first semester cumulative GPA increased the odds that the student will persist by a multiplicative factor of 2.70, when controlling for the other predictor variables.

Table 15

Summary of Logistical Regression Analysis for Predicting Attrition in Sophomore Vertical Transfer Students (n = 469)

Variable	B	Wald	df	Exp(B)	p
Age	-.02	.07	1	.98	.791
Male	-.28	1.18	1	.76	.278
Black	-.03	.00	1	.97	.953
White	.48	1.92	1	1.62	.166
Semester GPA	-.99	47.31*	1	.37	.000
TSS Index	-.02	.57	1	.98	.450
Transfer GPA	.38	.98	1	1.46	.323
Transfer Credits %	-.76	.24	1	.47	.623

Note: * p < .05.

Upper Division Vertical Transfer Students

Results of the logistic regression analysis for the upper-division vertical transfer students indicated that the eight-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (8, n = 554) = 47.86, p < .000. The Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, n = 554) = 9.43, p = .308, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 14.9% of the total variance. This suggests that the set of predictors discriminated between those students who persisted and those who did not persist. The overall prediction rate of persistence for the

cases used in the development of the model was 85.9% and correct prediction rate of

7.7% for attrition. Table 16 presents the regression coefficients (B), the Wald statistics,

significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported

that first semester cumulative GPA was a statistically significant predictor of attrition.

The inverted odds ratio for first semester cumulative GPA revealed that a single point

increase in the first semester cumulative GPA increased the odds of persistence by a

multiplicative factor of 2.22, when controlling for the other predictor variables.

Table 16

Summary of Logistical Regression Analysis for Predicting Attrition in Upper-Division Vertical Transfer Students (n = 554)

Variable	B	Wald	df	Exp(B)	p
Age	.10	3.67	1	1.11	.055
Male	-.18	.46	1	.83	.500
Black	-.46	.95	1	.63	.33
White	.26	.59	1	1.30	.443
Semester GPA	-.80	28.31*	1	.45	.000
TSS Index	.03	1.80	1	1.03	.180
Transfer GPA	.25	.43	1	1.29	.512
Transfer Credits %	-1.34	.46	1	.26	.496

*Note: * p < .05.*

Research Question 4

To what extent is there a significant relationship between the predictor variables of TSS

Index, percentage of transfer credits accepted by the target institution, transfer GPA, first

semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or

not a horizontal transfer student at a defined academic progress level (first-year,

sophomore, or upper-division) persists to the next academic year at the target

institution?

This research question suggested a relationship between noncognitive, cognitive,

and demographic variables, and persistence to the next academic year among horizontal

transfer students at various academic progress levels. Based on previous research by

Duggan and Pickering (2008), three TSS Indices were used in the analysis (first-year,

sophomore, and upper-division). Table 10 presents the basic descriptive statistical

measures for the horizontal transfer student population.

Because there are three different TSS Indices, which are based on academic level,

and the criterion variable in this study was dichotomous (student persists or not), three

logistic regressions were used to model students persistence. The predictor variables in

this study were gender, ethnicity, age, transfer GPA, percentage of transfer credits

accepted, TSS Index, and first semester cumulative GPA at the target institution. Gender

and ethnicity were dummy coded.

First-Year Horizontal Transfer Students

Results of the logistic regression analysis for the first-year horizontal transfer

students indicated that the eight-predictor model provided a statistically significant

improvement over the constant-only model, χ^2 (8, $n = 166$) = 19.96, $p = .011$. The

Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, n = 166) = 10.33, p

= .243, indicating the model was good and failed to reject the null hypothesis. The

Nagelkerke pseudo R^2 indicated that the model accounted for 17.6% of the total variance.

This suggests that the set of predictors discriminated between those students who

persisted and those who did not persist. The overall prediction rate of persistence for the

cases used in the development of the model was 80.1% and correct prediction rate of

20.0% for attrition. Table 17 presents the regression coefficients (B), the Wald statistics,

significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported

that two predictors (first semester cumulative GPA and gender) were statistically

significant predictors of persistence. The inverted odds ratio for first semester cumulative

GPA revealed that for each single point increase in the first semester cumulative GPA,

there was a 2.17 times greater likelihood of persistence, controlling for the other predictor

variables. The inverted odds ratio for the dummy coded gender predictor variable

revealed that odds of attrition for females were 3.57 times higher than for males. The

sample size of the horizontal first-year transfer students (n = 166), and the number of

predictor variables used in the model may have affected the validity of this model.

Table 17

Summary of Logistical Regression Analysis for Predicting Attrition in First-Year Horizontal Transfer Students (n = 166)

Variable	B	Wald	df	Exp(B)	p
Age	-.05	.06	1	.96	.808
Male	-1.27	8.13*	1	.28	.004
Black	.02	.00	1	1.02	.970
White	.03	.00	1	1.03	.964
Semester GPA	-.78	10.09*	1	.46	.001
TSS Index	-.02	.50	1	.98	.482
Transfer GPA	-.00	.00	1	1.00	.996
Transfer Credits %	.97	.32	1	2.64	.573

*Note: * p < .05.*

Sophomore Horizontal Transfer Students

Results of the logistic regression analysis for the sophomore horizontal transfer students indicated that the eight-predictor model provided a statistically significant improvement over the constant-only model, χ^2 (8, $n = 306$) = 33.92, $p < .000$. The Hosmer and Lemeshow goodness-of-fit test was non-significant χ^2 (8, $n = 306$) = 4.82, $p = .777$, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 16.9% of the total variance. This suggests that the set of predictors discriminated between those students who persisted and those who did not persist. The overall prediction rate of persistence for the

cases used in the development of the model was 82.4% with a correct prediction rate of

15.5% for attrition. Table 18 presents the regression coefficients (B), the Wald statistics,

significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported

that three predictor variables (first semester cumulative GPA, age, and TSS Index) were

statistically significant predictors of attrition. The inverted odds ratio for first semester

cumulative GPA revealed that a single unit increase in first semester cumulative GPA

increases the odds of persistence by a multiplicative factor of 1.85, when controlling for

the other predictor variables. For every one year increase in age there was a 1.31 times

increased likelihood of attrition, controlling for the other predictors. A single unit

increase in the TSS Index indicated a 1.10 times increased likelihood of attrition,

controlling for all other predictors.

Table 18

Summary of Logistical Regression Analysis for Predicting Attrition in Sophomore Horizontal Transfer Students (n = 306)

Variable	B	Wald	df	Exp(B)	p
Age	.27	6.70*	1	1.31	.010
Male	.08	.07	1	1.09	.796
Black	-.55	1.08	1	.58	.298
White	-.21	.19	1	.81	.666
Semester GPA	-.62	11.69*	1	.54	.001
TSS Index	.10	4.95*	1	1.10	.026
Transfer GPA	.39	.90	1	1.48	.344
Transfer Credits %	-.30	.03	1	.74	.866

*Note: * p < .05.*

Upper-Division Horizontal Transfer Students

Results of the logistic regression analysis for the upper-division horizontal transfer students indicated that the eight-predictor model provided a statistically significant improvement over the constant-only model, $\chi^2 (8, n = 77) = 25.38, p = .001$. The Hosmer and Lemeshow goodness-of-fit test was non-significant $\chi^2 (8, n = 77) = 6.20, p = .624$, indicating the model was good and failed to reject the null hypothesis. The Nagelkerke pseudo R^2 indicated that the model accounted for 47.1% of the total variance. This suggests that the set of predictors discriminated between those students who persisted and those who did not persist. The overall prediction rate of persistence for the

cases used in the development of the model was 89.6% with a correct prediction rate of 46.2% for attrition. Table 19 presents the regression coefficients (B), the Wald statistics, significance level, and the odds ratio [Exp(B)] for each predictor. The Wald test reported that two predictor variables (first semester cumulative GPA and age) were statistically significant predictors of attrition. The inverted odds ratio of first semester cumulative GPA revealed that a single point increase in the first semester cumulative GPA increased the likelihood of persistence by a multiplicative factor of 4.17, when controlling for the other predictor variables. For every one year increase in age there was a 1.18 times increased likelihood of attrition, controlling for the other predictor variables. The sample size of the upper-division horizontal transfer students ($n = 77$), and the number of predictor variables used in the model may have affected the validity of this model.

Table 19

Summary of Logistical Regression Analysis for Predicting Attrition in Upper-Division Horizontal Transfer Students (n = 77)

Variable	B	Wald	df	Exp(B)	P
Age	.37	4.11*	1	1.45	.043
Male	.16	.04	1	1.18	.843
Black	18.80	.00	1	1E+008	.999
White	19.68	.00	1	4E+008	.998
Semester GPA	-1.43	7.34*	1	.24	.007
TSS Index	.06	.48	1	1.06	.490
Transfer GPA	1.82	2.71	1	6.19	.100
Transfer Credits %	4.12	.60	1	61.64	.439

*Note: * p < .05.*

Summary

This chapter reported the findings from the analysis of the data used to answer the research questions in this study. Among each transfer student subpopulation included in this study there was a significant relationship between the predictor variable TSS Index and whether or not a student encountered academic difficulty. There was also a significant relationship between the predictor variable first semester cumulative GPA and whether or not a student persisted to the next academic year. Statistically significant relationships between the other predictor variables and academic difficulty or persistence varied among the different types and levels of transfer students. The analysis supports a

conclusion that transfer students are a heterogeneous population that can be segmented based on their transfer pattern (horizontal or vertical) and according to the number of transfer credits accepted by the transfer institution, which was used to determine academic level (first-year, sophomore, and upper-division). A discussion of the findings along with conclusions, implications, and recommendations for future research are presented in Chapter V.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Chapter I provided the background information for this study, including the

problem statement, significance, purpose, research questions, and limitations. Chapter II

presented the relevant literature and research related to the evolving transfer student

population, trends and profiles of transfer students, barriers to transfer student success,

and reviews of research on student adjustment, persistence, and other noncognitive

studies. Chapter III detailed the design of the study including the methods and procedures

for collecting and statistically analyzing the data. Chapter IV detailed the results of the

data analysis. This chapter discusses the findings of the study, including conclusions,

limitations, and recommendations for future research.

Summary of the Study

This study explored cognitive and noncognitive barriers to persistence and

academic performance of transfer students based on their academic level (first-year,

sophomore, and upper division) and transfer type (horizontal and vertical). It focused on

transfer students who most resembled the traditional college student, defined as students

who were enrolled at the main campus of the target institution and were not military

students, international students, or over the age of 29. The transfer student population was

also limited to vertical and horizontal transfers. Transfer students who transferred

multiple times or among multiple institutions were not included.

The study sought to answer the following research questions:

1. To what extent is there a significant relationship between the predictor variables of

    TSS Index, percentage of transfer credits accepted by the target institution, transfer

GPA, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution?

2. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) placed in academic difficulty at the end of their first semester at the target institution?

3. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a vertical transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persists to the next academic year at the target institution?

4. To what extent is there a significant relationship between the predictor variables of TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, ethnicity, and whether or not a horizontal transfer student at a defined academic progress level (first-year, sophomore, or upper-division) persists to the next academic year at the target institution?

The data used to investigate the research questions were gathered by the target institution for all incoming transfer students beginning in summer 2006 for the fall 2006 cohort. The target institution collects pre-transfer characteristics of transfer students using

the TSS. TSS Indices are then calculated by the Office of Institutional Research and Assessment (IRA) for each transfer student. The population of transfer students investigated in this study included transfer students who enrolled at the target institution in the fall 2006, fall 2007, and fall 2008. Demographic and cognitive data were gathered and provided by the institution's IRA office from the institution's SIS.

<div align="center">Summary of the Results</div>

Logistic regression was used to investigate the research questions and determine if noncognitive, cognitive, and demographic variables were good predictors of academic performance and persistence of transfer students when considering transfer background and academic level. Results were considered significant at the $p = 0.05$ level.

<div align="center">*Academic Difficulty*</div>

The purpose of the first two research questions was to investigate whether TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, age, gender, and ethnicity can predict academic difficulty. A summary of the findings for logistic regression model for academic difficulty is presented in Table 20. The significant predictors of academic difficulty grouped by academic level and transfer type are summarized in Table 21.

Table 20

Summary of R^2 and Prediction Success Rates (%) for Academic Difficulty

Logistic Regression Models

			Prediction Success (%)	
Subpopulations	*n*	R^2	Overall	Academic Difficulty
Vertical Transfers				
First-Year	143	.417	76.20	60.40
Sophomore	469	.219	69.90	31.50
Upper Division	554	.218	84.30	10.10
Horizontal Transfers				
First-Year	166	.174	73.50	23.40
Sophomore	306	.371	83.30	36.70
Upper Division	77	.418	87.00	33.30

Note: The logistic regression analysis for sophomore vertical transfer

students was significant but not a good fit. A reduced model analysis

resulted in a model that was significant and a good fit.

Table 21

Summary of Significant Predictors of Academic Difficulty

Variables	*Wald*	*p*	*Exp(B)*
First-year Vertical Transfer Students (n= 143)			
TSS Index	19.74	.000	1.16
Transfer GPA	12.66	.000	.16
First-year Horizontal Transfer Students (n=166)			
TSS Index	8.84	.003	1.09
Transfer GPA	4.17	.041	.43
Sophomore Vertical Transfer Students (n=469)			
TSS Index	24.55	.000	1.14
Transfer GPA	26.97	.000	.17
Sophomore Horizontal Transfer Students (n=306)			
White	5.81	.016	.27
TSS Index	26.78	.000	1.30
Upper-Division Vertical Transfer Students (n=554)			
Age	8.10	.004	.83
TSS Index	23.83	.000	1.10
Transfer GPA	18.15	.000	.20
Upper-division Horizontal Transfer Studnets (n=77)			
TSS Index	8.07	.005	1.40

First-Year Vertical Transfer Students

Results of the logistic regression analysis for the first-year vertical transfer students indicated a statistically significant relationship between the predictor variables of TSS Index and transfer GPA and whether or not a student encountered academic difficulty at the end of the first semester at the target institution. No statistically significant relationship was identified for age, ethnicity, gender, or percentage of transfer credits accepted. However, the full model with all predictor variables was a significant predictor of academic difficulty and correctly predicted academic difficulty in 60.4% of the cases. The R^2 value also indicated that the model accounted for 41.7% of the total variance. However, the size of the subpopulation ($n = 143$) in comparison to the number of predictor variables may have affected the validity of this model.

The key elements of logistic regression are the significant predictors and the log-odds units (B). The log-odds units are difficult to interpret without converting them into estimated odds ratios, Exp(B). The odds ratio estimates reveal the relationship between the predictor and criterion variables. For first-year vertical transfer students, a single unit increase in TSS Index increased the likelihood of experiencing academic difficulty by a factor of 1.16 (or 16%). Similarly, a single unit increase in transfer GPA reduced the likelihood of experiencing academic difficulty by a factor of .16. Another way of reviewing odds ratios below 1 is to calculate an inverted odds ratio to analyze the impact in the other direction, meaning the likelihood of experiencing academic success is 6.25 times greater for each single unit increase in transfer GPA. Therefore, first-year vertical

transfer students with high transfer GPAs and low TSS indexes are less likely to place in academic difficulty at the end of the first semester at the target institution.

First-Year Horizontal Transfer Students

Results of the logistic regression analysis for the first-year horizontal transfer students indicated a statistically significant relationship between the predictor variables of TSS Index and transfer GPA and whether or not a student encountered academic difficulty at the end of the first semester at the target institution. No statistically significant relationship was identified for age, ethnicity, gender, or percentage of transfer credits accepted. The model used was a significant predictor of academic difficulty and correctly predicted academic difficulty in 23.4% of the cases. Although the successful prediction rate is low, it is an improvement over the constant only model with no predictors. The R^2 value indicated that the model accounted for 17.4% of the total variance. However, the size of the subpopulation ($n = 166$) in comparison to the number of predictor variables may have affected the validity of this model.

The odds ratios for TSS Index and transfer GPA for first-year horizontal transfer students revealed slightly less impact per unit of change on academic performance as compared to first-year vertical transfer students. First-year horizontal transfer students were 1.09 times (or 9%) more likely to experience academic difficulty for each single unit increase in TSS Index. Additionally, a single unit increase in transfer GPA reduced the likelihood of placing in academic difficulty by a factor of .43. In summary, the odds of first-year horizontal transfer students achieving academic success improves for students with a higher transfer GPA and a lower TSS Index, as might be expected.

Sophomore Vertical Transfer Students

Results of the logistic regression analysis for the sophomore vertical transfer students indicated a statistically significant relationship between the predictor variables of TSS Index and transfer GPA and whether or not a student encountered academic difficulty at the end of the first semester at the target institution. No statistically significant relationship was identified for age, ethnicity, gender, or percentage of transfer credits accepted. However, the null hypothesis that the observed and expected values were the same was rejected, so the model was not a good fit. A follow-up backwards stepwise logistic regression resulted in a reduced model that was significant and a good fit. The reduced model indicated a statistically significant relationship between the predictor variables of TSS Index and transfer GPA and whether or not a student encountered academic difficulty. It correctly predicted 31.5% of the students who encountered academic difficulty and accounted for 21.9% of the total variance.

The estimated odds ratios for TSS Index and transfer GPA for sophomore vertical transfer students were very similar to the odds ratios for first-year vertical transfer students. Each single point increase in TSS Index increased the likelihood of a sophomore vertical transfer student experiencing academic difficulty by a factor of 1.14 (14%). The odds of one of these students being academically successful improved by 5.88 for every single unit increase in transfer GPA. Therefore, the odds a sophomore vertical transfer student will experience academic success improves for every single point increase in transfer GPA and decrease in TSS Index.

Sophomore Horizontal Transfer Students

Results of the logistic regression analysis for the sophomore horizontal transfer students indicated a statistically significant relationship between the predictor variables of TSS Index and ethnicity and whether or not a student encountered academic difficulty at the end of the first semester at the target institution. No statistically significant relationship was identified for age, gender, transfer GPA, or percentage of transfer credits accepted. The model used was a significant predictor of academic difficulty and correctly predicted academic difficulty in 23.4% of the cases. The R^2 value also indicated that the model accounted for 17.4% of the total variance. However, the size of the subpopulation ($n = 166$) in comparison to the number of predictor variables may have affected the validity of this model.

The estimated odds ratios for sophomore horizontal transfer students suggested that the lower the TSS Index the better the chances of academic success. Each single point added to the TSS Index increased the likelihood of encountering academic difficulty by a factor of 1.30 (30%). White sophomore horizontal transfer students are .27 times less likely to experience academic difficulty than non-black/non-white horizontal transfer students at the same academic level. In summary, white sophomore horizontal transfer students were more likely to be academically successful and the odds a sophomore horizontal transfer student experiencing academic success improves for students with lower TSS Indexes.

Upper-Division Vertical Transfer Students

Results of the logistic regression analysis for the upper-division vertical transfer students indicated a statistically significant relationship between the predictor variables of

TSS Index, transfer GPA, and age and whether or not a student encountered academic difficulty at the end of the first semester at the target institution. No statistically significant relationship was identified for ethnicity, gender, or percentage of transfer credits accepted. The model used was identified as a significant predictor of academic difficulty. However, the model only correctly predicted academic difficulty in 10.1% of the cases and the R^2 value indicated that it only accounted for 21.8% of the total variance.

For upper-division vertical transfer students, age was a significant factor. Older students were less likely to experience academic difficulty than younger students. Each single year increase in age improved the likelihood of academic success by a factor of 1.2 (20%). Transfer GPA and TSS Index also have significant relationships to academic performance. The odds ratio for transfer GPA indicates each single unit increase in transfer GPA the likelihood of academic success improves by a factor of 5. Additionally, each single point increase in TSS Index suggests a 1.10 (10%) increased likelihood the student will experience academic difficulty. Therefore, the odds a upper-division vertical transfer student will experience academic success improves for students who are older, have high transfer GPAs and low TSS Indexes.

Upper-Division Horizontal Transfer Students

Results of the logistic regression analysis for the upper-division horizontal transfer students indicated a statistically significant relationship between the TSS Index predictor variable and whether or not a student encountered academic difficulty at the end of the first semester at the target institution. No statistically significant relationship was identified for age, ethnicity, gender, transfer GPA, or percentage of transfer credits accepted. The model used was identified as a significant predictor of academic difficulty.

The model correctly predicted academic difficulty in 33.3% of the cases and the R^2 value indicated that it accounted for 41.8% of the total variance. However, the sample size ($n =$ 77) in comparison to the number of predictors used in the model may have affected the validity of the model.

The TSS Index was the only significant predictor of academic difficulty among upper-division horizontal transfer students. The estimated odds ratio for TSS Index suggested that each single point rise in TSS Index increased the likelihood of a student experiencing academic difficulty by a factor of 1.40 (40%). In summary, the odds of upper-division horizontal transfer students achieving academic success improves for students with lower TSS Indexes.

Summary of Findings for Academic Difficulty

The findings of this study support the literature on the noncognitive differences between students who are academically successful and those who encounter academic difficulty (Boyer & Sedlacek, 1988; Duggan & Pickering, 2008; Fuertes & Sedlacek, 1995; Fuertes, Sedlacek, & Liu, 1994; Pickering et al., 1992; Sedlacek & Adams-Gaston, 1992; Tracey & Sedlacek, 1984, 1985, 1987, 1989). Furthermore, this study supports the concept of using a noncognitive index based on student experiences, attitudes, behaviors, and beliefs to predict whether or not a student will encounter academic difficulty (Duggan & Pickering, 2008; Pickering, et al., 1992). The findings from this study also agree with the findings of Pickering, et al. which suggest that noncognitive predictors and GPA are the best predictors of academic performance. In the current study, TSS Index was a significant predictor for all subpopulations of transfer students. However, the strength of the relationship between TSS Index and academic difficulty varies among the

types of transfer students. For horizontal transfer students, the higher the academic level the greater the impact of TSS Index on the likelihood of experiencing academic difficulty. Transfer GPA was a significant predictor of academic difficulty for all subpopulations of transfer students except for the sophomore and upper division horizontal transfer students.

Persistence (Attrition)

The purpose of the third and fourth research questions was to investigate whether the TSS Index, percentage of transfer credits accepted by the target institution, transfer GPA, first semester cumulative GPA at the target institution, age, gender, and ethnicity can predict attrition. A summary of the findings for each logistic regression model for persistence is presented in Table 22. The significant predictors of persistence grouped by academic level and transfer type are summarized in Table 23.

Table 22

Summary of R^2 and Prediction Success Rates (%) for Persistence Logistic Regression Models

Subpopulations	n	R^2	Prediction Success (%)	
			Overall	Persistence
Vertical Transfers				
First-Year	143	.260	77.60	42.90
Sophomore	469	.202	80.40	18.90
Upper Division	554	.149	85.90	7.70
Horizontal Transfers				
First-Year	166	.176	80.10	20.00
Sophomore	306	.169	82.40	15.50
Upper Division	77	.471	89.60	46.20

Note: The logistic regression analysis for first-year vertical transfer students was significant but not a good fit. A reduced model analysis resulted in a model that was significant and a good fit.

Table 23

Summary of Significant Predictors of Persistence

Variables	*Wald*	*p*	*Exp(B)*
First-year Vertical Transfer Students (n= 143)			
Semester GPA	18.65	.000	.36
Transfer Credits %	3.91	.048	.11
First-year Horizontal Transfer Students (n=166)			
Male	8.13	.004	.28
Semester GPA	10.09	.001	.46
Sophomore Vertical Transfer Students (n=469)			
Semester GPA	47.31	.000	.37
Sophomore Horizontal Transfer Students (n=306)			
Age	6.70	.010	1.31
Semester GPA	11.69	.001	.54
TSS Index	4.95	.026	1.10
Upper-Division Vertical Transfer Students (n=554)			
Semester GPA	28.31	.000	.45
Upper-division Horizontal Transfer Students (n=77)			
Semester GPA	7.34	.007	.24

First-Year Vertical Transfer Students

Results of the logistic regression analysis for the first-year vertical transfer students indicated a statistically significant relationship between the predictor variables of percentage of transfer credits accepted by the target institution and first semester cumulative GPA, and whether or not a student persisted to the next academic year. No statistically significant relationship was identified for age, ethnicity, gender, transfer GPA, or TSS Index. However, the null hypothesis that the observed and expected values were the same was rejected which indicated the model was not a good fit. A follow-up backwards stepwise logistic regression resulted in a reduced model that was significant and a good fit. The reduced model correctly predicted 42.9% of the students who did not persist and accounted for 26% of the total variance. However, the sample size ($n = 143$) in comparison to the number of predictors variables used in the model may have affected the validity of the model.

Cumulative GPA at the end of the first semester at the target institution had a negative correlation with academic difficulty. The odds ratio for first semester cumulative GPA suggested that for every single unit increase in first semester cumulative GPA the likelihood of the student experiencing academic success improved by a factor of 2.78. Percentage of transfer credits accepted by the target institution also had a strong relationship with persistence. The findings indicate that for each single point increase in transfer credit acceptance rate the likelihood of the student persisting to the next academic year improved by a factor of 9.09. These findings suggest the higher the student's first semester cumulative GPA and the more transfer credits accepted, the better the odds the student will persist.

First-Year Horizontal Transfer Students

Results of the logistic regression analysis for the first-year horizontal transfer students indicated a statistically significant relationship between the predictor variables of first semester cumulative GPA and gender, and whether or not a student persisted to the next academic year. No statistically significant relationship was identified for age, ethnicity, percentage of transfer credits accepted, transfer GPA, or TSS Index. The model used was a significant predictor of attrition and correctly predicted attrition in 20% of the cases. The R^2 value also indicated that the model accounted for 17.6% of the total variance. However, the sample size ($n = 166$) in comparison to the number of predictor variables used may have affected the validity of the model.

First semester cumulative GPA and gender are predictors of persistence of first-year horizontal transfer students. Each single point increase in first semester cumulative GPA improves the chances of persistence by a factor of 2.17. Males in this subpopulation were 3.57 times more likely to persist than females. Therefore, first-year horizontal transfer students who are male or have higher first semester cumulative GPAs are more likely to persist.

Sophomore Vertical Transfer Students

Results of the logistic regression analysis for the sophomore vertical transfer students indicated a statistically significant relationship between the first semester cumulative GPA predictor variable and whether or not a student persisted to the next academic year. No statistically significant relationship was identified for age, ethnicity, gender, percentage of transfer credits accepted, transfer GPA, or TSS Index. The model used was a significant predictor of attrition and correctly predicted attrition in 18.9% of

the cases. The R^2 value also indicated that the model accounted for 20.2% of the total variance.

The odds ratio is similar in level to first-year vertical transfer students. A single point increase in first semester cumulative GPA improved the likelihood of persistence by a factor of 2.70. The odds ratio for first semester cumulative GPA of sophomore vertical transfer students indicates the higher the GPA the better the odds the student will persist.

Sophomore Horizontal Transfer Students

Results of the logistic regression analysis for the sophomore horizontal transfer students indicated a statistically significant relationship between the predictor variables of first semester cumulative GPA, age, and TSS Index, and whether or not a student persisted to the next academic year. No statistically significant relationship was identified for ethnicity, gender, transfer GPA, or percentage of transfer credits accepted. The model used was a significant predictor of attrition and correctly predicted attrition in 15.5% of the cases. The R^2 value also indicated that the model accounted for 16.9% of the total variance. However, the size of the subpopulation ($n = 166$) in comparison to the number of predictor variables may have affected the validity of this model.

The findings for this subpopulation suggest that older students are less likely to persist. For every year increase in age, the likelihood the student will not persist increased by a factor of 1.31 (31%). Higher values of TSS Index also suggested increased odds of attrition. Each single point increase of TSS Index indicates a 1.10 increased likelihood of attrition. A one unit increase in first semester cumulative GPA revealed a 1.85 times increased likelihood the student would persist. In summary, sophomore horizontal

transfer students who are younger, have lower TSS indexes and higher first semester cumulative GPAs are more likely to persist.

Upper-Division Vertical Transfer Students

Results of the logistic regression analysis for the upper-division vertical transfer students indicated a statistically significant relationship between the first semester cumulative GPA predictor variable and whether or not a student persisted to the next academic year. No statistically significant relationship was identified for age, ethnicity, gender, transfer GPA, percentage of transfer credits accepted, or TSS Index. The model used was identified as a significant predictor of academic difficulty. However, the model only correctly predicted attrition in 7.7% of the cases, and the R^2 value indicated that it only accounted for 14.9% of the total variance.

For upper-division vertical transfer students a single point increase in first-semester cumulative GPA improved the odds of persistence by a factor of 2.22. Therefore, the estimated odds ratio for upper-division vertical transfer students indicated the higher the students first semester cumulative GPA, the better the odds they will persist to the next academic term.

Upper-Division Horizontal Students

Results of the logistic regression analysis for the upper-division horizontal transfer students indicated a statistically significant relationship between the predictor variables of first semester cumulative GPA and whether or not a student persisted to the next academic year. No statistically significant relationship was identified for ethnicity, gender, transfer GPA, percentage of transfer credits accepted, or TSS Index. The model used was identified as a significant predictor of attrition. The model correctly predicted

attrition in 46.2% of the cases and the R^2 value indicated that it accounted for 47.1% of the total variance. However, the sample size ($n = 77$) in comparison to the number of predictors used in the model may have affected the validity of the model.

Upper-division horizontal transfer students had the largest odds ratio for first semester cumulative GPA. For these students, a single point increase in first semester cumulative GPA improved the likelihood of persistence by a factor of 4.17. Therefore, the odds an upper-division horizontal transfer student will persist improve as first semester cumulative GPA increases.

Summary of Findings for Attrition

This study indicates that first semester cumulative GPA is a significant predictor of attrition, which agrees with the existing literature on persistence (Bean & Metzner, 1985; Cabrera, Nora, & Castenada, 1993; Chartrand, 1992). These models of persistence suggest that academic backgrounds influence academic performance which impact persistence. However, the findings of this study do not fully support the Bean and Metzner (1985) Model of Non-traditional Student Attrition. The Bean and Metzner's model suggests that background variables (e.g. age, gender, ethnicity, high school GPA) contribute toward academic performance and also directly to attrition. However, the current study indicated the background variables were not directly predictive of attrition for most subpopulations of transfer students. Transfer GPA was not a significant predictor of persistence for any subpopulation. Percentage of transfer credits accepted by the target institution was only a significant predictor of persistence for first-year vertical transfer students. Because some schools do not officially evaluate transfer credits until

the student enrolls at the institution, this finding suggests that these first-year vertical transfer students may not persist due to the number of credits that were not accepted.

Implications for Higher Education

The findings from this study suggest that predictors of academic performance and persistence vary among transfer students. College administrators can use this knowledge to identify subpopulations of transfer students who are at-risk of encountering academic difficulty and attrition. However, identifying students who are at-risk is only the first step. The most critical action is determining how to help these students achieve their academic goals.

Transfer students arrive at institutions with varying backgrounds, experiences, expectations, and needs. Interventions and programs developed to assist traditional college students may not meet the needs of the transfer students. College administrators need to identify these characteristics to determine how to help these students be academically successful and persist to graduation. College leaders can use the findings of this study to better identify at-risk transfer students in the identified subpopulations and use targeted messaging to contact the students and provide appropriate resources. The targeted messages should have a positive focus, but include brief survey questions that would allow these students the opportunity to provide feedback about difficulties they are facing and if/how the institution can help. Responses to the targeted messages could be used to automatically direct students to resources, programs, and/or individuals who can assist them. Data collected could be used to develop resources, programs, and/or interventions that would be useful to these students. Similar systems are widely used among online retail merchants who use data to suggest merchandise to customers.

Enrollment management systems could be developed to suggest resources based on predetermined predictors of academic performance and persistence. The system could dynamically adjust based on performance in courses, fields of study, and other factors.

The findings of this study also have implications for faculty and advisors. These college personnel interact with transfer students on a regular basis but may not be fully aware of the unique challenges these students face and how best to help these students. Transfer policies and articulation agreements frequently change and vary among colleges and universities. It would be unreasonable to expect all faculty and advisors to remain current on all evolving transfer practices and understand the transfer experience. Instead, college administrators should establish positions for professional transfer advisors. These advisors should be well versed in transfer policies to help incoming transfer students navigate the transfer process. These transfer advisors could use the TSS Index to coach new transfer students who are identified as at-risk for experiencing academic difficulty. The university's targeted messaging system could be used to notify these advisors when a transfer student experiences drops in cumulative GPA which could impact persistence. These advisors could then contact the students to inform them of available resources and attempt to identify the source of the problem and make appropriate recommendations or referrals.

<div align="center">Limitations</div>

This study only examined horizontal and vertical transfer students at one institution of higher education. Additionally, the transfer student population used in the study was restricted to those who most resembled the characteristics of the traditional college student. The study focused on students who attend at the main campus of the

target institution and excluded military students, international students, and transfer

students over the age of 29. This prevents the findings from being generalizable to the

entire transfer student population. The study did not control for students' career goals,

subject areas of courses completed or enrolled, the intended or declared major of each

student, or the type of transfer institution (e.g. public, private, liberal arts, etc). Sample

size was also a concern because logistic regression analysis uses maximum likelihood

estimation, which requires large sample sizes. Researchers recommend the sample size be

between 10 (Hosmer & Lemeshow, 1989) and 30 (Pedhazur, 1997) times the number of

predictor variables being used in the analysis. Lastly, the subjects in this study were also

part of the population analyzed by the target institution to calculate the TSS Indices. The

target institution included all transfer students and did not exclude any students from the

population when calculating the TSS Indices on whom to test the models/predictions.

Future Research

Some of the limitations of this study could be overcome with additional research.

This study should be replicated using new cohorts of transfer students which would allow

the TSS Indices to be validated for future populations of transfer students. This study

should also be replicated to explore the ability of the TSS Index to predict persistence to

graduation. Identifying predictors of persistence to graduation would improve the ability

of college administrators to identify students who are most at risk of not graduating and

offering assistance to help the students achieve their academic goals.

Identifying predictors of academic difficulty and attrition is only the first step in

the process of helping students achieve their academic goals. Additional research is

needed to develop interventions that will assist at-risk transfer students to be successful in

college. Numerous programs exist to support at-risk first-year and traditional college students. Researchers should examine these existing interventions to measure their effectiveness for transfer students and modify the programs accordingly to meet the needs of this unique population. Because this study focused on a transfer student population that closely resemble the traditional college student population, some of the existing interventions designed for traditional college students might be applicable to the transfer students. However, information relevant to transfer students should be incorporated to better meet the needs of these students.

This study focused on horizontal and vertical transfer students at defined academic levels who most resembled the traditional college student. Similar studies should be conducted that focus on other unique subpopulations of transfer students (e.g. international transfer students, military transfer students, multiple transfers). These students face barriers to academic success and performance that traditional students, and transfer students who resemble the traditional college student, do not encounter. This study should be replicated for each of the subpopulations and the results used to support the development of customized programs to assist the identified at-risk students.

Finally, because the data analyzed in this study were from one institution, this study should be replicated at other institutions of higher education. This study was conducted at a public institution ranked as a large Carnegie Doctoral Research University with High Research Activity. Transfer students may have different experiences at private institutions, liberal arts colleges, historically black colleges and universities, etc. Colleges and universities have varying transfer articulation policies and agreements, which could impact students' transfer experiences and affect academic performance and persistence.

Institutions with more liberal transfer policies may recruit and retain more students than those with very strict policies. Transfer students are a complex, heterogeneous population who need to be the focus of additional studies aimed at identifying their unique needs and equipping college administrators with the knowledge to identify individuals at-risk for experiencing academic difficulty and attrition so they can help these students be academically successful.

Conclusions

All the models in the study were statistically significant, which suggests that the significant predictors identified for each subpopulation of transfer students were significantly different for students who encountered academic difficulty or academic success at the end of the first semester and those who persisted and did not persist to the next academic year. The data analysis revealed that the TSS Index, a noncognitive variable, was a significant predictor of academic difficulty among all subpopulations of transfer students included in this study. This indicates that the TSS Indices for transfer students in academic difficulty at the end of the first semester at the target institution were significantly higher than the TSS Indices of transfer students who were academically successful. This also supports the validity of using the TSS instrument to measure noncognitive variables to identify at-risk transfer students.

The analysis also revealed that first semester cumulative GPA was a significant predictor of attrition among all subpopulations of transfer students included in this study. This indicates that the first semester cumulative GPAs for transfer students who did not persist to the next academic year were significantly lower than first semester cumulative GPAs for transfer students who persisted to the next academic year. The TSS Index was

not identified as a significant predictor of attrition, except among sophomore horizontal transfer students. Although cumulative GPA at the target institution is predictive of persistence and the TSS Index predicts cumulative GPA, the TSS Index was not designed or calculated to predict persistence. Based on the results of this study, students with high cumulative GPAs are more likely to persist than students with lower GPAs; however, there are cases where students have low cumulative GPAs and persist, and those with high GPAs who do not persist. The frequency of these cases would hinder the ability of the TSS Index to predict persistence because it was only calculated to predict academic performance.

Analysis of the data confirmed the heterogeneity of the transfer student population. While there were significant predictors common among all transfer students in the study, other significant predictors varied among the subpopulations. Age was only a significant predictor for academic difficulty of upper division vertical transfer students. Similarly, age was only a significant predictor of attrition of sophomore and upper division horizontal transfer students. Gender was only a significant predictor of attrition among first-year horizontal transfer students. Ethnicity was only significant in predicting academic difficulty of sophomore horizontal transfer students. Transfer GPA was a significant predictor of academic difficulty for all subpopulations except sophomore and upper division horizontal transfer students. Percentage of transfer credits accepted was only significant in predicting attrition of first-year vertical transfer students. Furthermore, the analysis revealed that the significant predictors common among all subpopulations have varying odds ratios. A single point increase in TSS Index increased the likelihood of a transfer student experiencing academic difficulty by multiplicative factor between 1.09

to 1.40, depending on academic level and transfer pattern. A single point increase in first semester cumulative GPA increased the odds of persistence by a multiplicative factor ranging 1.85 to 4.17, depending on academic level and transfer pattern. The variability among the predictors should be considered by researchers in future studies and by college administrators when developing enrollment management strategies. Additional information about transfer students and their unique needs is necessary to ensure higher education leaders have the knowledge necessary to best assist the transfer student population.

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> http://www2.nea.org/he/healma2k8/images/a08p85.pdf

Appendix A

Transfer Student Survey 2009
Page 1
All information on the TSS will be held in the strictest confidence on secure computers with password protection. Only data on students as a group will be reported. Your name and University identification number (UIN) are required in order to create a record of your completed assessment. Your name and UIN will be used to combined your TSS results with other institutional data about you (e.g., high school GPA, SAT / ACT scores). With your permission these data will be released to your Academic Advisor who will assist you with interpreting your results. Any immediate questions about the TSS can be directed to assess@odu.edu. We would strongly encourage you to release this information to your academic advisor so that she or he may discuss the results with you and assist you in resolving any potential problems that could interfere with your academic success during your first year.

Please answer the survey as honesty and accurately as possible.
First Name
{Enter text answer}
[
]
Last Name
{Enter text answer}
[
]
Please enter your University Indentification Number (UIN):
Make sure you enter your UIN correctly so we can update your records.
{Enter text answer}
[00
]
Please enter your MidasID
(the username you used to log-on to Blackboard)
{Enter text answer}
[
]
May we release your results to your Academic Advisor?
{Choose one}
( ) Yes
( ) No
[ ]**By checking this box, you are saying that you have read the information above, or had it read to you, and that you agree to release the results to your**
{Choose if appropriate}
{Enter text answer}
[
]

Page 2

Please indicate how important each of the following reasons was in your decision to attend college.

To be able to get a better job

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To broaden my perspectives

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To be able to make more money

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To learn more about things which interest me

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To attain feelings of accomplishment and self-confidence

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To prepare myself for graduate or professional school

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To develop interpersonal skills

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

To respond to a change in my role as a spouse, parent, homemaker, or worker

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

Reasons for Attending College
You may list any other reasons that were important in your decision to attend college
{Enter answer in paragraph form}
[
]
Selected items on the Old Dominion University Transfer Student Survey were adapted or
adopted from the Freshman Survey conducted by the HigherEducation Research Institute
at UCLA. Used with permission (http://www.gseis.ucla.edu/heri/cirpoverview.php).
Page 3
Choosing Old Dominion University
Please rate the degree of importance you would attach to each of the following items as a reason for choosing Old Dominion University.
Talking with an Old Dominion University representative
{Choose one}
( ) Very Important
( ) Somewhat Important
( ) Not Important
Old Dominion University students/ graduates who are friends or acquaintances
{Choose one}
( ) Very Important
( ) Somewhat Important
( ) Not Important
Old Dominion University faculty members
{Choose one}
( ) Very Important
( ) Somewhat Important
( ) Not Important
Old Dominion University's good academic reputation
{Choose one}
( ) Very Important
( ) Somewhat Important
( ) Not Important
Financial Aid
{Choose one}
( ) Very Important
( ) Somewhat Important
( ) Not Important

Page 4

Choosing Old Dominion University, continued

Please rate the degree of importance you would attach to each of the following items as a reason for choosing Old Dominion University.

Cultural diversity

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

Convenient campus location or delivery mode

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

Availability of my chosen major

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

Cost of attending Old Dominion

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

Opportunity to take courses and work part- or full-time

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

Old Dominion's good social reputation

{Choose one}

( ) Very Important
( ) Somewhat Important
( ) Not Important

You may list any other reasons for choosing Old Dominion University

{Enter answer in paragraph form}

[
]

Page 5
Recent College Experience
To what extent did any of the following activities have a negative impact on your most recent previous college experience?
Insufficient time spent studying or doing homework
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Socializing with friends
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Not communicating with instructors outside of class
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Partying
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Working for pay
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Participating in campus clubs and groups
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent

Playing computer/video games
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Using the Internet for recreation
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent

Page 6
To what extent did any of the following activities have a negative impact on your most recent previous college experience?
Failed to complete a homework assignment on time
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Had difficulty concentrating on assignments
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Skipped classes
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Made careless mistakes on tests
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Felt overwhelmed by all I had to do
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent

Was too bored to study
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Felt depressed
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent

Recent College Experience, continued
Page 7
To what extent did any of the following activities have a negative impact on your most recent previous college experience?
Transporting family members/others to appointments and activities
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Being the primary caregiver of a dependent parent
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Having transportation problems
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Dealing with childcare issues
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent

Experiencing work conflicts
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Other family issues
{Choose one}
( ) Not at all
( ) To some extent
( ) To a great extent
( ) To a very great extent
Recent College Experience, continued
You may list any other activities that negatively impacted your most recent previous college experience
{Enter answer in paragraph form}
[
]

Page 8
Abilities and Traits
Please rate yourself on each of the following abilities or traits compared to the average
student your age.
General academic ability
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Mathematical ability
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Reading comprehension
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Study skills
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Time management skills
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Writing ability
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Computer skills
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Page 9
Problem-solving skills
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%
Concentration and memory
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Drive to achieve
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Leadership ability
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Physical health
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Self-confidence
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Interpersonal communication skills
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Multi-tasking
{Choose one}
( ) Top 10%
( ) Above Average
( ) Average
( ) Below Average
( ) Lowest 10%

Abilities and Traits, continued
Please rate yourself on each of the following abilities or traits compared to the average
student your age.
Page 10
Current Attitudes About Being a College Student
Please rate the extent to which you agree with each of the following statements about being
a college student.
It is important to me to be a good student
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I expect to work hard at studying in college
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I am committed to being an active participant in my college studies
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I will be proud to do well academically in college
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I find learning to be fulfilling
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I will allow sufficient time for studying in college
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

I see myself continuing my education in some way throughout my entire life
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I want others to see me as an effective student in college
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree
I feel really motivated to be successful in my college career
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Disagree
( ) Strongly Disagree

Page 11
I don't seem to have the drive to get my work done
{Choose one}
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree
I have no one to turn to with my problems
{Choose one}
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree
I fear I am not smart enough to pursue a degree
{Choose one}
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

I feel guilty spending time, money, and/or energy on my education
{Choose one}
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

I have no idea what I will do after I graduate
{Choose one}
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

Self-Descriptions
The following statements reflect various ways in which we can describe ourselves.
Please read each statement, then rate the extent to which you agree with each item.
There are no right or wrong answers, so please make your best judgment.
Above item contributed by Dr. Stephen Robbins, ACT. Used with permission.
[Robbins, S. and Patton, M. (1985). Self-Psychology and Career Development:
Construction of the Superiority and Goal Instability Scales. Journal of Counseling
Psyvhology, 32, 221-231.]

Page 12
Predictions About Your Academic Success
Nationally, about 50% of college students typically leave before receiving a degree.
If this should happen to you, which one of the following do you think would be
the MOST LIKELY cause?
{Choose one}
( ) I am absolutely certain that I will obtain a degree
( ) To accept a good job
( ) Military service
( ) It would cost more than I or my family could afford
( ) To get married/divorced
( ) Disinterested in study
( ) Lack of academic ability
( ) Inefficient reading or other study skills
( ) Courses not scheduled when I can attend
( ) Friends and/or family not supportive of my attending college
( ) Home responsibilities

Above item contributed by Dr. Willian Sedlacek, University of Maryland. Used with
permission. [Sedlacek, W. (2005). Beyond the Big Test: Noncognitive Assessment in
Higher Education. San Francisco, CA: Jossey-Bass, p. 180).

Page 13

Miss more than one class session per week

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Develop a good relationship with at least one faculty member or an advisor

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Earn at least a "B" average

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Study with other students

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Fail one or more courses

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Predictions About Your Academic Success, continued

How great are the chances that the following will happen to you?

Page 14

How great are the chances that the following will happen to you?

Find my courses boring

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Receive emotional support from my family and/or friends if I experience problems in college

{Choose one}

( ) Very Good Chance

( ) Some Chance

( ) No Chance

Complete a bachelor's degree at Old Dominion
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
If needed, seek assistance for personal, career, or academic problems
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Be placed on academic probation
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance

Predictions About Your Academic Success, continued
Page 15
How great are the chances that the following will happen to you?
Drop out of college temporarily
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Transfer to another college
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Return for another semester at this college
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Be satisfied with this college
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Have serious disagreements with my family and/or friends regarding my personal, social, academic, or career decisions
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance

Predictions About Your Academic Success, continued
Page 16
Predictions About Your Involvement with
Old Dominion University
In this section, we are interested in your estimates about how involved you might be in various activities at Old Dominion in addition to your courses.
I consider myself to be
{Choose one}
( ) a student at the main campus
( ) a distance learning student
( ) a student at one of the Hampton Roads higher education centers

Page 17
Predictions About Your Involvement with Old Dominion University
Involvement on the main campus in Norfolk
Use the library as a place to study?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Use the library resources for research for your classes?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Talk with faculty outside of class?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Think about course material outside of class and/or discuss it with other students?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Participate in cultural events (art, music, theater) on campus?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Use the student center as a place to eat and/or socialize with friends?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

During your first year, how often do you expect to:
Page 18
Involvement on the main campus in Norfolk, continued
During your first year, how often do you expect to:
Use campus athletic facilities for individual or group recreational activities?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Participate in campus clubs and organizations?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Read articles or books or have conversations with others on campus that will help you to learn more about yourself?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Make friends with students who are different from you (age, race, culture, etc.)?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Have serious discussions with students whose beliefs and opinions are different from yours?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Use what you learn in classes in your outside life?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Actively participate in your classes?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Page 19
Involvement as an Off-campus Student
During your first year, how often do you expect to:
Use the library and other on-site facilities as a place to study?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Use the library resources to do research for your classes?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Telephone and/or e-mail faculty informally outside of class?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Think about course material outside of class and/or discuss it with other students?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Participate in cultural events (art, music, theater) within your community or offered through the host campus?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Use on-site facilities or the host campus as a place to eat and/or socialize with friends?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Use on-site facilities or the host campus for individual or group recreational activities?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Page 20
Participate in clubs and organizations at the local host campus?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Read articles or books or have conversations with others on site that will help you learn more about yourself?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Make friends with students who are different from you (age, race, culture, etc.)
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Have serious discussions with students whose beliefs and opinions are different from yours?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Use what you learn through classes in your outside life?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often
Actively participate in your classes?
{Choose one}
( ) Never
( ) Occasionally
( ) Often
( ) Very Often

Involvement as an Off-campus Student, continued
During your first year, how often do you expect to:
Page 21
Predictions About Your Involvement with
Old Dominion University, continued
Work full-time while attending college
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Work part-time while attending college
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Attend college part-time for one or more semesters
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Do volunteer work
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance

Establish some close relationships with students I meet
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Feel overwhelmed occasionally by all that I have to do
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance
Find a job after college in my major field
{Choose one}
( ) Very Good Chance
( ) Some Chance
( ) No Chance

How great are the chances that the following will happen to you:
Page 22
Work/Career Experiences
Please check the one description below that you feel best represents your career plans at
this time.
{Choose one}
( ) I have NOT made a career choice at this time and do not feel particularly concerned or worried about it.
( ) I have NOT made a career choice and am concerned about it. I would like to make a decision soon and need some assistance to do so.
( ) I have chosen a career, and although I have not investigated it or other career alternatives thoroughly, I think I would like it.
( ) I have investigated a number of careers and have selected one. I know quite a lot about the career, including the kinds of training or education required and the outlook for jobs in the future.
Are you currently working for pay?
{Choose one}
( ) Yes
( ) No

Page 23
Work/Career Experiences, continued
How many hours a week do you currently work?
{Choose one}
( ) less than 10 hours a week
( ) between 11 and 20 hours each week
( ) between 21 and 30 hours each week
( ) between 31 and 40 hours each week
( ) over 40 hours each week

What is your current working situation?
{Choose one}
( ) I am working in a career path in which I plan to continue and grow professionally.
( ) I am working in a career path but seriously considering a change.
( ) I am working, but not in a career path.

Page 25
Transfer Experience
Are you entering Old Dominion University...
{Choose one}
( ) directly from another university, college, community college, or technical institute?
( ) after a period of 1 or more years not enrolled
How would you rate your overall transfer experience at Old Dominion University at this time?
{Choose one}
( ) Excellent
( ) Good
( ) Fair
( ) Poor
( ) Very poor

Page 27
Demographic Questions
I consider myself to be a...
{Choose one}
( ) community college transfer student
( ) four-year college/university transfer student
( ) foreign college/university transfer student
I transferred to Old Dominion University with...
{Choose one}
( ) less than 26 credits completed
( ) 26-57 credits completed
( ) 58-89 credits completed
( ) 90 or more credits completed

Page 28
Demographic Questions, continued
I expect to complete my bachelor's degree at Old Dominion within:
{Choose one}
( ) 1 year
( ) 2 years
( ) 3 years
( ) 4 years
( ) 5 years
( ) 6 years
( ) Do not expect to complete my bachelor's degree at Old Dominion University

How long has it been since you last attended college?
{Choose one}
( ) less than 1 year
( ) 1-4 years
( ) 5-9 years
( ) 10-19 years
( ) more than 20 years
During your most recent previous college term, were you...
{Choose one}
( ) part-time (less than 12 credit hours)
( ) full-time (12 or more credit hours)

Page 29
Thank you for taking the time to complete the Transfer Student Survey.
Good luck to you during your time at Old Dominion University.
Please click the "Finish" button below to complete the survey.

Appendix B

TSS Analysis Rubric

Students responses to each TSS question are aggregated and separated depending on his/her academic performance (below a 2.0 GPA, or at and above 2.0 GPA). Each response also includes a frequency overall percentage, row percentage, and column percentage. The overall percentage indicates the percentage of all respondents who selected that response. The row percentage is the percentage of respondents who selected that particular response and ended up in academic difficulty or good standing. The column percentage represents the distribution of the students who were in difficulty or good standing and how each of those groups responded to each question.

To determine whether a question should be included in the TSS Index calculation, there must be a significant difference between the column percentages. Previous research has found that a significant difference is 4.5% or more between those in difficulty and those in good standing. Because the purpose of the TSS Index is to identify those students who are at-risk for difficulty, the column percentage in the difficulty column must be greater than or equal to 4.5% higher than the good standing column.

Procedure:

1. Review the column percentages for each response and flag those where the difficulty column percentage is at least 4.5% higher than the column percentage of those in good standing.

2. Questions with a significant difference at only one end point of a scale should be included.

   a. If the significant response is not at the end of the scale, but the response to the question at the end of the scale increases the percentage, both responses should be included.

   b. If the significant response is not at the end of the scale and the response at the end of the scale decrease the percentage, the question/response should not be factored into the TSS Analysis. The only exception would be if the number of responses at the end of the scale is low and the question could logically be linked to difficulty.

3. Categorical questions can include any response with a significant difference.

4. Demographic questions are excluded from the TSS index calculations.

CURRICULUM VITAE

Christopher A. Davis

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EDUCATION

Associate of Arts & Sciences in Business Administration   May 1996
Patrick Henry Community College, Martinsville, VA
Honors: Magna Cum Laude

Bachelor of Science in Business Administration   May 1998
Averett University, Danville, VA
Concentrations: Marketing and Management Science
Honors: Magna Cum Laude

Master of Science in Computer Science   August 2003
Old Dominion University, Norfolk, VA
Concentration: Computer Information Systems

Education Specialist in Educational Leadership   May 2008
Old Dominion University, Norfolk, VA
Concentration: Higher Education Administration

Doctor of Philosophy in Higher Education   May 2010
Old Dominion University, Norfolk, VA
Dissertation Title: Noncognitive Predictors of Academic Performance and Persistence in Horizontal and Vertical Transfer Students by Academic Level

EXPERIENCE

Adjunct Instructor   March 2000 – April 2000
Patrick Henry Community College: Martinsville, VA

Fiscal Technician   May 2000 – August 2003
Old Dominion University
University Budget Office: Norfolk, VA

Database Analyst   August 2003 – October 2004
Old Dominion University
Office of Development – Alumni Records: Norfolk, VA

Adjunct Instructor   January 2004 – October 2004
Thomas Nelson Community College
Workforce Training & Continuing Education: Hampton, VA

Senior Assistant Registrar & Instructor   October 2004 – Present
Old Dominion University
Office of the University Registrar: Norfolk, VA

TEACHING EXPERIENCE

Patrick Henry Community College: Martinsville, VA (2000)
- Introduction to Microcomputers (IST 102)

Thomas Nelson Community College: Hampton, VA (2004)
- Computers for Beginners (DATA 102)
- Windows I (DATA 110)

PROFESSIONAL DEVELOPMENT

- **Master SCUBA Diver**, SCUBA Schools International: 2002
- **Management Practitioner**, Old Dominion University Leadership & Development Certificate Program: December 2004
- **Banner Curriculum, Advising, Program & Planning Training**: January & May 2005
- **Family Education Rights and Privacy Act (FERPA) Training**: April 2005
- **Sungard Higher Education Unified Digital Campus Support Center Training**: November 2005
- **Global Certificate Program**, Old Dominion University, Human Resources & International Programs: 2006
- **Terrorism and Security Awareness Training**, Old Dominion University: June 2006
- **Oracle Discoverer Functional Training**, Old Dominion University, January 2007
- **Supervisor Essentials**, Old Dominion University, Human Resources: Fall 2007
- **Master Advisor Certificate,** Old Dominion University: *In-progress, April 2010*
- **Senior Management Practitioner,** Old Dominion University Leadership & Development Certificate Program: *In-progress, December 2010*

CONFERENCES & PRESENTATIONS

- Mid-Atlantic Banner Users Group Conference, Washington, D.C.: November 2004
- Mid-Atlantic Banner Users Group Conference, Virginia Beach, VA: September 2005
- Old Dominion University Advisor Retreat, Norfolk, VA: October 2005
- Virginia Association of Collegiate Registrars & Admissions Officers, Virginia Beach, VA: December 2005
- Sungard Higher Education Banner User Conference, Orlando, FL: April 2006
    - Presenter: Concurrent Curricula
    - Presenter: Curriculum, Advising & Program Planning

- Mid-Atlantic Banner Users Group Conference, Richmond, VA: September 2006
    - Co-presenter: Concurrent Curricula
- Sungard Higher Education Banner User Conference, Las Vegas, NV: March 2007
    - Presenter: Curriculum, Advising & Program Planning
- Colonial Athletics Association Compliance Seminar, Richmond, VA: July 2007
- The Honor Society of Phi Kappa Phi Triennial Convention, Orlando, FL (Delegate): August 2007
- Mid-Atlantic Banner Users Group Conference, Blacksburg, VA: October 2007
- Southern Association of Collegiate Registrar's and Admissions Officers, Williamsburg, VA: February 2008
- Sungard Higher Education Banner User Conference, Anaheim, CA: April 2008
    - Presenter: Curriculum, Advising & Program Planning
    - Lead Panelist: Curriculum, Advising & Program Planning Session
- National Collegiate Athletics Association Rules Seminar, Boston, MA: May 2008
- Colonial Athletics Association Compliance Seminar, Newport News, VA: June 2008
- Sungard Higher Education User Conference, Philadelphia, PA: March 2009
    - Presenter: Curriculum, Advising & Program Planning vs. DegreeWorks
- Sungard Higher Education User Conference, San Francisco, CA: April 2010
    - Lead Panelist: Advising Session

COMMITTEES

- Chair - Large School Consortium/SungardHE Project: Concurrent Curricula, Phase 3 & 4: 2005-2006
- Foundations of Excellence – First Year Experience, All Students Dimension Committee: 2006
- Banner Information Group, Old Dominion University: 2006 - present
- Athletic Academic Advisor Search Committee, Old Dominion University: August 2007
- Southern Association of Collegiate Registrars and Admissions Officers, 2008 Conference Registration Committee: August 2007- February 2008
- Athletic Academic Advisor Search Committee, Old Dominion University: May 2008 – June 2008
- Coordinator - Curriculum, Advising, and Program Planning (CAPP) User Group, Sungard Higher Education: September 2007 – December 2008
- Strategic Enrollment Management Transfer Student Committee, Old Dominion University: September 2008-Present
- DegreeWorks Project Implementation Committee/Team, Old Dominion University: January 2008-present
- The Honor Society of Phi Kappa Phi, ODU Chapter #200
    - Board of Directors, Public Relations Officer: 2006-2008
    - Scholarship Committee: 2006 to present
    - Fellowship Committee: 2006 to present
    - Member Selection Committee: 2006 to present
    - Induction Ceremony & Reception Planning Committee: 2006 to present
    - Board of Directors, President: April 2008 to present
- Faculty Advisor, Phi Kappa Phi Student Organization, Old Dominion University: Fall 2009 to present

PROFESSIONAL ORGANIZATIONS MEMBERSHIPS

- American Association of Collegiate Registrars & Admissions Officers: 2005-present

GRANT APPLICATIONS, NOT AWARDED

- Davis, C. A., & Duggan, M. H. (2009, July). *Non-cognitive predictors of academic success and persistence of transfer students.* Paul P. Fidler Research Grant: $5,000.

AWARDS & ACHIEVEMENTS

- Virginia Parents and Teachers Association Scholarship: 1994
- Dean's List, Patrick Henry Community College: Fall 1994
- Honor's List, Patrick Henry Community College: Spring 1995, Fall 1995, & Spring 1996
- Phi Theta Kappa Honors Society – member
- Student Government Association, Patrick Henry Community College
  - Treasurer, 1994-1995
  - Vice President, 1995-1996
- Provost's List, Averett University: Fall 1996 & Spring 1997
- Vice President's List, Averett University: Fall 1997
- President's List, Averett University: Spring 1998
- Alpha Chi Honors Society - member
- Sidney M. Blumenreich Student Achievement Award, American Marketing Association: 1998
- The Honor Society of Phi Kappa Phi - member
- Golden Key International Honour Society - member

RESEARCH INTERESTS

- Transfer Student Success & Persistence
- Impacts of Technology on Student Success & Persistence
- College spending and cost-effectiveness