

PREDICTING POSTSECONDARY ENROLLMENT WITH SECONDARY STUDENT
ENGAGEMENT DATA

by

KATHLEEN WALSH FRAYSIER

(Under the Direction of Amy L. Reschly)

ABSTRACT

In our changing economic landscape, a college degree has become increasingly necessary for securing employment in an information-based society. Student engagement is an important factor in predicting and preventing high school dropout, and improving student outcomes. Although the relationship between secondary school engagement and high school completion is well supported in existing research, the relationship between secondary school engagement and postsecondary enrollment and persistence is unclear. This research study examined whether students' engagement in high school predicts postsecondary matriculation and persistence in the first year after accounting for demographic and school-level variables. Results indicated secondary student engagement does predict postsecondary enrollment and persistence beyond academic and behavioral variables. Consistent with research among secondary students, the Future Goals and Aspirations scale was the strongest engagement predictor. Results have implications for early warning systems and college retention efforts.

INDEX WORDS: Student Engagement, Postsecondary Enrollment, College Retention, Future Goals and Aspirations

PREDICTING POSTSECONDARY ENROLLMENT WITH SECONDARY STUDENT
ENGAGEMENT DATA

by

KATHLEEN WALSH FRAYSIER

B.A. Bowdoin College, 2010

A Thesis Submitted to the Graduate Faculty of The University of Georgia in
Partial Fulfillment of the Requirements for the Degree

MASTERS OF ARTS

ATHENS, GEORGIA

2017

© 2017

Kathleen Walsh Fraysier

All Rights Reserved

PREDICTING POSTSECONDARY ENROLLMENT WITH SECONDARY STUDENT
ENGAGEMENT DATA

by

KATHLEEN WALSH FRAYSIER

Major Professor: Amy L. Reschly

Committee: Scott Ardoin
Ashley Harrison

Electronic Version Approved: 4/18/2017

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
May 2017

DEDICATION

I would like to dedicate this thesis to the memory of my grandfather, James Robert Walsh, who believed whole-heartedly in the power and promise of higher education, and worked tirelessly to ensure that all seven of his grandchildren attended and graduated from college.

ACKNOWLEDGEMENTS

I would like to thank Dr. Amy Reschly for her help and guidance in creating this master's thesis, and to Dr. James Appleton for his assistance with data analysis and communicating complicated statistical procedures. I would also like to thank the School Psychology faculty, Dr. Michelle Lease, Dr. Scott Ardoin, and Dr. Ashley Harrison for teaching me to think critically and serving as wonderful examples of excellent scholarly research, and Dr. David Collings, Dr. Anne Kibbie, and Dr. Belinda Kong for teaching me how to communicate my ideas effectively in writing. Finally I would like to thank my family and my husband Zach Fraysier for your unconditional love and support.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	v
LIST OF TABLES	vii
CHAPTER	
1 INTRODUCTION	1
Factors that Contribute to College Enrollment	3
Student Engagement	6
Purpose of Study	11
2 METHOD	13
Sample	13
Measures	13
Procedures	17
Data Analyses	17
Missing Data Procedures	21
3 RESULTS	22
Model 1: Demographic Model	24
Model 2: Achievement Model	25
Model 3: Behavioral Engagement Model	26
Model 4: Cognitive and Affective Engagement Model	28
4 DISCUSSION	31

REFERENCES	36
------------------	----

LIST OF TABLES

	Page
Table 2.1: Demographics of Study Sample by Cohort	13
Table 3.1: Fit Statistics for each cohort in the Demographic, Academic, Behavioral and Cognitive/Affective Models.....	23
Table 3.2: Model 1 Odds Ratio Values for Demographic Parameters	24
Table 3.3: Model 2 Odds Ratio Values for Demographic and Achievement Parameters	26
Table 3.4: Model 3 Odds Ratio Values for Demographic, Achievement, and Behavioral Engagement Parameters.....	27
Table 3.5: Model 4 Odds Ratio Values for Demographic, Achievement, Behavioral, Cognitive and Affective Engagement Parameters	29

CHAPTER 1: INTRODUCTION

As the American economy evolves towards an information-based system, and job seekers are faced with a more technologically complex and globalized job market, the evolution of education must follow suit (Carnevale, Jayasundera, & Gulish, 2015, Organisation for Economic Co-Operation and Development Country Note [OECD], 2014). Historically, the purpose of education has been linked to meeting the social and economic needs of a given society (Tyack, 1988). As the job market becomes more fragmented and complex, obtaining a postsecondary degree becomes increasingly important to meeting the needs of society, and for both national and individual economic success (Baum, Ma, & Payea, 2013). This is evident in the rapid change in educational demand for jobs in the last forty years. In 1973, only 37% of jobs required an education beyond a high school diploma. In 2010, 59% of jobs required postsecondary education, and in 2020 74% of jobs are projected to require postsecondary education (Carnevale Smith, & Strohl, 2013, Kuczera & Field, 2014). Since 2008, 6.6 million jobs have been created, and 2.9 million of these are considered “good jobs,” defined as jobs paying \$53,000 a year or more. Of these 2.9 million jobs, all but 100,000 were filled by people with a college degree (Carnevale et al., 2015). Clearly there is an increasing demand for educated workers in the United States.

In the United States the stratification of earnings and employment rates by educational attainment is among the most dramatic in the developed world (OECD, 2014). The unemployment rate for individuals with a postsecondary degree in United States is 4.6%, while for those with only a high school degree the unemployment rate is 9.1%. For those with less

than a high school degree, the unemployment rate again rises dramatically to 14.3% (OECD, 2014). College graduates also earn a disproportionate amount of the national income. Of adults who have a college degree, 31% earn twice the national median income. Conversely, 48% of adults who did not complete high school earn only half of the median national income (OECD, 2014). Although there is a clear increase in the earnings and employment opportunities for those with a university degree, any sort of postsecondary education is beneficial. Scholars estimate that one third of the vacant jobs in 2015 will require sub-degree level postsecondary educational attainment, often in the forms of technical certifications and associate's degrees (Carnevale et al., 2013, Kuczera & Field, 2014).

The United States is currently ranked 5th in the world for postsecondary attainment, with 43% of adults having a university education. In the younger generation, however, the United States is losing ground, ranking 12th for 25-34 year olds with a university-level degree among developed nations (OECD, 2014). Clearly a focus on higher education and postsecondary degree completion is warranted in order to remain competitive in the global economy. Furthermore, secondary and postsecondary dropout are major problems in the United States. Overall dropout rates for high school students have dropped significantly in recent times, hitting a historic low of 6.5% in 2014. Although this improvement is certainly a boon to both our economy and individual students, significant dropout rates still exist especially for males and minority students. For example, while only 4.8% of white females dropout of high school, 11.8% of Hispanic males do not complete high school. Across both genders, more black students drop out than white students (7.4% vs. 5.2%) and more Hispanic students dropout than black students (10.6% vs. 7.4%), with males consistently dropping out at higher rates than females (National Center for Educational Statistics, 2016). In summary, while we have seen progress in rates of

high school completion, more focus on helping minority students, particularly male students, achieve a high school education, is needed in the United States.

Similar demographic trends can be observed at the postsecondary level. Although more students are entering college and attaining degrees than ever before, females are much more likely to complete their degree than males, and White and Asian-American students earn more degrees than Black and Hispanic students (NCES, 2016). While again these trends are encouraging, with only 45.3 % of students graduating with a bachelor's degree in five years or an associate's degree in three years (ACT, 2015), degree attainment is not aligned with the needs of the growing technologically and information-based economy. This failure to complete one's education not only limits an individual's job opportunities, but also results in wasted time and money, both for the individual and the institution, in unrealized credits (Schneider & Yin, 2011). The rising demand for educated workers and the large financial impact of unrealized credits created by high college dropout rates highlight the need for dropout prevention intervention at the postsecondary level.

Factors that Contribute to College Enrollment

Currently in the United States, 65.9% of all high school graduates go on to attend college (Bureau of Labor Statistics, U.S. Department of Labor, 2014). Many of the factors that lead students to enroll in college align with a student's ability to meet college admission criteria. These factors include taking a college admission test such as the ACT or SAT, high school GPA, and ability to pay for college (Cabrera & La Nasa, 2000). However, there are other social and psychosocial factors that also influence a student's decision to pursue a college education (Eccles, Vida & Barber, 2004).

In “Understanding the College Choice Process,” Cabrera and La Nasa (2000) described a student’s decision to attend college as a gradual process with three distinct stages. Different factors emerge with varying levels of influence at each phase and each phase has unique outcomes. The first phase of the model, identified as the Predispositions phase, occurs in grades 7-9. Other studies have also identified early adolescence as an important time period where students begin to form educational and occupational aspirations (Eccles, Vida, & Barber, 2004). This phase involves students beginning to form aspirations to continue their education beyond high school, often motivated by occupational aspirations. In the Predispositions phase, parental involvement is the most influential factor. Parental involvement comes in many different forms, including parental encouragement, parental college experiences and expectations, and also parents saving for college tuition. Other prominent factors in the Predispositions phase include student ability, socioeconomic status and the availability of information about college. Outcomes of the Predispositions phase include students beginning to develop career and educational aspirations and also academically preparing for college by further developing academic skills and enrolling in college preparatory courses.

The next phase in Cabrera and La Nasa’s model (2000) is the Search phase (grades 10-12). This phase consists of students beginning to search for potential postsecondary institutions. Parental support continues to be a major factor in the Search phase, but student factors gain more importance, with student ability, educational aspirations, and occupational aspirations gaining influence. High school academic resources also become a factor during the Search phase, as well as saliency of potential postsecondary institutions. Some outcomes of the Search phase include student’s listing of tentative institutions and then narrowing that list, and students securing information about institutions. A study by Roderick, Coca, and Nagaoka (2011) found

that organizational structures such as expectations of college attendance and support with the financial aid and application process significantly contributed to urban high-school students' college attendance.

The final phase of Cabrera and La Nasa's model (2000), the Choice phase, involves students making the choice to attend college and beginning preparations for entering a postsecondary institution, which includes completing applications and taking college entrance exams. Cabrera and La Nasa noted that the Choice phase can be seen through an economic or a sociological lens. In the economic lens, a cost-benefit analysis guides an individual's decision to go to college, as they weigh the costs of tuition, lost work opportunity, and other costs associated with going to college against the benefit of obtaining a postsecondary degree from a specific postsecondary institution. In the sociological perspective, the major contributing factors are a student's socioeconomic status and the expectations for college attendance in accordance with their social background. In both the economic and sociological perspectives, educational and occupational aspirations continue to be important factors, along with student ability and parental encouragement. New factors that emerge in the Choice phase include perceived institutional attributes and perceived ability to pay (Cabrera & LaNasa, 2000).

Although factors such as financial resources and parent characteristics are largely beyond educators' control, research suggests that engagement factors such as peer and parental support for learning and school identification are an important component of a student's choice to attend college (Cabrera & La Nasa, 2000, Eccles et al., 2004, Finn & Zimmer, 2012). College students have also been found to have higher levels of student engagement than high school students, indicating that more highly engaged students tend to continue their educational careers (Martin, 2009a).

Student Engagement

Defining student engagement. As is true in many social science fields, the literature for student engagement is plagued by a lack of conceptual clarity (Appleton, Christensen, & Furlong, 2008, Reschly & Christenson 2012). The definition of engagement has varied extensively across authors and studies over the past twenty years (Appleton et al., 2008) and there is considerable disagreement over the definitions and numbers of subcomponents of the student engagement construct (Reschly & Christenson, 2012). However, most scholars agree that student engagement is a meta-construct composed of three sub-constructs that have emotional, behavioral and cognitive components (Fredricks, Blumenfeld, & Paris, 2004). Christenson, Appleton, and colleagues further bifurcated behavioral engagement into academic and behavioral components to better link assessment and intervention strategies. In the Christenson and colleagues' model, academic engagement refers to academic forms of behavior, such as academic progress and time on-task. Behavioral engagement refers to engagement behaviors such as attendance, following school rules and displaying appropriate behaviors. Cognitive engagement refers to cognitive effort towards school, such as goal setting, believing in the value of school and using learning strategies. Affective engagement refers to a sense of belonging and identification with school (Christenson et al., 2008; Reschly & Christensen, 2012). It is hypothesized that cognitive and affective engagement are indirectly linked to outcomes such as achievement via behavioral and academic engagement (Reschly & Christensen, 2006; Voelkl, 2012).

Finn's participation-identification model. Although there are many different theories and conceptualizations of student engagement, one foundational theory of student engagement at the high school level is Finn's Participation-Identification model. According to Finn's model, as

students begin to participate more at school, interacting with teachers and peers, they also begin to engage more with their learning. This increased engagement also increases positive interactions with teachers and peers at school, creating a mutually reinforcing cycle of participation and identification with school. This participation and identification with school leads to positive academic outcomes, and is also protective against a number of negative outcomes (Finn, 1989, Finn & Zimmer, 2012). Conversely, non-participation leads to less interaction with teachers and peers, less engagement with learning, and subsequent poor school performance. This lack of interaction, engagement and achievement results in emotional withdrawal at school. Over time, as these students continue to exist in a cycle of nonparticipation, a lack of academic success, and emotional withdrawal, they ultimately completely withdraw from school and drop out. Finn's Participation-Identification Model describes completion and dropout not as discrete events but represent processes of engagement or disengagement over long periods of time (Finn, 1989).

Intervention and identification of at-risk students. In recent years, researchers have identified student engagement as a crucial component of academic success from elementary school, through high school, and into postsecondary education (Abbott-Chapman, et al., 2014; Christenson, et al., 2008, Martin, 2008a, 2008b). Student engagement has emerged as an important predictor of high school dropout (Christensen et al., 2008), with data from as early as elementary school predicting high school dropout or completion (e.g., Alexander, Entwisle, & Horsey, 1997 Barrington & Hendricks, 1989, Ensminger & Slusarcick, 1992). Furthermore, student engagement has consistently been linked to higher academic achievement (Finn & Zimmer 2012, Fredricks, et al., 2004) greater learner self-efficacy (Schunk & Mullen, 2012) improved behavior in the classroom (Lehr, Sinclair, & Christenson, 2004, Reschly &

Christenson, 2012) and socio-emotional wellbeing (Reschly & Christenson 2012, Lewis, Heubner, & Malone, 2011).

One of the reasons engagement has attracted so much attention among dropout prevention interventionists and scholars is that it is considered an alterable variable, making it a strong target for intervention (Christenson & Reschly, 2012). Many of the demographic variables that are risk factors for dropout, such as low Socioeconomic Status (SES) and being in an urban area cannot be changed whereas engagement can be addressed within the school setting (Finn & Rock, 1997, Fredricks et al., 2004, Reschly & Christenson 2012, Rosenthal, 1998). Studies have found empirical support for using engagement indicators, specifically indicators of cognitive and affective engagement, for screening purposes with various groups of at-risk students, finding that extremely low levels of cognitive and affective engagement align with expected low behavioral engagement (Lovelace et al., 2014). Empirical support has also been found for the consistency of indicators of cognitive and affective engagement across time, and the ability of cognitive and affective indicators of engagement to contribute unique variance to educational outcomes (Lovelace, Reschly and Appleton., 2013). In a study by Lovelace and colleagues, cognitive and affective indicators of engagement were tested for their ability to account for unique variance in on-time graduation and dropout. Using multi-level logistic regression, the study found evidence for the incremental validity of an indicator of cognitive engagement, future goals and aspirations, and one indicator of affective engagement, family support for learning, to predict high school dropout when controlling for demographic, academic, and behavioral factors. Future goals and aspirations predicted high school on-time completion with the same statistical significance as academic and behavioral factors such as overall academic achievement, out of school suspensions, and school attendance. Family support for

learning was slightly less predictive than achievement and attendance, but still on par with out of school suspensions for its ability to predict high school dropout (Lovelace et al., 2013).

Student engagement in the post-secondary literature. Previous research has demonstrated the direct and indirect impact of student engagement on high school completion (U.S. Department of Education, 2015), but does the effect of school engagement persist past high school? The concept of student engagement is present within the postsecondary literature as a point of intervention, but the construct of student engagement at the postsecondary level is less clearly defined and more institutionally based than at the secondary level (Waldrop, Reschly, Fraysier, & Appleton, in press). This is most clearly illustrated in the National Survey for Student Engagement (NSSE), developed by George D. Kuh (2001). This survey, which is still widely used today, focuses on the availability of resources at a particular institution. Specific factors of the NSSE examine college activities, and opportunities for personal growth (Kuh, 2001).

Although many theories of postsecondary student engagement focus largely on institutional factors, there are also studies of student engagement that more closely examine the construct at the individual level, allowing for more overlap with secondary theories. For example, Grier-Reed et al. (2012), found that higher levels of cognitive and affective engagement predicted career perception self-efficacy and higher GPA. Furthermore, a study by Finn (2006) found a relationship between lower levels of student engagement in high school and lower rates of postsecondary enrollment, credit accumulation, and completion. This study provided promising information for understanding college enrollment and persistence, and can be extended by replication a more in-depth study of specific facets of student engagement that contribute to postsecondary enrollment and persistence.

While the conceptualization of postsecondary engagement focuses more on institutional factors, one of the most prominent theories in the field of postsecondary student engagement, Tinto's theory of social and academic integration, focuses on individual factors (Tinto, 1975, 1982). Tinto stated that both social and academic integration into a particular institution are critical for students to continue and complete their postsecondary education. Tinto defined social integration as institutional commitment and a sense of belonging to the institution whereas academic integration is defined as commitment to academic goals and receiving adequate interaction and feedback from faculty members and classmates. Although social and academic integration are both critical to student retention, they can also detract from each other (Tinto, 1975). Tinto's theory distinguished between academic failure and voluntary withdrawal, and his later theory addresses important topics such as financial pressures and transferring to different institutions (Tinto, 1982).

Empirical research has found support for Tinto's theory. A meta-analysis by Robbins and colleagues (2004) found that academic integration in the form of achievement motivation and academic goals were strong predictors of GPA and retention. A follow-up study was conducted in 2006 to further investigate the connection between psychosocial factors and college performance and persistence (Robbins, Allen, Casillas, Peterson, & Le, 2006). This study also found support for social and academic integration contributing to college retention, identifying social connection, social activity, commitment to college, and academic discipline as significant predictors of retention past the first year of college (Robbins et al., 2006). Institutional commitment, academic preparedness and discipline, and goal commitment, which overlap with Tinto's theory of academic integration, continue to emerge as factors that contribute to postsecondary performance and retention. In a study by Davidson et al., in 2009, measuring

factors that influenced college student persistence, Commitment, Academic Integration and Academic Conscientiousness again emerged as factors that significantly predicted retention after the first year of college.

Links between engagement theory at the secondary and postsecondary levels. While few studies examine engagement across the secondary and postsecondary levels, and engagement at the secondary level tends to be more individually defined while engagement at the postsecondary level is more institutionally defined, there are some key areas of overlap between the two theories. Relationships with peers and instructors play prominent roles in both Tinto's model of academic and social integration and Christensen et al.'s conceptualization of affective engagement (Christensen et al., 2008; Finn, 1989; Tinto, 1975). Additionally, relevance and personal significance of schoolwork are part of both the Christensen et al., model of cognitive engagement and Tinto's academic integration (Christensen et al., 2008; Tinto, 1975). Class attendance, academic discipline and completion of academic work plays an important role in both the conceptualization of behavioral and academic engagement and academic integration (Christensen, et al., 2008; Tinto, 1975), and the role of these engagement indicators in college completion has found support in recent empirical studies (Davidson et al., 2009; Robbins et al., 2006). This overlap in theory suggests that the concept of student engagement can be studied across secondary and postsecondary contexts, and highlights a need for more empirical and theoretical work to improve our understanding in the role of student engagement across contexts.

Purpose of Study

The research literature has established that student engagement is a strong predictor of high school completion and also influences a number of other academic outcomes. However, the effects of high school engagement beyond high school graduation are not well understood.

Because most studies of student engagement focus heavily on predicting and planning interventions to prevent high-school dropout, the scope of studies rarely extend past high school. Additionally, there are few psychometrically strong measures capable of consistently and longitudinally measuring student engagement (Fredricks & McCloskey, 2012), and different results from studies make it difficult to generalize the impact of student engagement on specific outcomes (Reschly & Christensen, 2012). Studies that have measured engagement in postsecondary students have found higher rates of engagement in postsecondary students compared to high school students (Abbott-Chapman et al., 2014; Martin, 2008a) however further information is needed to clarify what aspects of student engagement contribute to educational persistence. In this study, we seek to answer the following question:

Does student engagement as measured by the SEI predict enrollment in postsecondary institutions and persistence beyond the first year?

CHAPTER 2: METHODS

Sample

Data were drawn from an extant dataset collected in a large, diverse school district in the Southeastern U.S. The data were collected for three separate cohorts; a 10th grade cohort in 2010, an 11th grade cohort in 2011, and a 12th grade cohort in 2012. Demographic information for each cohort may be found in Table 1.

Table 2.1: Demographics of study sample by cohort

Demographic Variables	2010 10 th Graders Sample Size /Percentage	2011 11 th Graders Sample Size /Percentage	2012 12 th Graders Sample Size /Percentage
Sample Size	7,430	7,890	6,853
Female	3,798/51.1	4,103/52.0	3,564/52.0
Male	3,632/48.9	3,787/48.0	3,298/48.0
Race:			
White	3,195/43.0	2,999/38.0	2,535/37.0
Black	1,932/26.0	2,051/26.0	1,782/26.0
Hispanic	1,114/15.0	1,420/18.0	1,302/19.0
Other	1,189/16.0	1,420/18.0	1,234/18.0
Free/Reduced Lunch Eligibility:			
Eligible	2,601/35.0	3,077/39.0	2,947/43.0
Ineligible	4,829/65.0	4,813/61.0	3,906/57.0
Limited English Proficiency	372/5.0	395/5.0	343/5.0
Repeating Grade	966/13.0	947/12.0	548/8.0
Gifted	1,560/21.0	1,578/20.0	1,302/19.0

Measures

Demographic variables. Demographic variables were included in the model to control for status variables that previous research has indicated may play a role in academic attainment.

Demographic variables included in this study were gender, ethnicity, free and reduced lunch status, gifted status, and Limited English Proficiency status.

Academic indicators. *Academic achievement.* When choosing indicators of academic achievement, we specifically looked at what indicators of academic achievement are predictive of college readiness, in order to be consistent with our research question of attempting to predict college enrollment and persistence. The John W. Gardner Center for Youth and Their Communities has produced a College Readiness Indicators and Supports Framework that includes individual level, school level, and system level indicators that contribute to college readiness (John W. Gardner Center, 2014). Two of the individual factors with data readily available for all of our participants included GPA and performance on high school exit or benchmark exams. Additionally, Neild, Balfanz and Herzog (2007) identify performance in mathematics and literacy in the middle grades as important early warning indicators for high school dropout. We selected 8th grade Criterion-Referenced Competency Scores (CRCT), in Language Arts and Math as an indicator for academic achievement, since this was a recent, readily available, standardized measure of achievement in mathematics and English, and consistent with the literature for both college readiness and early warning indicators. The CRCT is a criterion-referenced test used by Georgia public schools from the spring of 2002 to the 2013-2014 school year. Students in third, fifth and eighth grade were required to pass subject-specific CRCTs in order to be promoted to the next grade, in addition to meeting promotion criteria established by the local school board (Georgia Department of Education, 2017). We also used current Language arts and Math GPAs as academic indicators as recommended by the Gardner Center College Readiness Indicators, and to have a current perspective on academic indicators of engagement. Math and Language Arts were considered separately to control for a

misrepresentation of achievement data due to variability between Math and Language Arts performance.

Grade retention. We used grade retention as an indicator of academic engagement because grade retention has long been identified by research as a risk factor for high school dropout (Jimerson, Anderson, & Whipple, 2002). Grade retention is also an indicator of low academic engagement, as academic engagement is characterized by academic progress and grade retention indicates a lack of academic progress (Reschly & Christensen, 2012). The John W. Gardner Center also identified passing all major courses as an indicator of college readiness (Gardner Center, 2014), and retention would indicate that the student has not passed all major courses for a given year.

Behavioral indicators. Attendance. Several conceptualizations of behavioral engagement regard school attendance as a key indicator of behavioral engagement (Appleton et al., 2008, Fredricks, et al., 2004). Student attendance was defined as the percentage of days enrolled in the current school year.

Discipline. Positive school conduct and a lack of disruptive behaviors is considered an indicator of behavioral engagement (Appleton et al., 2008, Fredricks, et al., 2004, Reschly & Christenson 2012). In order to capture both the severity and frequency aspects of discipline, we used the following measures:

Discipline severity max. The Discipline Severity Max-Disposition is the maximum severity of any disposition received across disciplinary events for any given academic year. Each disciplinary event is scored on a scale of 1-6 based on the severity of the disposition received for an infraction. .10 point is added to this score for each day the student is assigned In-School Suspension (ISS) for up to 10 possible days (1.0 point). 0.05 days are added for each day

of Bus Suspension the student is assigned up to 20 possible days (1.0 point). Scores for the disposition received for any individual disciplinary event are truncated at 6.0 thus the largest value of this metric is also 6 (see Appleton, King, Reschly, Long, & Martin, 2017)

Indiscipline. Indiscipline is a measure of rate of disciplinary infractions, and was included in our model to capture the frequency aspect of disciplinary infractions. It is calculated by dividing the number of discipline incidents into the number of enrolled days with the maximum value truncated (to reduce skewness) at 0.10 or 18 incidents over 180 days which tended to be equal to or larger than 98% of indiscipline values (i.e., 2% of values had to be set to 0.10 as they were larger than that value).

Cognitive and affective engagement *Student Engagement Instrument:* the Student Engagement Instrument (SEI) measured students' cognitive and affective engagement. Developed in 2006, the SEI is a 35-item instrument-item instrument created to measure cognitive and affective engagement. The SEI consists of six factors, though for research purposes, only five factors are used. The SEI contains three affective and three cognitive factors. The affective factors are Teacher-Student Relationships (TSR), Family Support for Learning (FSL), and Peer Support for Learning (PSL). The cognitive factors are Future Aspirations and Goals (FG) and Control and Relevance of Schoolwork (CRSW), and Extrinsic Motivation. (Appleton, et al., 2006). Further study of the factor structure of the SEI found greater support for a five-factor model (Betts, et al., 2010), prompting the Extrinsic Motivation factor, which only contains two items, to be used infrequently in research. The psychometric properties of the SEI have been tested across several different age groups. Several studies have found evidence for the validity and reliability of the SEI (Appleton, et al., 2006, Betts, Appleton, Reschly, Christenson,

&Huebner, 2010) and a recent study by Lovelace et al., (2014) found evidence to support the SEI's predictive and concurrent validity.

Procedures

The SEI is administered twice a year as part of a district-wide initiative to enhance student engagement. SEI scores were averaged across fall and spring administration. Student secondary data was matched to college enrollment data from the National Student Clearinghouse (NSC) to ascertain how many students had then enrolled in a postsecondary institution and then persisted for a second term (quarter or semester) in their postsecondary education. The NSC is a nonprofit organization that collects all students' postsecondary enrollment and degree attainment data for student loan management purposes. Currently the NSC has data on 96% of students enrolled in postsecondary institutions in the United States (NSC Fact Sheet, 2017). For the sample population's district, 49-50% immediately transfer to postsecondary institutions, and 47% persist through the first year. Nationally, approximately 70% of postsecondary enrollees persist to the second year.

Data Analysis

The data were analyzed using a Multilevel Logistical Modeling, which allows for the consideration of both individual variables and school-level differences. In order to examine the unique effects of various types of student engagement, we used four successive models to analyze our data. The first model includes only demographic information, the second model examines demographic and behavioral engagement data, and the third model also examines academic engagement variables. The fourth and final model adds cognitive and affective engagement variables as measured by the SEI in order to measure the unique variance of cognitive and affective engagement on our outcome measure, postsecondary enrollment and

completion. Per Garson, 2012, the -2Log Likelihood, Akaike Information Criterion (AIC) and Bayesian information Criterion (BIC) statistics were used to determine whether the SEI and behavioral engagement data improved model fit beyond demographic and achievement models (per Bates, Maechler, Bolker & Walker, 2015). Following the methodology used by Lovelace et al., (2013) and the notation used by Raudenbush and Bryk (2002) and Rabe-Hesketh and Skrondal (2012), across all models, the probability that the response was equal to 1 was modeled using the logit link function with the traditional assumption that y_{ij} has a Bernoulli distribution. For ease of understanding, we show all models in their form prior to transformation with the link function.

$$\text{logit}(\varphi) = \eta_{ij}, \quad y_{ij} \sim \text{Bernoulli}(\varphi_{ij}) \quad (1)$$

All analyses were conducted in R using lme4 and caret packages.

Model 1: Demographic model. In Model 1 and across all models, our outcome variable, student persistence and enrollment, was measured dichotomously.

Equation 2 shows our Level 1 Demographic model, the first model we tested. Our outcome variable was persistence and enrollment, with 1 being coded as immediate postsecondary enrollment and 0 coded as not immediately enrolling in a postsecondary institution or not persisting at that institution. In this model, we estimate the variance in persistence and enrollment using only demographic variables. The demographic variables used are gender (FEMALE), dummy-coded race referenced against WHITE (BLACK, HISPANIC, OTHER), free or reduced lunch eligibility (FRL), limited English proficiency (LEP), and whether the student is currently in their schools' gifted program (GIFTED).

$$P.E_{ij} = \beta_{0j} + \beta_{1j}(FEMALE) + \beta_{2j}(BLACK) + \beta_{3j}(HISPANIC) + \beta_{4j}(OTHER) + \beta_{5j}(FRL) + \beta_{6j}(LEP) + \beta_{7j}(GIFTED) + r_{ij} \quad (2)$$

Because we did not add any predictors at the school level, we use a fully unconditioned model for our level 2 model (Equation 3). Intercepts were allowed to vary randomly.

$$\begin{aligned} \beta_{0j} &= \gamma_{00} + u_{0i} \\ \{\beta_{1j}, \beta_{2j}, \beta_{3j}, \beta_{4j}, \beta_{5j}, \beta_{6j}, \beta_{7j}\} &= \gamma_{10}, \gamma_{20}, \gamma_{30}, \gamma_{40}, \gamma_{50}, \gamma_{60}, \gamma_{70} \end{aligned} \quad (3)$$

Model 2: Academic model. In the academic model, we retained all of the variables from the demographic model, and also included the academic indicator variables. These variables are repeating a grade (REPGRD), 8th grade CRCT Language arts scores (SS_TOTLA), 8th grade CRCT Math scores (SS_TOTRD), current Language Arts cumulative GPA for the student's current academic year (LaCourseCumulGPA), and Math cumulative GPA for the student's current academic year (MaCourseCumulGPA). The equation for this model is shown in Equation 4.

$$\begin{aligned} P.E_{ij} &= \beta_{0j} + \beta_{1j}(FEMALE) + \beta_{2j}(BLACK) + \beta_{3j}(HISPANIC) + \beta_{4j}(OTHER) + \\ &\beta_{5j}(FRL) + \beta_{6j}(LEP) + \beta_{7j}(GIFTED) + \beta_{8j}(REPGRD) + \beta_{9j}(SS_TOTLA) + \\ &\beta_{10j}(SS_TOTRD) + \beta_{11j}(LaCourseCumulGPA) + \beta_{12j}(MaCourseCumulGPA) + r_{ij} \end{aligned} \quad (4)$$

Corresponding random Level 2 variables were added to the model to account for the academic variables included in this model. Additional Level 2 variables are shown in equation 5. As in the demographic model, slopes were fixed and intercepts were allowed to vary randomly.

$$\{\beta_{8j}, \beta_{9j}, \beta_{10j}, \beta_{11j}, \beta_{12j}\} = \gamma_{80}, \gamma_{90}, \gamma_{100}, \gamma_{110}, \gamma_{120} \quad (5)$$

Model 3: Behavioral model. The behavioral model contained all of the same variables as the Academic model, but with the addition of variables representing our indicators of

behavioral engagement. Those variables are as follows: percentage of days absent (PABS), discipline severity maximum (DSEVMAX) and indiscipline (DRATE). The equation for the behavioral model is shown below in Equation 6:

$$\begin{aligned}
 P.E_{ij} = & \beta_{0j} + \beta_{1j}(FEMALE) + \beta_{2j}(BLACK) + \beta_{3j}(HISPANIC) + \beta_{4j}(OTHER) + \\
 & \beta_{5j}(FRL) + \beta_{6j}(LEP) + \beta_{7j}(GIFTED) + \beta_{8j}(REPGRD) + \beta_{9j}(SS_{TOTLA}) + \beta_{10j}(SS_{TOTRD}) + \\
 & \beta_{11j}(LaCourseCumulGPA) + \beta_{12j}(MaCourseCumulGPA) + \beta_{13j}(PABS) + \\
 & \beta_{14j}(DSEVMAX) + \beta_{15j}(DRATE) + r_{ij}
 \end{aligned}
 \tag{6}$$

Corresponding random Level 2 variables were added to the model to account for the added behavioral variables included in this model. Additional Level 2 variables are shown in equation 7. As in the previous models, slopes were fixed and intercepts were allowed to vary randomly.

$$\{\beta_{13j}, \beta_{14j}, \beta_{15j} = \gamma_{130}, \gamma_{20}, \gamma_{140}, \gamma_{150}\}
 \tag{7}$$

Model 4: Cognitive/affective model. The Cognitive/affective model includes all of the variables from the Behavioral Model with the addition of factor scores from the five SEI factors. The cognitive factors are Future Goals and Aspirations (GFA) and Control and Relevance of Schoolwork (CRSW). The affective factors are Family Support for Learning (FSL), Peer Support for Learning (PSL) and Teacher-Student Relationships (TSR). The model is shown below in Equation 8:

$$\begin{aligned}
 P.E_{ij} = & \beta_{0j} + \beta_{1j}(FEMALE) + \beta_{2j}(BLACK) + \beta_{3j}(HISPANIC) + \beta_{4j}(OTHER) + \\
 & \beta_{5j}(FRL) + \beta_{6j}(LEP) + \beta_{7j}(GIFTED) + \beta_{8j}(REPGRD) + \beta_{9j}(SS_{TOTLA}) + \\
 & \beta_{10j}(SS_{TOTRD}) + \beta_{11j}(LaCourseCumulGPA) + \beta_{12j}(MaCourseCumulGPA) +
 \end{aligned}$$

$$\beta_{13j}(PABS) + \beta_{14j}(DSEVMAX) + \beta_{15j}(DRATE) + \beta_{16j}(TSR) + \beta_{17j}(CRSW) + \beta_{18j}(PSL) + \beta_{19j}(FG) + \beta_{20j}(FSL) + r_{ij}$$

(8)

Corresponding random Level 2 variables were added to the model to account for the cognitive and affective engagement variables included in this model. Additional Level 2 variables are shown in equation 9. As in the previous models, slopes were fixed and intercepts were allowed to vary randomly.

$$\{\beta_{16j}, \beta_{17j}, \beta_{18j}, \beta_{19j}, \beta_{20j} = \gamma_{160}, \gamma_{170}, \gamma_{180}, \gamma_{190}, \gamma_{120}\}$$

(9)

Missing data procedures

Missing data were handled using a k nearest neighbor matching approach, per Kuhn and Johnson's recommendations (2013). In this procedure, the entire data set was utilized to find five nearest neighbors in p-dimensional space where p is the number of nonmissing variables in the dataset. Variables are first centered and scaled by their variance to create a similarly weighted space for nearest neighbor searches. Upon locating the five nearest neighbors, the mean of their values on the variable that is missing for a specific case is used to replace the missing value. For all subsequent HLMS, the complete datasets are used.

CHAPTER 3: RESULTS

Table 3 shows results for the overall fit statistics across each cohort for each model. Three fit statistics are reported for each cohort within each model to determine the goodness of fit for each model: the -2LogLikelihood (-2LL), or the deviance, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). The AIC and BIC are both derived from the -2LL, but the AIC adjusts the -2LL to penalize for model complexity, while the BIC penalizes more severely for additional parameters, and tends to be conservative towards estimating Type II error (Garson, 2013). For each fit statistic, a lower value indicates a better fit to the data (Garson, 2013). With the exception of the BIC statistic for the 12th grade cohort, the lowest values for fit statistics are consistently found for the full model, which includes behavioral, academic, cognitive and affective indicators of engagement. This indicates that the addition of each set of student engagement indicators accounts for a greater degree of the variance between the predictors and the outcome.

Table 3.1: Fit Statistics for each cohort in the Demographic, Academic, Behavioral and Cognitive/Affective Models

	-2LL			AIC			BIC		
	10 th Grade	11 th Grade	12 th Grade	10 th Grade	11 th Grade	12 th Grade	10 th Grade	11 th Grade	12 th Grade
Model 1: Demographic	-4328.7	-4616.2	-3981.5	8675.3	9250.4	7981.0	8737.5	9313.1	8042.5
Model 2: Achievement	-3739.3	-3846.9	-3264.9	7506.5	7721.8	6553.4	7603.3	7819.4	6653.4
Model 3: Behavioral	-3671.9	-3749.5	-3169.1	7377.7	7532.9	6372.2	7495.2	7651.5	6488.4
Model 4 :Cognitive/Affective	-3637.5	-3714.8	-3152.1	7318.9	7373.5	6348.2	7471.0	7626.9	6498.5

Model 1: Demographic Model

Model fit criteria for Model 1, the Demographic Model, are found in Table 3. In this model, several variables were predictive of college enrollment and persistence across cohorts. Free and Reduced Lunch Status, English Language Proficiency and being Hispanic were negatively associated with college enrollment and persistence across cohorts ($p < .001$). Additionally, Giftedness and being female was positively predicted college enrollment and persistence across cohorts ($p < .001$). Black students were significantly more likely to enroll and persist at postsecondary institutions ($p < .01$) for the 10th grade cohort, but not in the 11th and 12th grade cohorts. Falling into the “Other” category for race was significantly predictive of college enrollment and persistence for the 10th grade ($p < .001$) and 11th grade ($p < .01$) cohorts, but not the 12th grade cohort.

Table 3.2: Model 1 Odds Ratio Values for Demographic Parameters

Parameter	Demographic		
	2010 (10 th Grade)	2011 (11 th Grade)	2012 (12 th Grade)
(Intercept)	1.45 (0.10)***	1.32 (0.12)**	1.02 (0.21)
Female	1.28 (0.03)***	1.29 (0.03)***	1.25 (0.03)***
Black	1.08 (0.03)**	1.05 (0.03)	1.04 (0.03)
Hispanic	0.76 (0.03)***	0.77 (0.03)**	0.74 (0.03)***
Other	1.11 (0.03)***	1.08 (0.03)*	1.06 (0.03)
F/R Lunch Eligible	0.73 (0.03)***	0.73 (0.03)***	0.79 (0.03)***
LEP	0.81 (0.03)***	0.80 (0.03)***	0.76 (0.03)***
Gifted	1.76 (0.03)***	1.75 (0.03)***	1.73 (0.04)***

*** $p < .001$, ** $p < .01$, * $p < .05$

Model 2: Achievement Model

When the achievement variables (i.e., repeated grade, 8th grade state test Language Arts score, 8th grade state Math score, current Language Arts GPA and current Mathematics GPA) were added, the model fit criteria improved significantly across all three cohorts. This indicates that Model 1, the Demographic model, fits the data significantly worse than Model 2, the Achievement Model, which includes both the demographic parameters and parameters that represent indicators of academic engagement. All of the achievement variables were significant at the $p < .001$ level across all three cohorts, indicating that students with higher CRCT scores and Math and Language Arts GPAs were significantly more likely to enroll in college and persist past the first year, while students who had repeated a grade were significantly less likely to enroll in college and stay enrolled past the first year. Similar to Model 1, Hispanic students, students with Free and Reduced Lunch status, students with Limited English Proficiency were significantly less likely to enroll in and persist at college across all three cohorts ($p < .001$), and giftedness remained positively predictive of college enrollment and persistence in the 10th and 11th grade cohorts ($p < .001$). With the addition of the achievement variables in Model 2, Giftedness was not predictive of college enrollment and persistence for the 12th grade cohort, however in this model Black students were about 1.25 times more likely to enroll and persist in college across cohorts. With the addition of the achievement variables, falling into the racial/ethnic category Other was not predictive of college enrollment and persistence for any of the cohorts and being female only positively predicted college enrollment and persistence only in the 10th grade cohort ($p < .05$).

Table 3.3: Model 2 Odds Ratio Values for Demographic and Achievement Parameters

Parameter	Achievement		
	2010 (10 th Grade)	2011 (11 th Grade)	2012 (12 th Grade)
(Intercept)	1.51 (0.08)***	1.43 (0.08)***	0.93 (0.18)
Female	1.08 (0.03)*	1.05 (0.03)	0.99 (0.03)
Black	1.25 (0.04)***	1.21 (0.04)***	1.24 (0.04)***
Hispanic	0.84 (0.04)***	0.82 (0.04)***	0.81 (0.04)***
Other	1.06 (0.03)	1.04 (0.03)	1.04 (0.04)
F/R Lunch Eligible	0.80 (0.03)***	0.81 (0.03)***	0.84 (0.04)***
LEP	0.86 (0.04)***	0.89 (0.04)***	0.85 (0.04)***
Gifted	1.18 (0.04)***	1.13 (0.04)***	1.05 (0.04)
Repeated Grade	0.70 (0.03)***	0.67 (0.04)***	0.41 (0.09)***
State LA Test	1.24 (0.05)***	1.18 (0.05)***	1.23 (0.06)***
State MA Test	1.28 (0.05)***	1.34 (0.05)***	1.19 (0.05)***
LA Annual GPA	1.85 (0.05)***	2.19 (0.05)***	2.60 (0.06)***
MA Annual GPA	1.31 (0.04)***	1.38 (0.04)***	1.28 (0.05)***

*** $p < .001$, ** $p < .01$, * $p < .05$

Model 3: Behavioral Engagement Model

As seen in table 3, model fit again improved across all cohorts when Behavior Engagement data was added (percentage of days absent, discipline severity maximum, indiscipline). Looking specifically at the behavioral engagement variables, students with a higher percentage of days absent were less likely to enroll and persist in their postsecondary education across all 3 cohorts ($p < .001$). Discipline Severity Max was negatively predictive of

college enrollment and persistence for the tenth grade cohort ($p < .001$) but not in the eleventh and twelfth grade cohorts. This may be because individuals who engage in severe behavior are often removed from school or drop out. Similarly, Indiscipline was negatively predictive of college enrollment and persistence in the tenth grade cohort ($p < .01$) and the eleventh grade cohort ($p < .001$) but not the twelfth grade cohort.

With the addition of the behavioral variables in Model 3, all achievement variables remained highly positively predictive of college enrollment and persistence. Demographic variable likelihood ratios remained similarly predictive to Model 2, with the exception of females being significantly more likely to persist and enroll in college in both the 10th and 11th grade cohorts as opposed to only in the 10th grade cohort.

Table 3.4: Model 3 Odds Ratio Values for Demographic, Achievement, and Behavioral Engagement Parameters

Parameter	Behavioral Engagement		
	2010 (10 th Grade)	2011 (11 th Grade)	2012 (12 th Grade)
(Intercept)	1.52 (0.07)***	1.38 (0.07)***	0.93 (0.16)
Female	1.11 (0.03)***	1.10 (0.03)***	1.05 (0.03)
Black	1.23 (0.04)***	1.16 (0.04)***	1.16 (0.04)***
Hispanic	0.82 (0.04)***	0.81 (0.04)***	0.79 (0.04)***
Other	1.03 (0.03)	1.01 (0.03)	1.02 (0.04)
F/R Lunch Eligible	0.82 (0.03)***	0.83 (0.03)***	0.86 (0.04)***
LEP	0.86 (0.04)***	0.89 (0.04)***	0.84 (0.04)***
Gifted	1.16 (0.04)***	1.11 (0.04)*	1.08 (0.04)
Repeated Grade	0.73 (0.04)***	0.69 (0.04)***	0.42 (0.09)***
State LA Test	1.23 (0.05)***	1.17 (0.05)***	1.24 (0.06)***

State MA Test	1.32 (0.05)***	1.41 (0.05)***	1.26 (0.06)***
LA Annual GPA	1.65 (0.05)***	1.91 (0.05)***	2.20 (0.06)***
MA Annual GPA	1.25 (0.04)***	1.28 (0.04)***	1.17 (0.05)***
Percentage of Enrolled Days Absent	0.75 (0.04)***	0.59 (0.05)***	0.58 (0.05)***
Discipline Severity Max	0.88 (0.04)***	0.94 (0.04)	0.97 (0.04)
Indiscipline Rate	0.88 (0.05)**	0.86 (0.05)***	0.90 (0.06)

*** $p < .001$, ** $p < .01$, * $p < .05$

Model 4: Cognitive and Affective Engagement Model

The model fit data again improved across all cohorts when the cognitive and affective engagement data were added (fit statistics and significance provided in Table 3). Looking specifically at the SEI scores, which are used as indicators of Cognitive Engagement, Future Goals was positively predictive of college enrollment and persistence across all three cohorts ($p < .001$). Control and Relevance of School Work was slightly negatively predictive in the tenth and eleventh grade cohorts ($p < .05$). For the Affective factors, Parent Support was positively predictive in the eleventh grade cohort ($p < .05$). Students who reported higher scores on the other two affective factors, Family Support for Learning and Peer Support for Learning, were not more likely to enroll and persist at college.

Demographic, academic and behavioral indicators retained similar levels of likelihood and significance with the addition of the SEI factor scores. The only changes in the significance and likelihood of enrollment and persistence in this model is female gender was only predictive for the 11th grade cohort ($p = < .01$) and Discipline Severity Max was slightly less predictive for the 10th grade cohort, though still statistically significant ($p = < .05$).

Table 3.5: Model 4 Odds Ratio Values for Demographic, Achievement, Behavioral, Cognitive and Affective Engagement Parameters

Parameter	Cognitive and Affective Engagement		
	2010 (10 th Grade)	2011 (11 th Grade)	2012 (12 th Grade)
(Intercept)	1.52 (0.07)***	1.38 (0.08)***	0.93 (0.16)
Female	1.08 (0.03)	1.06 (0.03)**	1.02 (0.03)
Black	1.21 (0.04)***	1.14 (0.04)***	1.15 (0.04)***
Hispanic	0.82 (0.04)***	0.80 (0.04)***	0.78 (0.04)***
Other	1.03 (0.03)	1.01 (0.03)	1.01 (0.04)
F/R Lunch Eligible	0.82 (0.03)***	0.83 (0.03)***	0.85 (0.04)***
LEP	0.86 (0.04)***	0.90 (0.04)***	0.85 (0.04)***
Gifted	1.15 (0.04)***	1.10 (0.04)*	1.07 (0.04)
Repeated Grade	0.73 (0.04)***	0.70 (0.04)***	0.42 (0.09)***
State LA Test	1.21 (0.05)***	1.16 (0.05)***	1.23 (0.06)***
State MA Test	1.31 (0.05)***	1.41 (0.05)***	1.27 (0.06)***
LA Annual GPA	1.62 (0.05)***	1.88 (0.05)***	2.17 (0.06)***
MA Annual GPA	1.24 (0.04)***	1.28 (0.04)***	1.16 (0.05)***
Percentage of Enrolled Days Absent	0.75 (0.04)***	0.59 (0.05)***	0.58 (0.05)***
Discipline Severity Max	0.90 (0.04)*	0.95 (0.04)	0.98 (0.04)
Indiscipline Rate	0.88 (0.05)**	0.86 (0.05)**	0.90 (0.06)
SEI-TSR	1.01 (0.04)	0.97 (0.04)	0.95 (0.05)
SEI-CRSW	0.89 (0.04)*	0.90 (0.04)*	0.96 (0.05)
SEI-PSL	1.03 (0.03)	1.10 (0.04)*	1.06 (0.04)

SEI-FG	1.32 (0.04)***	1.28 (0.04)***	1.24 (0.04)***
SEI-FSL	0.99 (0.04)	0.98 (0.04)	0.94 (0.04)

*** $p < .001$, ** $p < .01$, * $p < .05$

CHAPTER 4: DISCUSSION

The purpose of this study was to examine the role of student engagement at the secondary level in predicting postsecondary matriculation and persistence. Student engagement has been identified as a strong focus of intervention for high school completion (IES, 2015). With the growing need for an educated workforce and lagging college graduation rates in the American population, the need to understand factors that contribute to postsecondary enrollment and persistence are now more critical than ever. Understanding the role of student engagement in postsecondary enrollment and persistence provides valuable information for planning much-needed interventions to support students in extending their academic careers and meeting the needs of the flourishing technological economy.

Previous theory and research on the role of student engagement in educational attainment at both the secondary and postsecondary level highlight the importance of not only academic preparedness but also support from peers and family, students' beliefs in the importance of their education to obtain employment and accomplish goals, and the quality of interactions with teachers, professors, and personnel at their educational institutions (Christensen et al., 2008; Finn, 1989; Tinto, 1975, 1982). This study provides an extension of the existing literature on student engagement, as there are few studies that examine the role of student engagement over a period of several years or into the postsecondary education level. The use of a psychometrically sound measure, the SEI, strengthens the findings of this study and adds to the utility of it to the existing research.

When we examined the role of demographic, academic, behavioral, cognitive and affective indicators of student engagement in predicting whether a student would enroll in a postsecondary institution and persist at that institution, we found that our model was more accurately able to identify students who persisted and enrolled at college with the addition of each layer of engagement indicators. This provides support for a multi-faceted definition of student engagement, and for the utility of student engagement indicators in identifying which students are likely to enroll and persist at college. Findings from this study align with engagement theory at both the secondary and postsecondary levels, and with existing empirical research that supports these theories. Academic preparedness emerged as a consistent predictor of postsecondary enrollment and persistence, which aligns with previous research on the role of engagement and other psychological factors on educational attainment (Robbins et al., 2006, Davidson et al., 2009), and as expected students with lower rates of attendance and higher rates of discipline problems were less likely to enroll and persist at postsecondary institutions.

In this study we were specifically interested in the role of cognitive and affective engagement indicators to account for a student's likeliness to attend and persist at a postsecondary institution. The overall better fit of the data to the model that included cognitive and affective engagement indicators suggests that cognitive and affective engagement contribute to postsecondary enrollment and persistence. This is consistent with theories of engagement at both the secondary and postsecondary literature, which suggest that the interactions between students and their peers and instructors at an academic institution (Finn, 1989; Tinto, 1975, 1982), beliefs that education is necessary and important for a student's future (Tinto, 1975) and support of family for education (Cabrera & Lanasa, 2000; Christensen et al, 2008) are all important contributors to educational attainment. When looking at specific cognitive and

affective factors as measured by the SEI, the FGA factor demonstrated very strong predictive power, even when controlling for demographic factors and academic and behavioral engagement indicators. This suggests that future goals and aspirations may be a promising point of intervention in facilitating postsecondary enrollment and persistence. Institutional and academic commitment are both key components in postsecondary engagement theory, and having future goals and aspirations help students to realize the value and importance of schoolwork (Cabrera & LaNasa, 200; Christensen et al., 2008; Robbins et al., 2006; Tinto, 1975). The strength of the FGA factor confirms previous theory and research that students having future career aspirations and goals that require educational completion are more likely to enroll and persist at postsecondary institutions. CRSW negatively predicted postsecondary enrollment and persistence, even when controlling for demographic factors and academic and behavioral indicators. This factor has emerged as negatively predictive and inconsistent in other studies, suggesting that there may be a problem with the item structure or measurement of this construct (Appleton et al., 2006; Carte, et al., 2012).

Overall this study highlights the importance of cognitive and affective engagement and the positive role student engagement plays in postsecondary enrollment and persistence. Our results suggest that measures of cognitive and affective engagement could serve as an early warning indicator of students at-risk for choosing to not continue their education past high school or dropping out of their postsecondary institution. The results also indicate that focusing on cognitive and affective engagement, specifically future goals and aspirations, could be a point of intervention for both at-risk students and as a support for students already planning to attend college.

Although this study provides greater insight into the role of student engagement in postsecondary enrollment and persistence, and potential points of intervention, further research is still needed to replicate and expand on the results of this study. Further research could focus on the role of student engagement, and specifically cognitive and affective engagement, within different student populations, for example students with disabilities, focusing on certain geographic regions and students with varying levels of English proficiency. Future research could also look more closely at the FGA factor and items to further pinpoint why this factor was so strongly predictive and how that can be used for intervention. Examining the role of student engagement in college completion and career attainment is also a much-needed area of further research.

Future research should also address some of the limitations of the current study. Many postsecondary institutional variables are not directly addressed, such as cost of college, retention rates at a particular institution, and available support at these institutions. This information certainly plays a role in a student's choice to attend and persist at an institution, and understanding the role that these and similar variables play would be valuable knowledge in understanding how to promote postsecondary retention. While our study used a diverse sample, we were limited to a specific geographic area. Studies using national samples of samples from different geographic locations should also be conducted. Additionally, our study uses cross-sectional data. Using longitudinal data to track the progress and changes in the role of student engagement in postsecondary enrollment, persistence and completion over time would be a valuable addition to the research literature.

Overall, this study provides promising information in the role that student engagement plays in a student's decision to continue their educational careers. We saw a significantly

improved model fit with the addition of each level of engagement data, and found that having future goals and aspirations was a significant predictor of choosing to attend a postsecondary institution and then persisting at that institution past the first year. This information provides an exciting point for identifying at-risk students. It also suggests that encouraging students to set clear goals and aspirations for their future may be a meaningful point of intervention in encouraging students to continue their education, and hopefully through future study and intervention implementation, we can make postsecondary education and the accompanying benefits accessible to more and more Americans.

REFERENCES

- Abbott-Chapman, J., Martin, K., Ollington, N., Venn, A., Dwyer, T., & Gall, S. (2014). The Longitudinal association of childhood school engagement with adult educational and occupational achievement: findings from an Australian national study. *British Educational Research Journal*, 40(1), 102-120.
- ACT, Inc. (2015) National Collegiate Retention and Persistence-to-Degree Rates.
- Alexander, K. L., Entwisle, D. R., & Horsey, C. S. (1997). From first grade forward: Early foundations of high school dropout. *Sociology of education*, 87-107.
- Anderson, A. R., Christenson, S. L., Sinclair, M. F., & Lehr, C. A. (2004). Check & Connect: The importance of relationships for promoting engagement with school. *Journal of School Psychology*, 42(2), 95-113.
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, 45(5), 369-386.
- Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. *Journal of School Psychology*, 44(5), 427-445.
- Appleton, J.J., King, K.R., Reschly, A.L., Long, B., & Martin, C. (2017). Outcomes-based behavioral metrics: The monitoring and predictive utility of a dispositions-focused discipline index. *Manuscript submitted for publication*.
- Barrington, B. L., & Hendricks, B. (1989). Differentiating characteristics of high school

- graduates, dropouts, and nongraduates. *The journal of educational research*, 82(6), 309-319.
- Bates, D., Maechler, M., Bolker, B., Walker, S., Christensen, R. H. B., & Singmann, H. (2015). Linear Mixed-Effects Models using “Eigen” and S4 [Internet]. 2015.
- Baum, S., Ma, J., & Payea, K. (2013). Education pays 2013. *The College Board*.
- Betts, J. E., Appleton, J. J., Reschly, A. L., Christenson, S. L., & Huebner, E. S. (2010). A study of the factorial invariance of the Student Engagement Instrument (SEI): Results from middle and high school students. *School Psychology Quarterly*, 25(2), 84.
- Bureau of Labor Statistics, U.S. Department of Labor, *The Economics Daily*, 65.9 percent of 2013 high school graduates enrolled in college on the Internet at http://www.bls.gov/opub/ted/2014/ted_20140508.htm(visited November 03, 2016).
- Cabrera, A. F., & La Nasa, S. M. (2000). Understanding the college-choice process. *New directions for institutional research*, 2000(107), 5-22.
- Carter, C. P., Reschly, A. L., Lovelace, M. D., Appleton, J. J., & Thompson, D. (2012). Measuring student engagement among elementary students: Pilot of the Student Engagement Instrument—Elementary Version. *School Psychology Quarterly*, 27(2), 61.
- Carnevale, A. P., Smith, N. & Strohl, J. (2013) Recovery: Job growth and education requirements through 2020. Washington, DC: Georgetown University Center on the Workforce and Education
- Carnevale, A.P., Jayasundera, T., & Gulish, A. (2015). Good Jobs are Back: College Graduates are First in Line. Washington, DC: Georgetown University Center on the Workforce and Education
- Christenson, S. L., Reschly, A. L., Appleton, J. J., Berman, S., Spanjers, D., & Varro, P. (2008).

- Best practices in fostering student engagement. *Best practices in school psychology*, 5, 1099-1120.
- Davidson, W. B., Beck, H. P., & Milligan, M. (2009). The College Persistence Questionnaire: Development and validation of an instrument that predicts student attrition. *Journal of College Student Development*, 50(4), 373-390.
- Eccles, J. S., Vida, M. N., & Barber, B. (2004). The relation of early adolescents' college plans and both academic ability and task-value beliefs to subsequent college enrollment. *The Journal of Early Adolescence*, 24(1), 63-77.
- Ensminger, M. E., & Slusarcick, A. L. (1992). Paths to high school graduation or dropout: A longitudinal study of a first-grade cohort. *Sociology of education*, 95-113.
- Finn, J. D. (1989). Withdrawing from school. *Review of educational research*, 59(2), 117-142.
- Finn, J. D. (2006). The adult lives of at-risk students: The roles of attainment and engagement in high school: Statistical analysis report.
- Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In *Handbook of research on student engagement* (pp. 97-131). Springer US.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, 74(1), 59-109.
- Fredricks, J. A., & McColskey, W. (2012). The measurement of student engagement: A comparative analysis of various methods and student self-report instruments. In *Handbook of research on student engagement* (pp. 763-782). Springer US.
- Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of applied psychology*, 82(2), 221.
- Garson, G. D. (2013). Preparing to analyze multilevel data. *Hierarchical linear modeling: Guide*

and applications, 27-54.

Georgia Department of Education. (2017). *Promotion and Retention Guidance*. Retrieved From

<https://www.gadoe.org/External-Affairs-and-Policy/Policy/Pages/Promotion-and-Retention.aspx>

Grier-Reed, T., Appleton, J., Rodriguez, M., Ganuza, Z., & Reschly, A. L. (2012). Exploring the student engagement instrument and career perceptions with college students. *Journal of Educational and Developmental Psychology*, 2(2), 85.

Jimerson, S. R., Anderson, G. E., & Whipple, A. D. (2002). Winning the battle and losing the war: Examining the relation between grade retention and dropping out of high school. *Psychology in the Schools*, 39(4), 441-457.

John W. Gardner Center for Youth and their Communities, Stanford University. (2014).

Menu of college readiness indicators and supports. College Readiness Indicator Systems Resource Series. Seattle, WA: Bill & Melinda Gates Foundation.

Kuczera, M., & Field, S. (2014). OECD Reviews of Vocational Education and Training A Skills beyond School Review of the United States.

Kuh, G. D. (2001). The National Survey of Student Engagement: Conceptual framework and overview of psychometric properties. *Bloomington, IN: Indiana University Center for Postsecondary Research*, 1-26.

Kuhn, M., & Johnson, K. (2013). *Applied predictive modeling* (Vol. 26). New York: Springer.

Lehr, C. A., Sinclair, M. F., & Christenson, S. L. (2004). Addressing student engagement and truancy prevention during the elementary years: A replication study of the Check & Connect model. *Journal of Education for Students Placed At Risk*, 9(3), 279–301.

- Lewis, A. D., Huebner, E. S., Malone, P. S., & Valois, R. F. (2011). Life satisfaction and student engagement in adolescents. *Journal of Youth and Adolescence*, 40(3), 249-262.
- Lovelace, M.D., Reschly, A.L., & Appleton, J.J., (2017). *Longitudinal characteristics and incremental validity of the Student Engagement Instrument*. Manuscript in preparation.
- Lovelace, M. D., Reschly, A. L., Appleton, J. J., & Lutz, M. E. (2014). Concurrent and predictive validity of the Student Engagement Instrument. *Journal of Psychoeducational Assessment*, 0734282914527548.
- Martin, A. J. (2007). *The Motivation and Engagement Scale*. Sydney: Lifelong Achievement Group.
- Martin, A. J. (2008a). Motivation and engagement in diverse performance settings: Testing their generality across school, university/college, work, sport, music, and daily life. *Journal of Research in Personality*, 42(6), 1607-1612.
- Martin, A. J. (2008b). Enhancing student motivation and engagement: The effects of a multidimensional intervention. *Contemporary Educational Psychology*, 33(2), 239-269.
- Martin, A. J. (2009a). Motivation and engagement across the academic life span a developmental construct validity study of elementary school, high school, and university/college students. *Educational and Psychological Measurement*, 69(5), 794-824.
- Martin, A. J. (2009b). *The motivation and engagement scale—User manual*. Sydney: Lifelong Achievement Group.
- National Center for Education Statistics (2017). Public high school graduation rates. Retrieved from https://nces.ed.gov/programs/coe/indicator_coi.asp
- National Student Clearinghouse. (2017). *National Student Clearinghouse Fact Sheet*. Retrieved from <http://studentclearinghouse.info/onestop/wp-content/uploads/NSCFactSheet.pdf>

- Neild, R. C., Balfanz, R., & Herzog, L. (2007). An early warning system. *Educational leadership*, 65(2), 28-33.
- Organisation for Economic Co-Operation and Development. (2014) Education at a glance, 2014: Country Note, United States. Retrieved from:
<http://www.oecd.org/unitedstates/United%20States-EAG2014-Country-Note.pdf>
- Rabe-Hesketh, S. & Skrondal, A. (2012). *Multilevel and longitudinal modeling using Stata* (3rd ed., Vols. 1-2). College Station, TX: StataCorp.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (Vol. 1). Sage.
- Reschly, A. L., & Christenson, S. L. (2012). *Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct* (pp. 3-19). Springer US.
- Reschly, A. L., & Christenson, S. L. (2006). Prediction of Dropout Among Students With Mild Disabilities A Case for the Inclusion of Student Engagement Variables. *Remedial and Special Education*, 27(5), 276-292.
- Robbins, S. B., Allen, J., Casillas, A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of educational psychology*, 98(3), 598.
- Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis.
- Roderick, M., Coca, V., & Nagaoka, J. (2011). Potholes on the road to college high school effects in shaping urban students' participation in college application, four-year college enrollment, and college match. *Sociology of Education*, 84(3), 178-211.
- Rosenthal, B. S. (1998). Non-school correlates of dropout: An integrative review of the

- literature. *Children and Youth Services Review*, 20(5), 413-433.
- Schneider, M., & Yin, L. (2011). The High Cost of Low Graduation Rates: How Much Does Dropping Out of College Really Cost? *American Institutes for Research*.
- Schunk, D. H., & Mullen, C. A. (2012). Self-efficacy as an engaged learner. In *Handbook of research on student engagement* (pp. 219-235). Springer US.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of educational research*, 45(1), 89-125.
- Tinto, V. (1982). Defining dropout: A matter of perspective. *New Directions for Institutional Research*, 1982(36), 3-15.
- Tyack, D. B. (1988). Ways of seeing: An essay on the history of compulsory schooling. *Complementary methods for research in education*, 24-58.
- U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2015). *Check & Connect*. Retrieved from <http://whatworks.ed.gov>
- Voelkl, K. E. (2012). School identification. In *Handbook of research on student engagement* (pp. 193-218). Springer US.
- Waldrop, D., Reschly, A., Fraysier, K., Appleton, J. (in press). Measuring the Engagement of College Students: Administration Format, Structure, and Validity of the Student Engagement Instrument- College. *Measurement and Evaluation in Counseling and Development*