THE ROLE OF HIGH SCHOOL STUDENT ENGAGEMENT IN POSTSECONDARY ENROLLMENT AND PERSISTENCE

by

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(Under the Direction of Amy L. Reschly)

ABSTRACT

In our technological and information-based economy, more jobs are requiring postsecondary education, which has increasing the demand for a highly educated workforce (Carnevale, Jayasundera, & Gulish, 2016). Though rates of high school and postsecondary completion are at historic highs, many students, particularly students from minority and low-income households, drop out of postsecondary institutions within the first year (McFarland, Cui, & Stark 2018; Shapiro et al., 2014). This trend indicates early intervention is needed. In both the secondary and postsecondary literature, student engagement is identified as a promising point of intervention to prevent both high school and postsecondary dropout (Reschly & Christenson, 2012; Tinto, 1993), though a gap exists in the research literature for large-scale theory-driven student engagement research linking secondary student engagement to postsecondary outcomes.This study examines the role of secondary student engagement in postsecondary enrollment and persistence using data from the High School Longitudinal Study of 2009 (HSLS:09), a large-scale, nationally representative study (NCES, 2018). Multilevel modeling is used to analyze the extent to which demographic, academic, financial, and engagement variables predict postsecondary enrollment and persistence. Results from the current study indicated that model fit improved with the addition of engagement variables for postsecondary enrollement and

persistence for both the 9th and 11th grade cohorts. Students with higher scores on a measure of future goals and aspirations were significantly more likely to enroll in postsecondary institutions. Students reporting higher levels of peer support for learning were more likely to persist at postsecondary institutions. Directions for future research and limitations of the current study are discussed.

INDEX WORDS: Student engagement, Postsecondary enrollment, Postsecondary persistence

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DEDICATION

This dissertation is dedicated to my grandfather, William Dulaney Gwinn. A professor of chemistry at the University of California at Berkeley, he was a wonderful teacher, an innovative researcher, and committed to learning his entire life, working in his garden, building computers, creatively repairing the family cars or cultivating his impressive collection of sourdough bread starters. Some of my fondest childhood memories involve visiting him and my grandmother in California, baking bread, hiking in the nearby canyon, and asking him a million questions about stars, animals, or whatever my interest was at the time. He always encouraged my curiousity and is my inspiration to this day.

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THE ROLE OF HIGH SCHOOL STUDENT ENGAGEMENT IN POSTSECONDARY ENROLLMENT AND PERSISTENCE

CHAPTER 1

INTRODUCTION

In recent years, the demand for a more educated workforce has grown along with the number of jobs requiring postsecondary education (Carnevale, Jayasundera, & Gulish, 2016). Though rates of high school completion and postsecondary attainment are at their highest levels, postsecondary dropout rates, and dropout rates for students from minority groups and low-income households at both the secondary and postsecondary level, remain high (McFarland et al., 2017; McFarland, Cui, & Stark, 2018). In addition, the United States is losing ground in educational attainment when compared to other developed nations. The US fell from 2nd in 2000 to 19th in 2014 for postsecondary degree attainments among 25-34 year olds living in economically developed countries (Organisation for Economic Co-Operation and Development, 2014). To keep pace with the demand for educated workers, and remain competitive in the global economy, America must address its postsecondary dropout problem.

Secondary and postsecondary dropout is costly for both the individual dropping out and the nation as a whole. In the United States, earnings stratification by educational attainment is some of the most dramatic in the developed world, where individuals with less education are much more likely to be in poverty (Pew Research Center, 2014). Students who drop out of college often take on student loan debt without any of the economic benefits of completing a postsecondary degree. Contrary to popular belief, individuals with smaller loans (less than $10,000) are more likely to default, as these borrowers often represent individuals who borrowed but did not complete their degrees (Executive Office of the President, 2016). As the majority of student loans are subsidized by the federal government, defaulted student loans also cost the American taxpayer both in unpaid loans, the lost opportunity cost for publicly funded colleges and universities, and taxes from more lucrative employment (Schneider & Yin, 2011).

Most students who drop out of postsecondary institutions do so within the first year (Shapiro et al., 2014), indicating that intervention earlier in students' educational careers is needed. Many studies have documented the link between stronger academic preparation and higher rates of postsecondary enrollment and retention (Belfield & Crosta, 2012; Brown et al., 2008; Robbins, Allen, Casillas, Peterson, & Lee, 2006; Robbins et al., 2004). With the costs of postsecondary education rising and fewer students from low-income families attending postsecondary institutions (Cahalan et al., 2016), financial preparation for high school students is likely a needed point of intervention. Scholars have also identified several psychosocial factors that appear to contribute to postsecondary enrollment and retention, including resilience (Eccles, Vida, & Barber, 2004), self-esteem (Napoli & Wortman, 1998), self-discipline (Porchea, Allen, Robbins, & Phelps, 2010; Robbins et al., 2006), and student engagement (Fraysier, Reschly, & Appleton, 2019; Kuh, Cruce, Shoup, Kinzie, & Goyea, 2008; Laird, Chen, & Kuh, 2008; Sciarra, Seirup, & Sposato, 2016).

Student engagement is a prominent point of intervention for dropout prevention at both the secondary and postsecondary level (Kuh, 2014; Reschly & Christenson, 2012; Tinto 1993). Scholars across literatures agree student engagement is important to positive academic outcomes, though the student engagement construct lacks conceptual clarity (Reschly & Christenson, 2012). A wide variety of definitions and applications of student engagement exist both across and within secondary and postsecondary engagement literatures (Reschly & Christenson, 2012; Waldorp, Reschly, Fraysier & Appleton, 2019). At the elementary and secondary level, Finn's Participation-Identification Model (Finn, 1989) is largely regarded as a seminal theory on student engagement and the basis for much of the recent theoretical work (Reschly & Christenson, 2012). According to the Participation-Identification Model, when students begin participating in school, even at a basic level (e.g., attending, answering teacher questions, following directions) they receive positive reinforcement for their role as a student, increasing their sense of belonging and school identification. This greater identification leads to more participation, creating a cycle of participating in and identifying with school (Finn, 1989). Finn's Participation-Identification Model has found empirical support through both the Check & Connect intervention, a

dropout prevention intervention based on the model, and various other studies examining school belonging and identification. From Finn's Participation-Identification model and data from the implementation of the Check & Connect Intervention, Christenson et al. (2008) developed a conceptualization of student engagement that defined student engagement as a meta-construct (Fredricks, Blumenfeld, & Paris, 2004), identifying four distinct components of student engagement: academic (e.g. time on task, homework completion, credit accrual), behavioral (e.g. attendance, following school rules), cognitive (e.g. valuing school and learning, future goals), and affective (e.g. feelings of belonging at school, positive peer and teacher relationships).

At the postsecondary level, conceptualizations of student engagement focus heavily on both individual and institutional factors, as exemplified by the National Survey of Student Engagement (NSSE), one of the most common measurement tools for student engagement at the postsecondary level (Kuh, 2003). However one prominent theory of postsecondary engagement, Tinto's theory of academic and social integration, provides a more individually defined theory of student engagement at the postsecondary level. Tinto defined academic integration as commitment to intellectual development, identifying grades as an important indicator, and social integration as a sense of belonging at an institution achieved through positive social encounters (Tinto, 1975, 1982). Tinto's theory of academic and social integration is similar to Christenson and colleague's (2008) conceptualization of academic, behavioral, cognitive and affective engagement, providing a possible theoretical bridge between the two literatures and a point for understanding the developmental process of engagement across secondary and postsecondary schooling experiences.

There are few existing measures of student engagement that provide a theoretically cohesive, empirically supported framework for measuring indicators of cognitive, behavioral, and affective engagement (Fredricks & McColsky, 2012). Many indicators of academic and behavioral engagement are readily available through school data, though cognitive and affective engagement are primarily internal processes and more difficult to measure (Appleton et al., 2006; Reschly & Christenson, 2012). To measure cognitive and affective engagement, Appleton et al. developed the Student Engagement

Instrument (SEI), which has its theoretical basis in Finn's Participation-Identification Model (Finn, 1989) and data from the Check & Connect intervention (Appleton et al., 2006). The SEI contains two factors of cognitive engagement, Future Goals and Aspirations and Control and Relevance of Schoolwork, and three affective engagement factors: Teacher-Student Relationships, Peer Support for Learning, and Family Support for Learning (Appleton et al., 2006). The SEI has demonstrated strong psychometric properties across several studies and a wide range of populations (Appleton et al., 2006: Betts et al., 2010; Lovelace, Reschly, Appleton, & Lutz, 2014).

The current empirical data on the role of secondary engagement in postsecondary enrollment is limited, but the existing research is promising. For example, Sciarra et al. (2016) found a relationship between student engagement behaviors, such as more interaction with mathematics teachers outside of class and higher levels of extracurricular participation, and four-year college persistence. Parenting behaviors that support learning and engagement behaviors have also been found to have an indirect impact on postsecondary enrollment (Hill & Wang, 2015), and Fraysier et al. (2019) found students with higher attendance, secondary academic achievement, low rates of disciplinary actions and student-held future goals and aspirations, an indicator of cognitive engagement, were significantly more likely to attend and persist at postsecondary institutions.

The Secondary Longitudinal Studies Program, operated by the National Center for Educational Statistics (NCES), provides scholars with an opportunity to study engagement with a large, nationally representative sample of students. Studies using the National Longitudinal Study of 1988 (NELS:88) and Educational Longitudinal Study of 2002 (ELS:2002) have linked higher levels of student engagement to higher rates of school completion (Fall & Roberts, 2012; Finn & Rock, 1997; Reschly & Christenson, 2006). Student engagement has also been studied as an outcome variable, with higher levels of student engagement found at smaller schools (Finn & Voelkl, 1993; Lee & Smith, 1993; Weiss, Carolan & Baker-Smith, 2010), and that negative school-student perception (Ripiski & Gregory, 2009) and parent-school interactions (Fan & Williams, 2010) were related to lower levels of student engagement. Findings from the NELS:88 and ELS:2002 provide empirical support for the role of student engagement in

academic outcomes, though a lack of conceptual clarity plagues the literature (Reschly & Christenson, 2012).

At present there is a gap in the literature for large-scale theory-driven student engagement research linking secondary student engagement to postsecondary outcomes. The current study seeks to examine whether student engagement at the secondary level predicts postsecondary enrollment and persistence, utilizing the Christenson et al. (2008) four-component model of student engagement including academic, behavioral, cognitive and emotional engagement. This study will analyze data from the most recent study in the Secondary Longitudinal Studies Program, the High School Longitudinal Study: 2009 (HSLS:09).

Purpose of Study

The purpose of the present study is to measure the role of secondary student engagement in postsecondary enrollment and persistence. The current study uses a theory-driven definition of engagement, defining engagement as a global construct that includes behavioral, cognitive, and affective components. The analysis will include variables previous research has established as related to postsecondary enrollment and persistence, including gender, race/ethnicity, parental SES, academic achievement, beliefs about the financial feasibility of attending a postsecondary institution, and measures of behavioral, cognitive, and affective engagement. Chapter 2 consists of a literature review on the current state of educational attainment in the United States, an overview of previously identified factors contributing to postsecondary enrollment and persistence, and models of student engagement at both the secondary and postsecondary level.

Chapter 2 highlights the importance of secondary preparation in postsecondary success, and discusses the extent to which student engagement is a developmental process that emerges early in the schooling experience, evolves throughout a student's school career, and influences future academic contexts. Chapter 2 also presents the Secondary Longitudinal Studies program, which provides large-scale, nationally representative data on school experiences across many levels of schooling and into early adulthood. I review findings and conceptualization of the student engagement construct from existing

research utilizing Secondary Longitudinal Studies data to study student engagement. Basing my argument in previous research identifying the importance of secondary student engagement on postsecondary student enrollment and persistence, I argue that data from the Secondary Longitudinal Studies program addresses a critical gap in the research literature by allowing for examination of the role of student engagement in postsecondary enrollment in a large-scale, nationally representative study. I hypothesize that students who persist to the second year of postsecondary study will have higher levels of secondary engagement. In Chapter 3, I provide a detailed description of the methodology used to empirically test this hypothesis. Chapter 4 presents the results of the study. Chapter 5 discusses the relationship between the study results and existing research and discusses study limitations and directions for future research.

CHAPTER 2

REVIEW OF THE LITERATURE

Recent economic trends in the United States demonstrate a decline in goods-producing jobs such as mining and manufacturing and the growth of high-skill, information-based jobs in healthcare, technology, and services, increasing the demand for educated workers (Carnvale & Rose, 2015). The Bureau of Labor Statistics estimated jobs requiring postsecondary education will be the fastest growing job sector through 2022 (Bureau of Labor Statistics, 2018), and by 2020 two thirds of all jobs will require some sort of postsecondary education (Carnevale, Smith, & Strohl, 2013). The recent Great Recession and subsequent recovery has also impacted the demand for educated workers, with 99% of the 11.6 million jobs added since the recession going to individuals with some postscondary education (Carnevale, Jayasundera, & Gulish, 2016). In contrast, the majority of jobs lost during the recession, 5.6 million out of 7.2 million, were occupied by workers with a high school diploma or less (Carnevale et al., 2016). Workers without postsecondary education who have regained employment post-recession are far less likely to have "good jobs," defined by Carnevale et al. (2016) as jobs that pay over $53,000 a year and come with benefits. Growth in the service sector has also led to the rising demand for educated workers with associate's degrees or some sort of postsecondary training, while demand for jobs requiring only a high school degree or less has declined (Carnevale, Strohl, & Ridley, 2017). As America continues its economic growth post-recession, it is clear the stakes for producing an educated population have never been higher.

The need to build an educated workforce in the United States is highlighted by the fact that the US income stratification by earnings level is among the most dramatic in the developed world (OECD, 2014). A recent Pew research study indicated this earnings gap has expanded over the last 20 years (Pew Research Center, 2014). The median income difference (in 2012 dollars) between 25-32 years olds with high school degrees, compared to those with bachelors degrees, for Millenials and Gen Xers was approximately $17,500, up from $14,245 for Late Boomers, $9,690 for Early Boomers, and $7,499 for Silent Generationers (born from the mid-1920s to the mid-1940s) (Pew, 2014). Young Americans with only a high school degree also have much higher rates of unemployment and poverty when compared to their more educated peers. For those with a bachelor's degree, the unemployment rate was 3.8%, with only 5.8% living in poverty. For those with some college, those numbers more than double (8.1% unemployed, 14.7% living in poverty). These trends continue for those with only a high school degree (12.2% unemployed, 21.8% in poverty; Pew, 2014).

Educational Attainment in the United States

It is clear from existing educational and economic trends that producing an educated workforce is a necessity for both national economic success and the wellbeing of individual citizens. Overall, the youngest generation of Americans is the most highly educated in comparison to all previous generations (Pew, 2014). Currently, the National Center for Education Statistics (NCES) reports that 92% of adults ages 25-29 have completed high school (McFarland et al., 2017), and only 6.5% of 16-24 year olds had left school without a high school diploma or equivalent credential (McFarland, Cui, & Stark, 2018). However, the rates of high school completion in the United States vary greatly between groups of students, with minority students, students from low-income homes, and students born outside the U.S. graduating at

much lower rates than the national average (McFarland et al., 2018). For example, the percentage of White 16-24 year olds without a high school diploma was 5.2%, compared to 7.4% of Black, 10.6% of Hispanic, and 15.7% of American Indian/Alaskan Native 16-24 year olds without a high school diploma or equivalent credential. For 16-24 year olds from the lowest third of the family income distribution, 11.6% did not have a high school diploma or equivalent, and 13.9% of 16-24 year olds with disabilities did not have a high school diploma (McFarland et al., 2018). Additionally males (7.1%) and individuals born outside the US (21%) were more likely to leave school without a diploma or credential (McFarland et al., 2018). Although high school dropout rates are at historic lows, it is clear that among specific groups of students high school dropout is still an area in need of attention and intervention.

Similar demographic trends in educational attainment are apparent at the postsecondary level. The NCES reported that 46% of 25-29 year olds in the US have attained associate degrees or higher and 36% have attained bachelor's degrees or higher (McFarland et al., 2017), with 9% more women earning associate degrees and 8% more women earning bachelor's degrees (McFarland et al., 2017). Large discrepancies persist in degree attainment by race/ethnicity and socioeconomic background. In 2017, 64% of 25-29 year-old Asian/Pacific Islander young adults had earned a Bachelor's degree, compared to 43% of Whites, 23% of Blacks and 19% of Hispanics (McFarland et al., 2017). At the associate's degree level, Asian/Pacific Islanders again had the highest rates of educational attainment at 69%, compared to 54% of Whites, 32% of Blacks, 27% of Hispanics and 17% of American Indians/Alaskan Natives (McFarland et al., 2017). The Pell Institute Report on College Equality documented that family income plays a large role in whether students both enroll in and complete postsecondary education (Calahan et al., 2016). Eighty percent of high school students from the top family income quartile enroll in

postsecondary institutions, while only 45% of those from the lowest quartile do (Cahalan et al., 2016). Furthermore, of all bachelor's degree earning students identified as dependent family members under the age of 24 (full-time students) in 2014, 54% were in the top income quartile, and only 10% were in the bottom income quartile (Cahalan et al., 2016). The current income inequality in both postsecondary enrollment and completion, combined with data indicating growing earnings stratification level by educational attainment in the U.S., highlights the need for interventions aimed improving educational attainment in young adults from diverse socioeconomic backgrounds.

Overall trends toward a more educated American populace, particularly among young people, are positive and reflect the effectiveness of initiatives geared towards improving high school completion. However, the United States is not keeping pace with the expected demand for educated workers (Carnevale et al., 2013). Although postsecondary enrollment and completion rates continue to rise in the US, other developed nations have outpaced the US in postsecondary educational attainment, particularly among young adults. In 2000, the US ranked 2nd out of 30 Organisation for Economic Coperation and Development countries in postsecondary attainment for adults aged 25-34. In 2014, the overall number of adults aged 25-34 with postsecondary degrees had increased from 30 percent in 2000 to 35 percent in 2014, but the US was ranked 19th out of 43 OECD countries (OECD, 2014).

Postsecondary Dropout

Postsecondary dropout is a major problem in America. Thirty-one million students have dropped out of college over the past two decades, and 20% of the US adult population over age 25 have attended a postsecondary institution without completing a degree (Shapiro et al., 2014). Although some factors influencing secondary dropout also influence postsecondary dropout,

such as academic preparedness and previously mentioned demographic risk variables, postsecondary students also have unique attributes. Many postsecondary institutions have minimum academic requirements that must be met for admission, a requirement that does not exist at public US high schools. Secondary attendance through aged sixteen is compulsory in most states; however, postsecondary enrollment is not compulsory in the US, and individuals choose to start and stop postsecondary studies at almost any point in their adult life. Additionally, postsecondary students have a greater degree of choice in which postsecondary institution and what type of institution they attend, and also must consider how they will pay for their education. The rise of for-profit colleges, and with it non-traditional students (e.g., older, part-time, mixed enrollment) present additional considerations when examining postsecondary attainment in the United States. For example, non-traditional students have lower postsecondary completion rates than traditional, first-time students (National Student Clearinghouse, 2017; Shapiro et al., 2017). However, even when focusing on only first-time, traditional students, alarming postsecondary dropout trends emerge. In a recent study conducted by Shapiro et al. (2017), in which a cohort of over 2 million incoming postsecondary students was followed over a six year period, 55.9% completed their degree (2 or 4 year) within 6 years. At the final follow-up 11.7% of these students were still enrolled, but almost a third (31.4%) had dropped out and were no longer enrolled in any postsecondary institution. For students under the age of 20 at first enrollment, 61.7% had completed their degree, 12.3% were still enrolled and 26.0% had dropped out. For students over age 20 when first entering college, nearly half had dropped out after six years (Shapiro et al., 2017). Thus, postsecondary dropout is a widespread problem in the United States among both traditional and non-traditional students.

Many states have implemented merit-based scholarships to encourage promising high school graduates to continue their education. Examples include the Florida Bright Futures Scholarship and Georgia's Help Outstanding Pupils Educationally (HOPE) Scholarships. Although studies have found that these scholarships increase enrollments in general by about 5-8%, including for minority students (Cornwell, Mustard, & Sridhar, 2006; Zhang, Hu, & Seisening, 2013), a significant portion of this enrollment increase is from retaining students who would have otherwise chosen out-of-state schools (Cornwell et al., 2006; Zhang, Hu, Sun, & Pu, 2016). Studies have found that merit-based aid programs have a less dramatic effect on degree production (Zhang et al., 2013), with one large study examining merit-based aid across 25 states finding no meaningful increase in college completion when students were exposed to merit-based aid (Sjoquist & Winter, 2015). This may be because individuals utilizing merit-based aid are often promising students who would otherwise graduate and that many individuals lose merit-based aid prior to graduation (Sjoquist & Winter, 2015).

Postsecondary Student Debt

With the rising cost of tuition and increasing student debt (Lucca, Nadauld, & Shen, 2017), many people are beginning to question whether the benefits of postsecondary education outweigh these increasing costs. However, when surveyed, 72% of young adults ages 25-32 with a Bachelor's degree reported their degree had paid off; an additional 17% said they believed it would pay off in the future (Pew, 2014). When young adults were asked about whether they believed their student loans were a good investment, a large majority (87%) reported they believed these loans were (Pew, 2014). This information, combined with previously reported statistics on income stratification based on earnings, provides strong evidence that attending and completing a postsecondary degree is a worthwhile investment for young Americans.

Although students who complete their degrees report feeling their degree paid off (and statistics show that it likely will), students who take out loans to pursue postsecondary education but then drop out are often left in a precarious financial position. According to a 2016 report on student debt for the Executive Office of the President, individuals who did not complete their degree had a default rate of 25% on their students loans, compared to a 9% default rate for students who had completed their degree. When comparing the difference between completers and non-completers in measures of dollars repaid, the Student Debt Report found that only 38% of noncompleters had paid back a dollar on their loans, compared to 58% of completers. Among completers, these repayments had led to a 14% decline in the original balance. This figure was only 6% for noncompleters (Executive Office of the President, 2016). The Student Debt Report detailed that, contrary to popular belief, individuals with smaller student debt (less than $5,000) are much more likely to default on their loans than those with debts over $20,000. This is because individuals with smaller loans are less likely to complete college than borrowers with higher loans. Among borrowers with over $20,000 in loans, approximately 66% completed their degree, whereas only 16% of borrowers with less that $5,000 in loans completed their degrees. For borrowers with less than $5,000 in debt, a full quarter had defaulted within 7 years, and approximately two-thirds of all student debt defaults are by borrowers with less than $10,000 in loans. In comparison, for borrowers with more than $40,000 in loans, only 7% had defaulted within three years (Executive Office of the President, 2016).

This higher default and lower repayment rate for students who drop out of postsecondary institutions has consequences both to the individual and society. For the individual, that person is saddled with the financial cost of postsecondary enrollment without the benefits; those who do not compete degrees have a much lower median wage than individuals who complete

postsecondary degrees (NSC, 2017; Pew, 2014). Additionally, these loans cannot be discharged in bankruptcy and often impose a harsh financial burden on the borrowers for years (Executive Office of the President, 2016). For American taxpayers, many student loans are funded by the federal government using taxpayer money, so taxpayers foot the bill when these loans are not repaid (Executive Office of the President, 2016). When students attending taxpayer-funded universities and do not complete their education, they consume valuable resources (e.g., grants, scholarships, access to coursework and training) that do not produce workers ready to meet the needs of society (Schneider & Yin, 2011). According to estimates from the American Institute for Research, postsecondary dropout costs American taxpayers $565.9 million dollars in lost federal income tax, $164.4 million dollars in lost state income tax, and a staggering $3.7 billion dollars in lost income (Schneider & Yin, 2011). Postsecondary dropout is a problem that impacts both the individual dropping out and American society at large, and thus is worthy of interventions focused on retention and prevention.

Preparing Students for Postsecondary Education

Students who do not complete their postsecondary education tend to leave early in their careers, with a recent report from the National Student Clearinghouse finding that 87.6% of American adults who attended a postsecondary institution, but did not obtain a degree, dropped out within the first two years of study; approximately two thirds dropped out within the first year (Shapiro et al., 2014). This high proportion of students dropping out early in their postsecondary careers suggests that these students were likely not prepared to meet the academic, financial, and/or social-emotional demands of college and that postsecondary preparation at the secondary level may be a crucial place for early intervention. Currently, a wealth of evidence exists for the connection between academic preparation and postsecondary performance. Research has

repeatedly found high school academic achievement and preparedness is highly predictive of college enrollment and retention (Belfield & Crosta, 2012; Brown et al., 2008; Robbins, Allen, Casillas, Peterson, & Le, 2006; Robbins et al., 2004) and that this effect can be observed as early as the third grade (Lesnick, Goerge, Smithgall & Gwynne, 2010). It appears that skills and content learned in high school and earlier, and strategies for academic success, continue to be applicable at the postsecondary level.

As the cost of postsecondary education has increased and national student debt continues to climb, researchers have begun to examine the role of financial preparation, planning, and literacy in an individual's decision to attend college. Existing data clearly indicate that individuals from lower-income families and independent young adults routinely attend postsecondary institutions less frequently than higher income students (Cahalan et al., 2016). What is more surprising is that low income students and families often overestimate the cost of college and underestimate the benefits (Avery & Kane, 2004; Grodsky & Jones, 2007). As the cost of higher education continues to increase and a larger share of that cost is being covered by individuals and families (Cahalan et al., 2016), financial preparation for higher education may become an increasingly important point of intervention for students and their families.

Researchers have also examined the role of certain psychosocial factors in postsecondary enrollment and completion. Psychosocial factors are often considered to be alterable variables, as opposed to more static status variables such as parental SES or quality of previous education, and therefore amenable to intervention (Reschy & Christenson, 2012). Many psychosocial factors appear in published literature, often with conflicting definitions of similar constructs, leading to less conclusive results when compared to studies focused on academic data. However, some studies have shown promising results for psychosocial factors in contributing to postsecondary

enrollment, suggesting these psychosocial factors might serve as points of postsecondary intervention. A meta-analysis by Robbins et al. (2004) found that academic goals (e.g., commitment to college degree, goal-directed behavior), academic related-skills (e.g., cognitive strategies, academic tools, task management skills) and academic self-efficacy (e.g., belief that one is able to be academically successful) were all related to postsecondary retention. Eccles et al. also identified career goals as a predictor of postsecondary enrollment, along with resilience (Eccles, Vida, & Barber, 2004). Other identified psychosocial factors include personality (e.g. conscientiousness, agreeableness) (Peterson, Casillas, & Robbins, 2006), self-discipline (Porchea, Allen, Robbins & Pehlps, 2010; Robbins et al., 2006) and self-esteem (Napoli & Wortman, 1998). One psychosocial factor that repeatedly emerges at both the postsecondary and secondary level as an important indicator of educational persistence and retention is student engagement.

Student Engagement

Webster's dictionary defined engagement as "emotional involvement or commitment" (Merriam-Webster, 2018), though the conceptualization students' emotional involvement or commitment to school takes on a broad, varied meaning within the psychological and educational literature. The term "student engagement" occurs in both in the secondary and postsecondary psychology literatures; and both within and across literatures the definition and measurement of student engagement varies widely (Reschly & Christenson, 2012). Student engagement appears as an important construct and point of intervention within both the secondary and postsecondary education literatures, though there is limited theoretical overlap between the two literatures or discussion of overarching theories that bridge the gap between the two levels of schooling. Across both literatures, scholars recognize that student behavior and

social interactions with teachers and peers at school are critical to student engagement (Astin, 1984; Finn, 1989; Kuh, 2003; Reschly & Christenson 2012; Tinto, 1993) Though much debate still exists around the role motivation plays in student engagement, especially since the concept of engagement is newer than several others in psychology, including motivation, many scholars believe that motivation is an underlying component of engagement (Fredricks & McColskey, 2012; Reschly & Christenson, 2012).

Student engagement at the elementary and secondary level. Within the secondary and elementary school literature, the construct of student engagement most frequently appears within the dropout prevention and school reform literature (Reschly & Christenson, 2012). Many different definitions and conceptualizations of student engagement exist, though Jeremy Finn's seminal theory, the Participation-Identification Model (Finn, 1989), is often cited as the basis for many current empirically supported theories, interventions, and measures of student engagement (Reschly & Christenson, 2012). Initially developed as a contribution to the dropout prevention literature, Finn's Participation-Identification Model conceptualizes student engagement as a long-term process by which students become more engaged or disengaged with school, ultimately resulting in either school completion or dropout (1989). Using the Perry Preschool Program as an example (Berruta-Clement, Schweinhart, Barnett, Epstein & Weikart, 1984), Finn argued for examining social bonding to school as an important component of both school completion and positive behaviors (Finn, 1989). Finn posed the Participation-Identification Model as a means of understanding the process of socially bonding and identifying with school and subsequent positive academic outcomes. According to the Participation-Identification Model, as students participate in school (defined, at the most basic level, as attending school, responding to teacher questions and directions, and being prepared) and they receive positive

reinforcement for their role as a student and member of the school community. This, in turn, fosters a sense of belonging that leads to further and more intensive forms of participation (Finn, 1989).

Finn built upon previous lines of dropout prevention literature which focused on a cycle of academic failure and decreasing self-esteem leading to school withdrawal and eventually dropout (Bernstein & Rulo, 1976; Gold & Mann, 1984). Although he agreed that dropout represented a process of disengagement from school, he cited the mixed evidence for a causal role of self-esteem in school completion and positive school behaviors (Finn, 1989). Finn argued that the frustration-self-esteem model provides a framework for identifying a negative cycle, but does not provide a theory for a positive cycle or preventative practices that could lead to higher levels of engagement and therefore reduce dropout risk (Finn, 1989). The Participation-Identification Model describes both positive and negative cycles of engagement and disengagement, provides a point for early identification and intervention of school withdrawal, and outlines a preventative practice by encouraging participation in children at school.

Scholars have continued to build upon Finn's Participation-Identification model through both theoretical and empirical work, highlighting the importance of school participation and other forms of behavioral engagement, along with aspects of affective or emotional engagement, such as school belonging and identification. Research has consistently found a strong, positive relationship between participation or behavioral engagement, notably school attendance and school completion (Alexander, Entwisle, & Horsley, 1997; Balfanz, Herzog, & Mac Iver, 2007; Barrington & Hendricks, 1989; Ensminger & Slusaricick, 1992; Reschly & Christenson, 2006) Empirical research suggests school identification is significantly, positively related to aspects of behavioral engagement, including classroom participation (Voelkl, 1997), and with dropout or

school completion (Finn & Zimmer, 2012; Reschly & Christenson, 2006). Finn's Participation-Identification Model has also served as a basis for other successful dropout completion interventions, most notably Check & Connect (Sinclair, Christenson, Evelo, & Hurley, 1998). At-risk students who receive the Check & Connect intervention, which promotes a sense of belonging and identification at school though building relationships and encouraging school participation, have consistently demonstrated increased school attendance and participation (Anderson, Christenson, Sinclair, & Lehr, 2004; Sinclair et al., 1998; Sinclair, Christenson, & Thurlow, 2005).

Through increased theoretical and empirical scholarship, secondary engagement scholars have refined their conceptualization of student engagement. Currently most scholars recognize student engagement as a multidimensional construct consisting of cognitive, behavioral, and psychological or affective components (Fredricks, Blumenfeld, & Paris, 2004; Reschly & Christenson, 2012). Christenson et al. (2008) proposed a four subtype model, including cognitive engagement (e.g., valuing learning, setting personal goals), affective engagement (e.g., relationships with peers and teachers at school, sense of identification or belonging at school), and distinguishing between academic engagement (e.g., time on task, credits accrued, homework completion) and behavioral engagement (e.g., attendance, disciplinary record, extra-curricular participation). They identified academic and behavioral engagement as more observable types of engagement, and cognitive and affective engagement as less observable forms, noting that less research had been dedicated to these less observable but still important types of engagement (Apppleton et al., 2006; Christenson et al., 2008). See Figure 1 for a representation of Christenson et al. 4-type model and common indicators for each type.

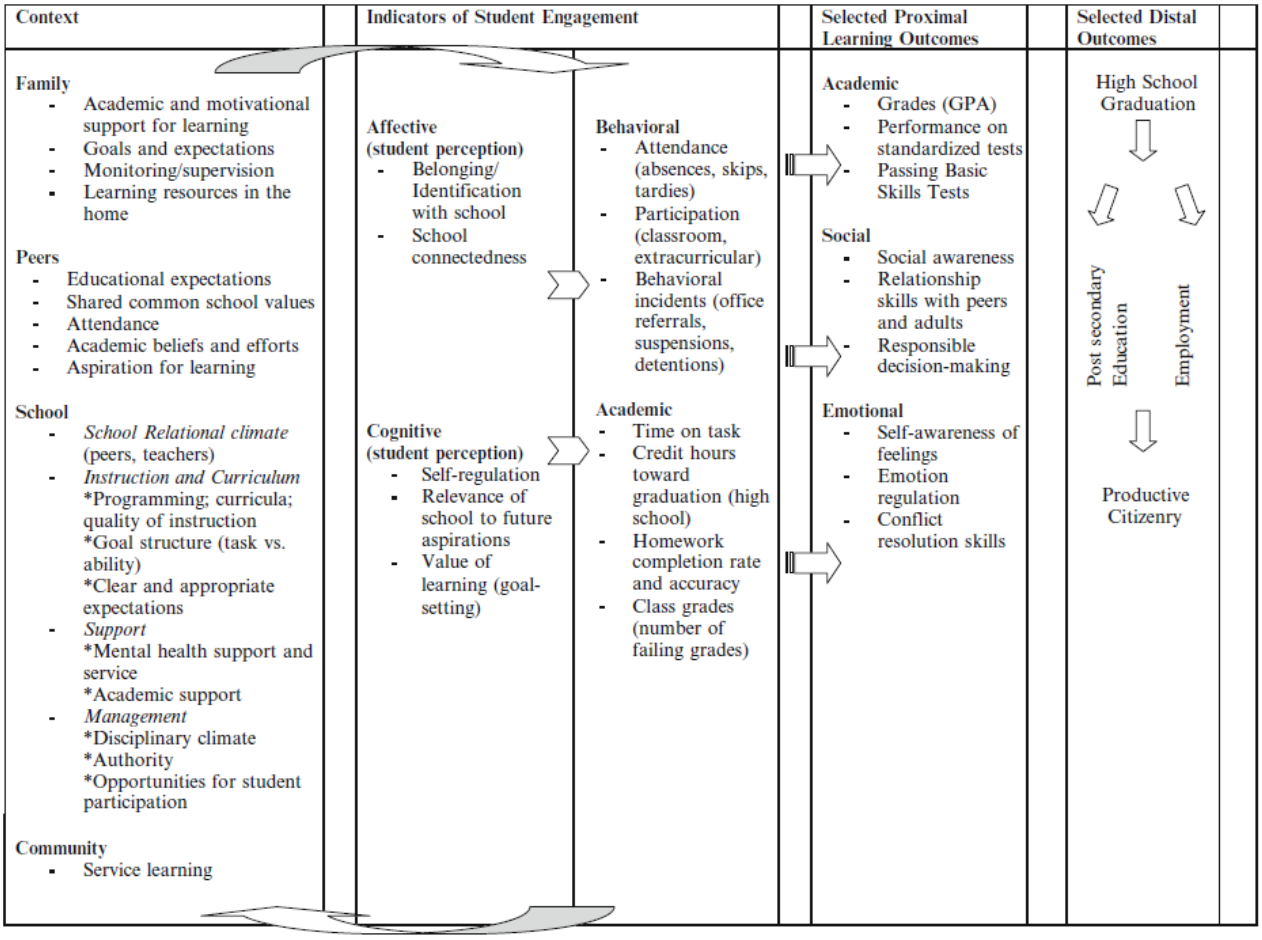

Figure 1. Context, Indicators, and Outcomes of Engagement. Reprinted with permission from Reschly & Christenson, 2012.

The roles of academic, behavioral, cognitive and affective engagement in positive school outcomes have all received some degree of empirical support. Academic engagement is easily measured through direct observation and consistently linked to student achievement (Gettinger & Seibert, 2002; Greenwood, Horton, & Utley, 2002); however, direct observation is time intensive and therefore costly. Studies have found that other indicators of academic engagement, such as course, assignment, and homework completion have significant, positive relationships with school achievement and completion (Finn, Pannozo, &Voelkl, 1995; Finn & Zimmer, 2012).

Behavioral engagement consistently emerges in the literature as an important predictor of high school completion and academic achievement, with studies finding attendance significantly and positively correlated to academic achievement (Gottfried, 2009; Roby, 2004; Steward et al., 2008) and that both attendance and low rates of disciplinary infractions in high school significantly predict postsecondary enrollment and persistence (Fraysier et al., 2019). Research indicates participation in extracurricular activities has a small-to-moderate, statistically significant relationship with academic achievement (Chambers & Schrieber, 2004; Feldman & Matajasko, 2005; Gerber, 1996), school completion (Eccles & Barber, 1999) and postsecondary enrollment (Marsh & Kleitman, 2002). Cognitive and affective engagement are more difficult to measure as they are more internal, less observable forms of student engagement (Appleton et al., 2006; Christenson et al., 2008), and many scholars believe cogntive and affective engagement indirectly impact academic outcomes, such as school completion and academic achievement, by working indirectly through behavioral and academic engagement (Reschly & Christenson, 2012; Voelkl, 2012). However, higher levels of cognitive and affective engagement have been significantly, positively linked to school completion (Lovelace et al., 2014), contribute unique variance to positive school outcomes (Lovelace, Reschly, & Appleton, 2017) and postsecondary enrollment and retention (Fraysier et al., 2019).

Student engagement at the postsecondary level. The construct of student engagement at the postsecondary level, and its conceptualization within the empirical literature, share many similarities with conceptualizations and applications of student engagement at the secondary level. However, despite these similarities, and their common goals of improved educational outcomes for students, little overlap exists between the literatures. One seminal student engagement theory within the postsecondary literature is Vincent Tinto's theory of academic and

social integration. Similar to many secondary scholars, he argued dropping out is a longitudinal process of engagement or disengagement determined by the extent to which a student is academically and socially integrated with their postsecondary institution (Tinto, 1975). Tinto defined academic integration as a commitment to intellectual development, which can be observed as students interacting with faculty members and classmates in addition to demonstrating commitment to academic goals. He highlighted grades as an important indicator of academic integration (Tinto, 1975). Tinto defined social integration as positive peer relationships with other students at the institution and a series of successful social interactions (1975). He stated both social and academic integration were important to postsecondary persistence, though academic and social integration can work against each other (1975). In later writings, Tinto expanded his theories to include distinctions between voluntary withdrawal and academic dismissal and to further discuss important topics such as transfer and financial pressures of paying for college (Tinto, 1982). Empirical research has supported Tinto's theories of academic and social integration, with a meta-analysis by Robbins et al. (2004) finding academic integration to be predictive of retention and higher GPA. A subsequent study identified aspects of social and academic integration as statistically significant predictors for postsecondary retention (Robbins et al., 2006).

Several similarities exist between Tinto's conceptualization of student engagement at the postsecondary level and conceptualizations of student engagement at the secondary level. Similar to Finn's Participant-Identification Model (1989), Tinto identified withdrawal as a longitudinal process of disengagement. Both Finn's Participation-Identification Model and Tinto's Social and Academic Integration theory highlighted the association between participation, belonging, and social interactions to school persistence (Finn, 1989; Tinto, 1975).

Tinto's theory of academic integration, which includes relationships with other students and teachers, are both components of affective engagement in the Christenson et al. (2008) conceptualization, and academic commitment and setting academic goals are both part of Tinto's academic integration and Christenson et al.'s, cognitive engagement, respectively. Similarly, both models recognize the importance of attendance and work completion (Christenson et al., 2008; Tinto, 1975). Tinto includes extracurricular participation, positive social experiences, and a general sense of identification with the institution as components of social integration, which overlap with Christenson et al.'s behavioral and affective engagement (Christenson et al., 2006; Tinto, 1975).

Theories of student engagement at the secondary and postsecondary level have many similarities, but also some key differences. One major difference between the definition of student engagement within the postsecondary versus secondary literature is that the postsecondary literature often describes student engagement within the framework of specific institutional characteristics and practices (Waldrop, Reschly, Fraysier, & Appleton, 2019). Although some secondary engagement research does focus on school-level factors, such as school size (Finn & Voelkl, 1993; Lee & Smith, 1993; Weiss, Carolan, & Baker-Smith, 2010) and climate (Ripiski & Gregory, 2009), engagement research and research-directed interventions often focus more on student-level characteristics. An example of the inclusion of specific institutional characteristics in the student engagement construct at the postsecondary level comes from George Kuh, a leading researcher in postsecondary student engagement and creator of the National Survey of Student Engagement (NSSE). Kuh defined engagement as "the time and energy students devote to educationally sound activities inside and outside of the classroom, and the policies and practices that institutions use to induce students to take part in these activities,"

(Kuh, 2003, p. 25). A great deal of empirical and theoretical work at the postsecondary level utilize both Kuh's definition of student engagement and the NSSE as an instrument for measuring student engagement.

Measuring student engagement. Measuring student engagement presents a challenge to researchers because of a lack of clarity and inconsistency with construct definitions and conceptualizations of student engagement (Reshcly & Christenson, 2012). An additional challenge is the limited pool of measures with theoretically-based frameworks that provide psychometrically sound measurements of indicators of student engagement (Fredricks & McCoksky, 2012). The NSSE is frequently used both in research on postsecondary student engagement and as a tool for individual institutions to privately assess student engagement and evaluate their institutional practices, and does have a secondary school version, the High School Survey of Student Engagement (Fredricks & McColsky, 2012; Martin & Torres, 2016; NSSE, 2018). The NSSE provides engagement data across four broad themes: Academic Challenge (i.e., Higher Order Learning, Reflective and Integrative Learning, Learning Strategies, Quantitative Reasoning), Learning with Peers (i.e., Collaborative Learning, Discussion with Diverse Others) Experiences with Faculty (i.e., Student-Faculty Interaction, Effective Teaching Practices), and Campus Environment (i.e., Quality of Interactions, Supportive Environment;NSSE, 2018).

Research with the NSSE revealed statistically significant relationships between postsecondary student engagement, achievement, and retention (Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008; Laird, Chen, & Kuh, 2008); however, the reliability of NSSE scores, and the validity of NSSE scores to predict positive student outcomes and measure student engagement, have been called into question by several empirical studies (Campbell & Cabrera, 2011; Gordon, Ludlum, & Hoey, 2008; LaNasa, Cabrera, & Tangsrud, 2009; Lutz & Culver, 2010; Tendhar,

Culver, & Burge, 2013). The High School Survey of Student Engagement (HSSE) was created out of the NSSE, though the HSSE adopts the three part model of student engagement (emotional, behavioral, and cognitive) and contains completely separate items and composites from the NSSE (Martin & Torres, 2016) so cannot be classified as a downward extension of the NSSE. The HSSE appears much less frequently in the research literature than the NSSE, does not have any published reliability and validity statistics (Fredricks & McColskey, 2012), and is currently used primarily by independent, private schools, though the survey is available for free online (Martin & Torres, 2016). Considering psychometric issues with the NSSE and HSSE, and the extent to which the NSSE and HSSE differ in their conceptualization of student engagement at different levels of schooling, the NSSE model of student engagement is practically and theoretically not conducive to examining the role of high school engagement in postsecondary persistence and enrollment.

The Student Engagement Instrument (SEI), created by Appleton et al. and based on the Christenson et al. model of student engagement (see Figure 1), is a theoretically-driven measure of student engagement that has demonstrated strong psychometric properties in empirical research (Appleton et al., 2006: Betts, Appleton, Reschly, Christenson, & Huebner, 2010; Carter, Reschly, Lovelace, Appleton, & Thompson, 2012; Lovelace, Reschly, Appleton, & Pohl, 2014; Waldorp et al., 2018). Noting that academic and behavioral indicators, as described in Figure 1, are often easily available in school data, the SEI focuses on measuring cognitive and affective engagement, internal states that are often more difficult to measure (Appleton et al., 2008; Reschly & Christenson, 2012). Several measures of student engagement have aimed at measuring more internal aspects of the construct, though few have available psychometric information and a strong theoretical basis (Fredricks & McCokskey, 2012). The SEI is self-

report measure of cognitive and affective engagement, has its theoretical basis in Finn's Participant-Identification model and is a refinement of engagement data from the Check & Connect Intervention (Appleton et al., 2006). Studies have found validity evidence for SEI scores for students in elementary school through college (Appleton et al., 2006: Betts et al., 2010; Carter et al., 2012; Lovelace et al., 2014; Waldrop et al., 2018), one of the only measures of student engagement to have such strong psychometric properties (Fredricks & McColskey, 2012).

The SEI includes six factors of cognitive and affective engagement which align with indicators of cognitive and affective engagement (see Figure 1), though for research purposes only five are used; three affective factors, Teacher-Student Relationships (TSR), Family Support for Learning (FSL) and Peer Support for Learning (PSL) and two cognitive factors, Future Goals and Aspirations (FGA) and Control and Relevance of Schoolwork (CRSW) (Betts et al., 2010; Lovelace et al., 2014). The affective measures, TSR, PSL, and FSL measure the extent to which students feel a sense of identification and belonging with school through supportive peer, family, and teacher relationships (Betts, 2012). The cognitive scales, FGA and CRSW, measure the extent to which students self-regulate, set goals, and believe in the value and relevance of their schoolwork (Appleton et al., 2006). The SEI provides a theoretically and psychometrically sound framework for measuring student engagement that is applicable at both the secondary and postsecondary level.

The Role of Secondary Student Engagement in Postsecondary Attainment

Although there is limited literature on the connection between secondary school engagement and postsecondary persistence and enrollment, current literature does suggest that student engagement, and certain aspects of the engagement construct, are linked to

postsecondary enrollment and persistence. In a study by Finn (2006), at-risk students with higher levels of secondary behavioral engagement were more likely to attend postsecondary institutions, accrue credits, and complete their degrees. A recent study by Sciarra, Seirup and Sposato (2016) found that students with higher engagement behaviors in secondary school, specifically greater hours participating in extracurricular activities and interacting with the mathematics teacher outside of class, were significantly more likely to persist in four-year colleges. Another study examining parenting behaviors found behaviors supportive of learning (i.e., monitoring, warmth, and autonomy support) had a significant, positive impact on grade point average in high school (Hill & Wang, 2015). Learning-supportive parenting behaviors were also positively related to higher levels of behavioral, cognitive, and emotional engagement in high school, and were indirectly related to higher rates of postsecondary enrollment (Hill & Wang, 2015). Fraysier et al. (2019) also found several indicators of engagement measured at the secondary level significantly predicted postsecondary retention and enrollment, including attendance, low rates of disciplinary action, and students' own future goals and aspirations. Students with strong future goals and aspirations were significantly more likely to attend a postsecondary institution and persist past the first year, even after controlling for demographic, academic, and behavioral variables (Fraysier et al., 2019). Taken together, these studies suggest secondary student engagement potentially plays an important role in postsecondary attainment. Further research is needed to fully understand and explore the relationship.

Student Engagement and the ELS Studies

Although studies have been conducted across many settings, an important goal for understanding the true relationship between a variable and its outcome is examining the extent to which it generalizes to a wider population. The Secondary Longitudinal Studies Program is a

series of longitudinal studies conducted by the NCES with the goal of gaining an in-depth, developmental perspective of the how school characteristics and attitudes towards school impact an individual's educational career and their lives beyond school (NCES, 2018). The Secondary Longitudinal Studies Program includes three completed studies, and two studies currently in progress. Completed studies include The National Longitudinal Study of the Class of 1972 (NLS:72), the High School and Beyond Study of 1980 (HS&B), and the National Educational Study of 1988 (NELS:88), with the Educational Longitudinal Study of 2002 (ELS:2002) and the High School Longitudinal Study of 2009 (HSLS:09) still ongoing.

The studies in the Secondary Longitudinal Studies program provide an opportunity for researchers to examine various factors related to academic achievement, educational attainment and school experience within the context of a large, nationally-representative sample. Many researchers have used the Secondary Longitudinal Studies, particularly the NELS:88 and ELS:2002 studies, to examine both the role of student engagement in educational outcomes and to measure student engagement as an outcome variable in relation to other school and individual level variables. Results from studies using the NELS:88 and ELS:2002 have found that smaller schools have higher levels of student engagement (Finn & Voelkl, 1993; Lee & Smith, 1993; Weiss, Carolan, & Baker-Smith, 2010), more engaged students were more likely to complete high school (Fall & Roberts, 2012; Finn & Rock, 1997; Reschly & Christenson, 2006), and negative relationships and perceptions between both students and schools (Ripiski & Gregory, 2009) and schools and parents (Fan & Williams, 2010) led to lower levels of student engagement. One problem with studying student engagement within the context of the Secondary Longitudinal Studies is that the conceptualization of and ways of measuring student engagement varies considerably from study to study, making it difficult to generalize results and

integrate findings across studies. These conceptualizations and measurement of student engagement are often not theory-driven. For a more in-depth look at conceptualizations of student engagement and findings from engagement-related studies, see Table 1 (NELS:88 Studies Measuring Student Engagement) and Table 2 (ELS:2002 Studies Measuring Student Engagement).

Table 1

NELS:88 Studies Measuring Student Engagement

Study	Conceptualization of Engagement	Findings
Finn & Rock, 1997 *Academic Success Among Students at Risk for School Failure*	3 composite variables • 3 teacher report items measuring the student's willingness to work hard for good grades, preparedness for class, and attendance • student report composite measuring engagement inside the school with items pertaining to attendance, preparedness for class, and frequency of behavioral trouble at school • student report composite measuring engagement behaviors outside of the classroom, with items asking number of sports participated in, extracurricular participation, and homework hours completed outside of school	Among minority students from low SES homes, those who completed school had significantly higher levels of engagement behaviors than those who did not, with "resilient" completers (academically successful completers) having the highest levels of engagement.
Finn & Voelkl, 1993 *School Characteristics Related to Student Enagement*	Six indicators of student engagement- • ABS-TARDY-teacher report items of frequent absence or tardiness • NOT-ENGAGED- teacher report items of attentiveness and disruption in class and	Smaller schools were related to higher levels of engagement, and the number of African American faculty members and the school regulatory environment do not appear to have an impact on student engagement. Schools with

	homework completion • ATTENDANCE- student report of absences, skipping school, tardiness and parents contacted about their attendance • PREPARATION- student report of frequency of coming to class without homework, books or paper and pencil • BEHAVIOR- student report of frequency of fights with other students, warnings on behavior, and being sent to the office for behavior • STUDENT-TEACHER RELATIONSHIPS- student report of getting along with teachers, sense of school spirit, teacher interest and praise for students, and whether students felt "put down" by their teachers	a higher percentage of minority students had higher levels of absenteeism and lower teacher-reported student preparedness, but a higher sense of community as rated by minority students.
Lee & Smith 1993 *Effects of School Restructuring on the Achievement and Engagement of Middle-Grade Students*	Engagement in Academic Work • Five item student report factor composite consisting of items measuring preparedness for class, weekly time spend on homework, and frequency of experiencing boredom at school At-Risk Behaviors • Seven item student report factor composite including being sent to the office, parents notified of misbehavior, unexcused absences or tardies, skipping class, getting in fights with peers and being seen as a troublemaker by peers	School restructuring had a small, consistently positive relationship to achievement and engagement, and small school size was related to higher levels of engagement and more equitably distributed academic achievement
Ream & Rumburger 2008 *Student Engagement, Peer*	Homework Activites • 2 item student-report composite measuring time spent on homework	Lower levels of engagement in formal, school-sponsored extracurricular activities and unorganized academic endeavors

Social Capital, and School Dropout Among Mexican American and Non-Lation White Students	completion both inside and outside of school School Preparation • 3 item student-report composite measuring preparedness for class including bringing homework, books, and pencil/paper Athletic Participation • 3 item student-report composite pertaining to intramural and interscholastic sports participation Arts Participation • 2 item student-report composite measuring participation in school music groups and or musicals/plays	were found among Mexican American students when compared to Non-Latino White peers
Reschly & Christenson 2006 *Prediction of Dropouts Among Students with Mild Disabilities*	Behavioral Engagement • 3 student report items on absences, tardies and skipping class • 2 student report factor composites pertaining to preparation for class and school behavior • 2 student report composites measuring time spent on homework and extracurricular participation Psychological/Interpersonal Engagement • 6 item student report School Warmth Scale factor composite • 6 item student report composite pertaining to student interactions with teachers Cognitive Engagement • 4 item student report factor composite measuring student beliefs around school utility • 1 student-report item asking how often students felt bored at school	Student engagement variables significantly predicted school dropout and completion rates for students with and without learning and emotional/behavioral disabilities.

Table 2
ELS:2002 Studies Measuring Student Engagement

Study	Conceptualization of Engagement	Findings
Fall & Roberts, 2012 *High school dropouts: Interactions between social context, self-perceptions, school engagement, and student dropout*	12 items measuring behavioral and academic engagement • Behavioral engagement- 4 student report items including attending class and following classroom behavioral expectations • Academic engagement- 8 teacher report items measuring persistence, effort and attention in English and Math classes • Study also included student-reported scales on school identification, parent support and teacher support	Higher levels of academic and behavioral engagement in 10th grade were negatively related to 12th grade dropout; teacher and parent support predicted students' sense of school belonging and control, which predicted academic achievement and academic and behavioral engagement
Fan & Williams, 2010 *The effects of parental involvement on students' academic self-efficacy, engagement and instrinsic motivation*	3 item student-report sale including items pertaining to working as hard as possible, working when material is difficult and put forth their best effort when studying.	Parental educational aspiration, benign school-initiated parental contact and family rules for watching television had a positive relationship to school engagement, and parent-school contact pertaining to school problems was negatively related to student engagement.
Ripiski & Gregory, 2009 *Unfair, Unsafe, and Unwelcome: Do High School Students' Perceptions of Unfairness, Hostility, and Victimization in School Predict Engagement and Achievement?*	5 item teacher-report scale measuring student attentiveness in class, student disruptiveness in class, student homework completion and student tardiness to class.	At the school level, perceptions of hostility predicted lower levels of engagement and reading achievement. At the individual level higher student perceptions of victimization predicted lower levels of both math achievement, reading achievement and student engagement.

Sciarra & Seirup, 2008 *The Multidimensionality of School Engagement and Math Achievement Among Racial Groups*	3 scales representing behavioral, emotional and cognitive engagement • Behavioral scale: 14 items, 8 student report items and 3 teacher report items including attendance, disciplinary action, attentiveness in class and hours spent participating in extracurricular activities • Emotional scale: 24 student report items including school safety, quality of peer relationships, quality of student-teacher relationships, and harmony between racial and ethnic groups at school • Cognitive scale: 10 items, 8 student report and 2 teacher report, measuring time spent doing homework, homework completion, commitment to grades and learning, and perseverance on difficult work.	More math achievement variance was accounted for by behavioral and cognitive engagement than by emotional engagement.
Sciarra, Seirup, & Sposate, 2016 *High School Predictors of College Persistence: The Significance of Engagement and Teacher Interaction*	2 internal scales • Academic support- 3 student report items measuring the extent to which finishing school, continuing education past high school, and studying were important to their friends. • Social support- 3 student report items measuring the importance of the strength of their friendships, and the importance getting together with friends and going to parties. 7 categorical variables • 2 teacher reported variables pertaining to whether students talk with Math or English teachers outside of class • student report item asking student if they had seen a school counselor for college planning • student report item asking if the	Interacting with math teachers outside of class and number of hours spend on extracurricular activities significantly related to persistence in college.

	student had performed community service, unpaid or volunteer work • 3 student report variables asking students to report hours spent working at a job, participating in extracurricular activities, and doing homework outside of school.	
Weiss, Carolan, & Baker-Smith, 2010 *Big School, Small School: (Re)Testing Assumptions about High School Size, School Engagement and Mathematics Achievement*	7 composites that contributed to the school engagement outcome variable • Teacher experience- teacher report items measuring years teaching experience (math and secondary level) • Delinquent Behavior- student report items measuring behaviors such as skipping class and being suspended • Academic Friend- student report variable measuring how important school was to student's closest three friends • Educational Motivation- student report scale measuring whether students found class interesting and believed that school was necessary and useful for their future • Teacher Beliefs and Ability- teacher report scale measuring beliefs that student can learn mathematics • School Preparedness- student report scale measuring how often students came to class with books, assignments and paper/pencil • Parental Involvement- parent report scale measuring parent particiation in school-based activities (ex. PTA).	Smaller school size and moderately sized grade-level groups/cohorts were related to highest levels of engagement, and grade levels with over 400 students were related to potentially harmful changes in engagement.

Purpose of Study

The goal of this study was to examine student engagement at the secondary level in predicting postsecondary enrollment and persistence. Student engagement is a broad construct with varying definitions within the educational and psychological literatures. For this paper, student engagement is described as a multidimensional construct including four different aspects of engagement: academic, behavioral, cognitive and affective, following Christenson et al.'s conceptualization of student engagement (Appleton et al., 2006; Christenson et al., 2008; Reschly & Christenson, 2012; Reschly et al., 2014). This definition provides the greatest overlap between empirically supported conceptualizations at both the secondary and postsecondary level. This study extends the existing literature on student engagement by utilizing a large, nationally representative dataset to address the following research questions:

1) Does high school student engagement predict enrollment in postsecondary institutions beyond academic, financial and demographic variables?
2) Does high school student engagement predict persistence in postsecondary institutions beyond the first year?

CHAPTER 3

METHOD

This study uses data from the High School Longitudinal Study of 2009 (HSLS:09), the most recent longitudinal study conducted by the NCES Secondary Longitudinal Studies Program. The study consists of five waves, or rounds, of data collection. The first wave, or Base-Year, was collected in 2009, from 944 of 1,889 eligible schools identified through school recruitment and stratified random sampling, with a response rate of 50% (weighted) or 55.5% (unweighted). From the 944 participating schools, 25,206 randomly-sampled ninth graders were identified as eligible selections. Of these 25,206 students, 24,658 were identified as questionnaire capable (i.e. English language proficient, no disabilities preventing questionnaire completion) and 21,444 completed the student questionnaire. During the Base Year data collection, questionnaires were also collected from school administrators, school counselors, parents, mathematics teachers and science teachers (Ingels et al., 2011; Ingels et al., 2013).

Data for the HSLS:09 First Follow-up were collected in the spring of 2012, when most student participants were in the spring of their junior year. For the First Follow-up, 25,194 student were identified as questionnaire eligible, of whom 20,594 completed the student questionnaire. Base-year and First Follow-up studies were conducted through a contract with the non-profit, university-affiliated RTI International (Ingels et al., 2013). A 2013 Update was conducted in the fall of 2013 to obtain data on the student cohort's postsecondary education plan, with 18, 558 students completing questionnaires during the 2013 Update (Ingels et al., 2015). High school transcripts were also collected for the 2013-2014 academic school year (Ingels et al.,

2015). A Second Follow-up was conducted in 2016, three years post-graduation for the majority of the student cohort, and a Final Follow-up is planned for 2025 (Ingels et al., 2011).

Sample

Our sample consists of two cohorts of students, a 9th grade cohort collected during the 2009 Base-Year data collection wave and an 11th grade cohort collected during the 2011 First Follow-up. Demographic information for the study participants and schools are included in Table 3.

Table 3

Individual and School Level Demographic Characteristics for Study Sample

Demographic Variables		2009 9th Graders Sample Size Percentage	2011 11th Graders Sample Size Percentage
Sample Size		21,444	20,594
Female		10,887 50.8%	10,384 50.4%
Male		10,557 49.2%	10,210 49.6%
Race:			
	American Indian/Alaskan Native	163 0.8%	142, 0.7%
	Asian	1,672 7.8%	1,675 8.1%
	Hispanic	3,515 16.4%	3,271 15.8%
	Black/African American	2,218 10.3%	2,121 10.3%
	White	11,854 55.3%	11,532 56.0%
	Native Hawaiian/Pacific Islander	110 0.5%	97 0.5%
	More than one race	1,912 8.9%	1,756 8.5%
Socioeconomic Status:			
	First quintile	3,434 16.0%	3,167 15.4%
	Second quintile	3,705 17.3%	3,660 17.8%
	Third quintile	4,233 19.7%	3,900 18.9%
	Fourth quintile	4,553 21.2%	4,506 21.9%
	Fifth quintile	5,519 25.7%	5,361 26.0%

School Type:			
	Public	17,511 81.7%	16,797 81.6%
	Catholic or Private	3,933 18.3%	3,336 16.2%
	Not applicable	-	236 1.1%
	Missing	-	225 1.1%
Locale			
	City	6,067 28.3%	5,629 27.3%
	Suburban	7,636 35.6%	6,146 29.8%
	Town	2,580 12%	2,598 12.6%
	Rural	5,161 24.1%	5,756 27.9%
	Not Applicable	-	236 1.1%
	Missing	-	229 1.1%
Region	Northeast	3,331 15.5%	3,169 15.4%
	Midwest	5,695 26.6%	5,346 26%
	South	8,705 40.6%	8,261 40.1%
	West	3,713 17.3%	3,350 16.3%
	Not Applicable	-	236 1.1%
	Missing	-	232 1.1%

For the persistence models, students were included in the sample if they indicated on the 2016 Second Follow-up survey they had attended college after high school. The 9,663 students from the original sample who indicated they had attended college after high school and were included in the 9th and 11th grade persistence models.

Variables

Independent variables in this study are separated into student-level and school-level variables. Student-level variables included three demographic variables, two academic achievement variables, two financial variables, and four engagement variables. Three demographic school-level variables were also included. The dependent or outcome variables were whether (a) students has immediate plans to attend a postsecondary institution (2013 Update) and (b) students is enrolled in a postsecondary institution or has completed a

postsecondary certificate or degree, as measured during the 2016 Second Follow-up. Specific information on items and coding procedures for each variable are included in Table 4.

Demographic variables. Demographic variables describing student gender, race/ethnicity, and parental SES served as covariates in this study These covariates were included because existing data indicate individuals of different genders, racial/ethnic backgrounds, and SES attend postsecondary institutions at varied rates, which necessitates accounting for these variables in the model (Cahalan et al., 2016: McFarland et al., 2017; Pew Research Center, 2014). Gender and race/ethnicity were included as composites created by the NCES and represent responses from student questionnaires, parent questionnaires, or school-provided sampling rosters (Ingels et al., 2011; Ingels et al., 2013). The SES composite consists of five parent-report items: occupations for two parents and/or guardians, education level for two parents and/or guardians, and an item reporting family income. Imputed values based on information from other sources within the study were used for cases with missing data (Ingles et al., 2011; Ingels et al., 2013).

Academic achievement. Due to the large volume of research documenting the connection between secondary achievement and postsecondary enrollment and persistence (Belfield & Crosta, 2012: Brown et al., 2008; Lesnick et al., 2010; Robbins et al., 2006: Robbins et al., 2004), academic achievement indicators were included. Academic achievement was represented by cumulative Math and English GPAs from the 2013-2014 school year, when most student participants were in their senior year of high school.

Financial variables. Financial variables were included in the model to account for student beliefs around the financial accessibility of postsecondary education. With the rising costs of tuition and increasing attention to student debt (Lucca, Nadauld, & Shen, 2017), studies

of postsecondary enrollment and retention would be remiss to exclude students' beliefs about the financial feasibility of attaining a postsecondary education.

Belief in Postsecondary Affordability. Students' beliefs about whether they or their families would be able to afford postsecondary education are included in the study and measured by a student self-report item from both the 2009 Base-Year study and the 2011 First Follow-up study.

Estimated Postsecondary Costs. Students' perceived costs of postsecondary education were measured through a series of items asking students to estimate the cost of tuition and fees at various types of postsecondary institutions. Previous research has indicated students from lower-income families are more likely to overestimate the cost of postsecondary education, and that this may be a potential reason for these students to choose not to continue their education (Avery & Kane, 2004: Grodsky & Jones, 2007). For the 9th grade cohort, this was measured by an item from the 2009 Base-Year study asking students for basic estimates of one year's tuition and fees at a four-year, in-state university or college. For the 11th grade cohort, estimated postsecondary costs were measured by a composite of responses to more detailed follow-up questions asking students to estimate the cost of one year's tuition and fees at various types of postsecondary institutions, collected during the 2011 First Follow-up Study.

Engagement variables. Engagement variables were constructed for three types of engagement: behavioral, cognitive, and affective. Although academic engagement is a part of our model and an important component of student engagement, it is difficult to measure with surveys. For that reason, and for the purposes of this study, we used academic achievement as a covariate in the model and indicator of academic engagement, but did not specifically represent an academic engagement variable.

Behavioral engagement. According to the Christenson et al. (2008) conceptualization of engagement, behavioral engagement consists of regularly attending school, following school rules (e.g., low incidence of office discipline referrals or suspensions) and school participation (Appleton et al., 2006; Christenson et al., 2008; Reschly & Christenson, 2012). Behavioral engagement was represented by two NCES provided composites, one from the Base-Year data collection (Ingels et al., 2011) and one from the First Follow-up data collection (Ingels et al., 2013). The ninth grade scale, referred to as the School Engagement scale, includes items pertaining to homework, preparation and attendance, and has a reliability of $\alpha = 0.67$ (Ingels, et al., 2011). The eleventh grade scale, referred to as the Student Behavior scale, contains items related to preparation, attendance, and disciplinary actions, and has a reliability of $\alpha = 0.73$ (Ingels, et al., 2013).

Cognitive engagement. As per Christenson and colleague's (2008) conceptualization of student engagement (See Figure 1 for reference), indicators of cognitive engagement include holding future goals and aspirations and belief in the value/relevance of schoolwork. In this study, Future Goals and Aspirations was measured by a four item composite for the 9th grade cohort and four item composite for the 11th grade cohort. Items for the 9th grade cohort pertained to plans to take college entrace exams and taking Advanced Placement classes and exams. Previous research has found positive, statistically significant relationships between taking college preparatory classes and college entrance exams with postsecondary enrollment and completion (Avery & Kane, 2004; Berkner & Chavez, 1997; Cabrera & LaNasa, 2001; Klasik 2012). Items for the 11th grade cohort pertained to postsecondary plans and aspirations. Future goals and aspirations have emerged as statistically significant predictors of postsecondary enrollment and persistence in previous research (Fraysier, Reschly, & Appleton, 2019). Control

and Relevance of Schoolwork was measured by a ten item factor composite drawn from the 2009 Base-Year Study student questionnaire items for the 9th grade cohort and by a twelve item factor composite drawn from the 2011 First Follow-Up student questionnaire for the 11th grade cohort. Items pertain to both general beliefs in the use of schoolwork, and also questions about the beliefs of the utility of math and science courses.

Affective engagement. Three composites were created for measuring affective engagement, mirroring the three affective engagement factors common to the Christenson and colleagues' conceptualization of engagement: Teacher-Student Relationships, Peer Support for Learning, and Family Support for Learning. A Peer Support for Learning composite was created for both the 9th grade cohort and the 11th grade, as Peer Support for Learning was identified as a statistically significant predictor for postsecondary enrollment and persistence in a previous study (Fraysier et al., 2019). The 9th grade Peer Support scale contained six items asking students to report whether they talked to friends about coursework, future plans and personal problems. The 11th grade Peer Support scale consists of five items asking students to report the number of friends who engage in positive or negative academic behaviors. A teacher-student relationships scale was created for both the 9th and 11th grade cohorts. Items from this scale pertain to student-reported beliefs about teachers' respecting, valuing, and fairly treating their students. Scale items are drawn from students' reports on two different core subject teachers, math and science. A family support for learning scale was also created for the 9th grade cohort. This scale was comprised of student reports of how often they spoke with each parent about which courses to take, future plans, and personal problems. No data were available for parent support for learning items for the 11th grade cohort, therefore an 11th grade Family Support scale was not created.

School-Level Variables. School-level variables were included in the model for school type (Public vs. Private), geographic region, and school urbanicity. Student responses for the HSLS:09 are not independent, isolated events, as the sampling design for the study first identified target schools, then sampled students from within these schools (Ingels et al., 2011, 2013). Students in schools more similar to one another might be more similar than individual students truly selected at random, necessitating accounting for this potential source of variance within the model.

Outcome Variables. There were two different outcomes variables, one to address each research question. The first outcome variable, which pertains to postsecondary enrollment, was collected during the summer of 2013 as part of the 2013 Update, and asked students or their parents if the student was planning on attending a postsecondary institution in the fall of 2013 (Ingels et al., 2015). The second outcome variable asked students who indicated whether they had ever attended a postsecondary institution if they had attended full-time or part-time between the end of their high-school graduation and February 2016. The item included data for students who indicated that they had not attended a postsecondary institution between graduation and February 2016 (NCES, 2019).

Table 4

Names and Descriptions of Variables

Variable	Type	Description
Demographic Variables		
SES	Composite	5 item NCES constructed scale. Scale items record parental occupation, highest level of parent education, and family income. (X1SES for 9th grade cohort, X2SES for 11th grade cohort).
Gender	Item	Taken from the Base-year student

		questionnaire, parent questionnaire, or school-provided sampling roster (X1SEX for 9th grade cohort, X2SEX for 11th grade cohort). Responses coded as 1 = male, 2 = female.
Race/Ethnicity	Composite	NCES-created composite (X1RACE, X2RACE) that summaries six dichotomous race/ethnicity composites (for 9th grade cohort: X1HISPANIC, X1WHITE, X1BLACK, X1ASIAN, X1PACISLE, X1AMINDIAN. For 11th grade cohort X2HISPANIC, X2WHITE, X2BLACK, X2ASIAN, X2PACISLE, X2AMINDIAN). Based on responses from student questionnaire, school-provided sampling roster, or parent questionnaire. Responses coded as 1 = American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, non-Hispanic 2 = Asian, non-Hispanic, 3 = Black/African American, non-Hispanic, 4 = Hispanic, no race specified and Hispanic, race specified, 5 = More than one race, non-Hispanic, 6 =White, non-Hispanic.
Academic Achievement		
High School Math GPA	Item	Cumulative GPA for high school math classes collected during the 2013-2014 transcript update (X3TGPAMAT)
High School English GPA	Item	Cumulative GPA for high school English courses collected during the 2013-2014 transcript update (X3TGPAENG)
Financial Variables		
Belief in Postsecondary Affordability- 9th Grade	Item	*How much do you agree or disagree with the following statement? Even if you study, your family cannot afford to pay for you to attend college.* (S1AFFORD) Responses coded as 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree
Belief in Postsecondary Affordabiltiy-11th Grade	Item	*How much do you agree or disagree with the following statement? Even if you get accepted to college, your family cannot afford to send you.* (S2CANTAFFORD)

		Responses coded as: 1= strongly agree, 2 = agree 3 = disagree 4 = strongly disagree
Estimated Postsecondary Costs-9th Grade	Item	*What is your best estimate of the cost of one year's tuition and mandatory fees at a public 4-year college in your state?* (S1ESTIN). Responses coded as a continuous variable ranging from $2,000 - $50,000.
Estimated Postsecondary Costs-11th Grade	Factor Composite	Factor composite of three items (S2COST2YPUB, S2COST4YPUB, S2COST4YPRV). *What is your best estimate of the cost of one year's tuition and required fees at a) a public 2-year community college in your state b) a public 4 year college in your state c) a typical private 4 year college?* Responses represented as continuous variables ranging from $2,000-$100,000. Cronbach's alpha = 0.82 for this scale.
Engagement Variables		
Behavioral Engagement		
School Engagement Scale-9th grade	Factor Composite	NCES-created summed composite of four items: *How often do you a) go to class without your homework done? b) go to class without pencil or paper? c) go to class without books? d) go to class late?* (X1SCHOOLENG). Responses coded as: 1 = often, 2 = sometimes, 3 = never, 4 = rarely Items were reverse coded so larger values represented higher levels of attributes measured. Variables were standardized to have a mean of 0 and standard deviation of 1. Cronbach's alpha = 0.67 for scale.
Student Behavior Scale-11th grade	Factor Composite	NCES-created factor composite of seven items from the first follow-up including: *How many times did the following thing happen during the last six months (you were in school)? a) you were late for class, b) you were absent from school c) you attended class without your homework done d) you attended class without pencil and paper,*

		computer, or other device for taking notes e) you attended class without books or other reading materials f) You cut or skipped class g) you were put on in-school suspension (X2BEHAVEIN). Responses coded as: 1 = 10 or more times, 2 = 7-9 times, 3 = 3-6 times, 4 = 1-2 times, 5 = never. Items were reverse coded so larger values represent higher levels of attributes measured. Variables were standardized to have a mean of 0 and standard deviation of 1. Cronbach's alpha = 0.73 for the scale.
Cognitive Engagement		
Future Goals and Aspirations- 9th Grade	Factor Composite	Factor composite of four items including (S1PSAT, S1SAT, S1ACT, S1AP): *Have you taken or are you planning to take a) the PSAT, b) the SAT c) the ACT, d)AP Exam?* Responses coded as 1 = no/don't know what they are, 2 = haven't decided yet, 3 = yes. Cronbach's alpha for this scale = 0.79.
Future Goals and Aspirations- 11th grade	Factor Composite	Factor composite of four items (S2EDUASP, S2EDUEXP, S2SUREDIPL, S2SUREBA) *If there were no barriers, how far in school would you want to go? As things stand now, how far in school do you think you will actually get? How sure are you that you will receive a high school diploma? How sure are you that you will pursue a bachelor's degree?* Responses coded for S2EDUASP and S2EDUEXP as 1= high school diploma or less, 2 = complete associates degree or certificate, 3 = complete a bachelor's degree, 4 = complete an advanced degree. S2SUREDIPL and S2SUREBA responses were coded as 1 = very sure will not, 2 = will probably not, 3 = probably will, 4 = very sure will. Cronbach's alpha for this scale = 0.73
Control/Relevance of Schoolwork- 9th grade	Factor Composite	Factor composite of ten items (S1PAYOFF, S1GETINTOCLG, S1MWASTE, S1MBORING, S1MUSELIFE, S1MUSEJOB, S1SWASTE, S1SBORING, S1SUSELIFE, S1SUSEJOB): *How much do*

		you agree of disagree with the following statements: a) studying in school rarely pays off later with good jobs b) even if you study you will not be able to get into college c) you think (math/science) class is a waste of time, d) you think (math/science) class is boring, e) what students learn in (math/science) class is useful for everyday life, f) what students learn in (math/science) class will be useful for a future career. Responses coded 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree. All items were coded so that higher values represented a more positive view of control and relevance of school work. Cronbach's alpha for this scale = 0.82
Control/Relevance of Schoolwork- 11th grade	Factor Composite	Factor composite of twelve items (S2PAYOFF, S2DOOKAY, S2BADGRADES, S2SCHWASTE, S2MWASTE, S2MBORING, S2MUSECLG, S2MUSEJOB, S2SWASTE, S2SBORING, S2SUSECLG, S2SUSEJOB): *How much do you agree or disagree with the following statements: a) studying in high school rarely pays off later with good jobs b) People can do okay even if they drop out of high school c) Students with bad grades often get good jobs after high school d) High school is often a waste of time e) you think (math/science) course is a waste of your time, f) you think (math/science) class is boring, g) (math/science) is useful for college h) (math/science) is useful for a future career.* Responses coded as 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree. All items coded so that higher values reflect a more positive view of control/relevance of schoolwork. Cronbach's alpha for this scale = 0.78
Affective Engagement		
Student/Teacher Relationships- 9th grade	Factor Composite	Factor composite of eight items, four each for math and science teacher (S1MTCHVALUES, S1MTCHRESPECT, S1MTCHFAIR, S1MTCHTREAT,

		S1STCHVALUES, S1STCHRESPECT, S1STCHFAIR, S1TCHTREAT): *How much do you agree or disagree with the following statements about your teacher? Your teacher a) values and listens to students' ideas b) treats students with respect c) treats every student fairly d) treats some kids better than other kids.* Responses were: 1 =strongly agree, 2 = agree, 3 = disagree and 4 = strongly disagree. All items were coded so that higher scores reflected more positive student/teacher relationships. Cronbach's alpha for this scale = 0.91.
Student/Teacher Relationships- 11th grade	Composite	Factor composite of ten items, five each for math and science teacher (S2MTCHTREAT, S2MTCHTHINK, S2MTCHGIVEUP, S2MTCHEASY, S2MTCHINTRST, S2STCHTREAT, S2STCHTHINK, S2STCHGIVEUP, S2STCHEASY, S2STCHINTRST) : *How much do you agree or disagree with the following statements about your teacher? Your teacher a) treats some kids better than other kids b)wants students to think, not just memorize things c) doesn't let people give up when the work gets hard, d) makes math/science interesting, e) makes math/science easy to understand.* 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree. All items were coded so that higher scores reflected more positive student/teacher relationships. Cronbach's alpha for this scale = 0.91.
Family Support for Learning- 9th grade	Composite	Factor composite of ten items, five for each parent (S1MOMTALKM, S1DADTALKM, S1MOMTALKS, S1DADTALKS, S1MOMTALKOTH, S1DADTALKOTH, S1MOMTALKCLG, S1DADTALKCLG, S1MOMTALKPRB, S1DADTALKPRB): *Since the beginning of the year, who have you talked to about a) which math courses to take this year b) which science courses to take this year c) which courses to take this year other than math and science courses d)*

		going to college and e) personal problems. Responses coded as 1 = yes, 0 = no. Cronbach's alpha for this scale = 0.89
Peer Support for Learning-9th Grade	Composite	Factor composite of six items (S1FRNDTALKM, S1FRNDTALKS, S1FRNDTALKOTH, S1FRNDTALKCLG, S1FRNDTALKPROB, S1FRNDTALKJOB): *Since the beginning of the year, who have you talked to about a) which math courses to take this year b) which science courses to take this year c) which courses to take this year other than math and science courses d) going to college e) personal problems and f) possible jobs or careers as an adult.* Responses coded as 1 = yes, 0 = no. Cronbach's alpha for this scale = 0.75.
Peer Support for Learning-11th grade	Composite	Factor composite of five items (S2FRGRADES, S2FRDROPOUT, S2FRCLGEXAM, S2FR4Y, S2FRFTJOB): *How many of your friends a) get good grades b) have ever dropped out of high school c) have taken the PSAT, ACT, PLAN or ACT d) plan to attend a 4-year college e) plan to have a full-time job instead of continuing their education*. Responses were 0 = none, 1 = less than half, 2 = about half, 3 = more than half, 4 = all. All responses were coded so that higher scores represented greater levels of peer support for learning. Cronbach's alpha for this scale = 0.66.
Level-2 Variables		
School Type	School-Level Composite	NCES-created school-level composite that identifies a school as public or private/catholic/other (X1CONTROL for 9th grade cohort, X2CONTROL for 11th grade cohort). Data coded as 1 = public school, 2 = Catholic or other private school.
School Urbanicity	School-Level Composite	NCES-created school-level composite that identifies school level of ubranicity among the following: urban, suburban, town or rural (X1LOCALE for the 9th grade cohort,

		X2LOCALTE for the 11th grade cohort). Data coded as 1 = city, 2 = suburb, 3 = town, 4 = rural.
School Region	School-Level Composite	NCES-created school-level composite that identifies a school as belonging to one of the following geographic region: Northeast, Midwest, South, West. (X1REGION for the 9th grade cohort, X2REGION for the 11th grade cohort). Data coded as 1 = Northeast, 2 = Midwest, 3 = South, 4 = West.
Outcome Variables		
Immediate Plans to Enroll in Postsecondary Institution	Item	*Which of the following activities will you be doing on or around November 1st: Taking classes from a college, university, community college, trade school, or other occupational school?* (S3CLASSES). Responses coded as 0 = no, 1 = yes.
Still Enrolled in/Completed a Postsecondary Degree or Certificate	Item	S4CLGFTPT. Item asks students who have stated they have attended a postsecondary institution wether their enrollment was full-time or part-time. Responses coded as 0 = student is not currently enrolled in a postsecondary institution or has never been enrolled in a postsecondary institution 1 = student is enrolled part-time or full-time in a postsecondary institution.

Data Analysis

In this study, data analysis was conducted using a cross-sectional design, with a 9th and 11th grade cohort. Throughout the analysis, data were weighted with NCES-provided student-level analytic base weights to account for sampling and nonresposne bias (Ingels et al. 2011, 2013, 2015). Hierarchical Linear Modeling (HLM) was used as the statistical procedure for analysis, which allowed for the analysis of both individual and group-level variables. HLM accounts for the fact that each observation within the HSLS:09 sample is not an independent observation, but that students are nested within various school-level variables that might account

for large portions of variance, including school geographic region, school type, and school urbanicity. Individual demographic, academic, financial and engagement variables served as Level 1 variables, while school region, urbanicity, and control served as level 2 variables. Two research questions were posed: 1) Does high school student engagement predict enrollment in postsecondary institutions beyond academic, financial and demographic variables? 2) Does high school student engagement predict persistence in postsecondary institutions? From the collected data, five successive models were created to examine the unique effects of specific sets of variables. The first model contained only demographic data, the second model contained demographic and academic data, the third model contained demographic, academic, and financial data, the fourth models added in behavioral engagement data, and the final model represents the full model with all variables, including cognitive and affective engagement, entered into the model. After all variables were included, a Rao-Scott Likelihood Ratio Chi-Squared test was performed to identify non-significant variables, and thse variables were removed from the models, creating a final model. All models were run for both research questions and for each cohort, with enrollment serving as the outcome for research question one, and persistence as the outcome variable for research question 2.

To assess whether the inclusion of additional variables improved the fit of the model, the Akaike Information Criteria (AIC) and Bayseian Information Criteria (BIC) fit statistics were calculated (Garson, 2013). Both the AIC and BIC are derived from the model deviance, or -2LogLikelihood (-2LL), with the BIC is the most conservative of the fit statistics, tending to be conservative towards type II error and penalizing for additional parameters. The AIC adjust the -2LL for model complexity, and is therefore more conservative than the -2LL, but less so than the BIC. Per the methodology used by Lovelace et al., (2014) the probability that the response was

equal to 1 was modeled using the logit link function across models, with the traditional assumption that y_{ij} has a Bernoulli distribution per the notation used by Raudenbush and Bryk (2002) and Rabe-Hesketh and Skrondal (2012). In the description of data analysis below, we show all models in their form prior to transformation with the link function to ease understanding.

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

Across all models and research questions, the outcome variable was measured dichotomously; 1 = plans to enroll or persistence in postsecondary education, 0 = no plans to enroll or did not persist in postsecondary education. All analysis was conducted using SPSS and SAS.

Model 1: Demographic Model. Equations 2 and 3 show the Demographic Model for research questions 1 and 2 respectively. These models include sex, race/ethnicity, and student SES, and use the same variables for both the 9th grade and 11th grade cohort.

$$Enroll_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + r_{ij} \qquad (2)$$

$$Persist_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + r_{ij} \qquad (3)$$

The level 2 model, which includes the school-level predictors, is shown in equation 4:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(LOCALE) + \gamma_{02}\,(REGION) + \gamma_{03}\,(CONTROL) + u_{0i}$$

$$\beta_{1j} = \gamma_{00} + \gamma_{01}(LOCALE) + \gamma_{02}\,(REGION) + \gamma_{03}\,(CONTROL) + u_{0i} \qquad (4)$$

Level 2 variables were included as fixed effects. The level 2 model is unchanged for both research questions.

Model 2: Academic Model. In the Academic Model, all variables from the demographic model are retained, with Math and English GPA added into the model as level 1 predictors. Equations 5 and 6 show the level one equations for Research Questions 1 and 2, respectively.

$$E_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + r_{ij}$$

(5)

$$P_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + r_{ij}$$

(6)

The level 2 model remains unchanged from the demographic model.

Model 3: Financial Model. The Financial Model again retains all variables from the previous two models, but includes the beliefs in affordability and cost estimates collected for both cohorts. Wording of items and specific data collected vary slightly across the two cohorts, with more detailed estimation data collected from the 11th grade cohort. Equations 7 and 8 represent the level one formula for research questions 1 and 2. The level 2 predictors for the Financial Model are unchanged from previous models, and therefore the equation for level 2 predictors is unchanged from previous models.

$$E_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + \beta_{6j}(AFFORD) + \beta_{7j}(COST) + r_{ij} \quad (7)$$

$$P_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + \beta_{6j}(AFFORD) + \beta_{7j}(COST) + r_{ij} \quad (8)$$

Model 4: Behavioral Engagement Model. For the Behavioral Engagement Model, all demographic, academic, and financial variables are retained in the model, while the NCES-created behavioral scales for each respective cohort are added as level one variables. Equations for the enrollment and persistence outcomes are shown in equations 9 and 10. The level 2 equations remained unchanged.

$$E_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + \beta_{6j}(AFFORD) + \beta_{7j}(COST) + \beta_{8j}(BEHAVIOR) + r_{ij} \quad (9)$$

$$P_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + \beta_{6j}(AFFORD) + \beta_{7j}(COST) + \beta_{8j}(BEHAVIOR) + r_{ij} \quad (10)$$

Model 5: Cognitive and Affective Engagement Model. Model 5 represents the full model, and retains all variables from the earlier models. For this model all cognitive and affective variables for each cohort are added. Equations 11 and 12 represent the formulas for the persistence and enrollment outcomes. The Level 2 variables and the equation for Level 2 variables remains the same as in previous models.

$$E_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + \beta_{6j}(AFFORD) + \beta_{7j}(COST) + \beta_{8j}(BEHAVIOR) + \beta_{9j}(GOALS) + \beta_{10j}(CRSW) + \beta_{11j}(TSR) + \beta_{12j}(PSL) + \beta_{13j}(FSL) + r_{ij} \quad (11)$$

$$P_{ij} = \beta_{0j} + \beta_{1j}(SEX) + \beta_{2j}(RACE) + \beta_{3j}(SES) + \beta_{4j}(GPAMATH) + \beta_{5j}(GPAENG) + \beta_{6j}(AFFORD) + \beta_{7j}(COST) + \beta_{8j}(BEHAVIOR) + \beta_{9j}(GOALS) + \beta_{10j}(CRSW) + \beta_{11j}(TSR) + \beta_{12j}(PSL) + \beta_{13j}(FSL) + r_{ij} \quad (12)$$

Final Model. After all variables were added into the model, a Rao-Scott Likelihood Ratio Chi-Squared test was performed to identify non-significant variables at both the student and school level. Non-significant variables were then removed from the model and models were re-fitted, providing a final model for each cohort and outcome.

Missing Data. Due to a small percentage of missing data (less than 5% for all variables), missing data were deleted using listwise deletion.

CHAPTER 4

RESULTS

9th Grade Cohort Enrollment Model

Tables 5 displays results for odds ratios and overall fit statistics for the models predicting postsecondary enrollment for the 9th grade cohort. The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) are reported for each cohort within each model to compare models to one another and determine goodness of fit. Lower values indicate a better fit to the data for all three fit statistics (Garson, 2013). In the 9th grade enrollment models, a Rao-Scott Likelihood Ratio Chi-Squared test indicated no significant association between school region and the college enrollment, therefore school region was not included as a variable in the models.

Table 5 Odds Ratios and Fit Statistics for 9th Grade Enrollment Models

	Demographic	Academic	Financial	Behavioral Engagement	Cognitive/Affective Engagement
(Intercept)	1.80	0.13 **	0.13 **	0.14 **	0.15 *
SES	2.62 ***	1.97 ***	1.87 ***	1.88 ***	1.77 ***
Female	1.77 ***	1.22 *	1.23 *	1.22 *	1.24 *
Asian	4.44 **	2.80	2.81	2.74	2.79
Black	2.20	2.81	2.71	2.67	2.76
Hispanic	2.47	2.61	2.66	2.64	2.72
Multiracial	1.49	1.58	1.65	1.63	1.64
Whilte	1.70	1.47	1.48	1.46	1.46
Private/Catholic School	2.63 ***	1.93 ***	1.89 ***	1.88 ***	1.84***
Suburban	1.06	1.02	1.03	1.02	1.01
Town	0.80	0.74	0.74 *	0.74 *	0.75
Rural	0.86	0.74 *	0.74 *	0.74 *	0.73 *
Math GPA		1.42 ***	1.41 ***	1.40 ***	1.37 ***
English GPA		2.34 ***	2.32 ***	2.29 ***	2.25 ***
Affordability Beliefs			1.24 ***	1.23 ***	1.20 ***
Behavioral Engagement				1.07	1.04
FGA					1.13 *
CRSW					0.95
FSL					1.16 **
PSL					0.96
TSR					1.06
AIC	8110	7147	7102	7102	7092
BIC	7469	7161	7151	7157	7182

*** p <0.001; **p < 0.01; *p<0.05.

**FGA = Future Goals and Aspirations, CRSW = Control and Relevance of Schoolwork FSL = Family Support for Learning, PSL = Peer Support for Learning, TSR = Teacher-Student Relationships*

Model 1: Demographic Model. The Demographic Model included student-level demographic variables including student socio-economic status, racial/ethnic group membership, and sex. It also included school-level demographic variables including public or private/Catholic control, western, northeastern, southern or midwestern regions, and city, suburban, town or rural locale. Females (p <0.001), students from higher SES backgrounds (p <0.001), and Asian students (p <0.01) were significantly more likely to enroll in college. Students who attended private or Catholic schools were also significantly more likely to enroll in college (p <0.001).

Model 2: Academic Model. The Academic Model retained all of the student-level and school-level demographic variables, and added in student Math and English high school GPAs as academic variables. Both of the AIC and BIC fit statistics decreased when comparing the Demographic Model to the Academic Model, indcating an improvement in model fit. In the Academic Model, students with higher Math and English GPAs were significantly more likely to enroll in college (p <0.001), and similar to the Demographic Model, students from higher SES backgrounds (p <0.001) those attending Catholic or private schools (p <0.001), and females (p >0.05) are more likley to enroll in college. Students from rural areas are less likely to enroll in college (p <0.05).

Model 3: Financial Model. The Financial Model retained all of the student-level and school-level variables from the Academic Model, and included an item asking students to report whether they believed they or their families could afford to send them to college. Both the AIC and BIC fit statistics decreased when comparing the Academic Model to the Financial Model, indicating that the Financial Model is a better fit to the data than the Academic Model. In the Financial Model, ninth grade students who believed they could afford to go to college were significantly more likely to enroll in college (p <0.001). Similar to the Academic Model, students

from higher SES backgrounds (p <0.001), who attended private or Catholic schools (p <0.001) , and had higher Math and English GPAs (p <0.001) were significantly more likely to enroll in college. Females were more likely to enroll in college (p <0.05), and students from rural areas (p <0.05) and towns (p <0.05) were less likely to enroll in college.

Model 4: Behavioral Engagement Model. The Behavior Engagement Model included the addition of the School Engagement scale, an NCES-created composite (Ingles et al., 2011) that asked students to rate the extent to which they go to class prepared, specifically asking how often they attend class late, without their homework, without books or without paper and pencils. When comparing the fit statistics from the Financial Model to the Behavioral Engagement Model, the AIC remained constant while the BIC increased, indicating that the addition of the School Engagement scale does not improve the model fit to the data. All variables in the Financial Model with significant odds ratios remained significant to the same degree in the Behavioral Engagement Model.

Model 5: Cognitive/Affective Engagement Model. The Cognitive/Affective Engagement Model retained all of the variables from the Behavioral Engagement Model with the addition of the two cognitive engagement composites and three affective engagement composites. The cognitive engagement composites are Future Goals and Aspirations and Control and Relevance of Schoolwork, and the affective engagement composites are Family Support for Learning, Peer Support for Learning, and Teacher/Student Relationships. When comparing the fit statistics from the Behavioral Engagement Model to the Cognitive/Affective Engagement Model, the AIC decreased, indicating an improved model fit, while the BIC increased, indicating worsening model fit to the data. The discrepancy between these two fit statistics may be due to the fact that the BIC penalizes more severely for the inclusion of additional variables. In the

Cognitive/Affective Engagement Model, students who indicated greater levels of future goals and aspirations were more likely to enroll in college (p <0.05), and students who indicated they had more family support for their education were also more likely to enroll in college (p <0.01). Similar to the previous models, students who were from a higher SES background, attended private or Catholic schools, had higher Math and English GPAs, and believed they could afford college were more likely to enroll in college (p <0.001). Females were also more likely to enroll in college (p <0.05), and students from rural areas were less likely to enroll in college (p <0.05).

Model 6: Final Model. Table 6 shows the odds ratios and fit statistics for the Final Model for ninth grade postsecondary enrollment. In the Final Model, non-significant variables were removed from the model, including the School Engagement scale, Control and Relevance of Schoolwork, Peer Support for Learning, and Teacher/Student Relationships. Variables were removed when a Rao-Scott Likelihood Ratio Chi-Squared test indicated no significant association between the variable and the outcome. When comparing the fit statistics between the Final Model and the previous models, the AIC indicates that the Final Model provides the best fit for the data. The BIC for the Final Model remained constant when comparing the Final Model and the Cognitive/Affective Engagement Model, and is higher than the BIC for the Behavioral Engagement, Financial and Academic Models. As previously stated, this may be due to the fact that the BIC penalizes more severely for the addition of multiple variables. In the Final Model, ninth graders who come from higher SES backgrounds (p <0.001), female students (p <0.05), students who attended private or Catholic schools (p <0.001), have higher Math GPAs (p <0.001) and English GPAs (p <0.001) and believe they can afford college (p <0.001) are more likely to enroll in college. Students who report higher levels of family support for learning are more likely to enroll college (p <0.01), and students who report more future goals and aspirations

are also more likely to enroll in college (p <0.05). Students from rural areas remained less likely to attend college in the final model (p <0.05).

Table 6. 9th Grade Enrollment Final Model Odds Ratios and Fit Statistics

	Final Model
(Intercept)	0.15*
SES	1.77***
Female	1.22*
Asian	2.80
Black	2.80
Hispanic	2.73
Multiracial	1.65
White	1.48
Private School	1.86***
Suburban	1.01
Town	0.75
Rural	0.73*
Math GPA	1.38***
English GPA	2.26***
Affordability Beliefs	1.21***
Future Goals and Aspirations	1.13*
Family Support for Learning	1.15**
AIC	7076
BIC	7182

***p<0.001; **p<0.01; *p<0.05

9th Grade Cohort Persistence Model

Table 7 shows the fit statistics and odds ratios from the 9th grade cohort persistence model. In the 9th grade persistence models, a Rao-Scott Likelihood Ratio Chi-Squared test indicated significant association between school region and postsecondary persistence, and school region is included as a variable in the persistence models. Again the AIC and BIC are used to evaluate model fit.

Table 7. Odds Ratios and Fit Statistics for 9th Grade Persistence Models

	Demographic	Academic	Financial	Behavioral Engagement	Cognitive/Affective Engagement
Intercept	4.87 *	0.73	0.73	0.77	0.92
SES	1.69 ***	1.39 **	1.35 **	1.35 **	1.29 *
Female	1.53 **	1.20	1.21	1.21	1.10
Asian	2.41	1.36	1.38	1.36	1.35
Black	3.16	2.94	2.92	2.94	3.21
Hispanic	1.79	1.45	1.47	1.48	1.58
Multiracial	2.48	2.09	2.15	2.15	2.15
White	2.80	1.99	2.01	2.01	1.99
Private/Catholic School	3.71 ***	3.38 ***	3.36 ***	3.33 ***	3.41 ***
Suburban	0.84	0.85	0.85	0.84	0.85
Town	1.02	0.93	0.93	0.93	0.98
Rural	1.23	1.16	1.16	1.15	1.17
Midwest	0.71	0.73	0.73	0.73	0.69
South	0.57 *	0.63 *	0.61 *	0.62 *	0.55 **
West	0.44 ***	0.45 **	0.44 **	0.45 **	0.41 ***
Math GPA		1.12	1.12	1.11	1.11
English GPA		2.06 ***	2.04 ***	2.02 ***	1.95 ***
Affordability Beliefs			1.13	1.12	1.11
School Engagement				1.06	1.06
FGA					1.10
CRSW					0.97
FSL					1.09
PSL					1.26 **
TSR					0.93
AIC	3501	3347	3346	3350	3341
BIC	3452	3387	3393	3401	3427

*** p <0.001; **p < 0.01; *p<0.05.

FGA = Future Goals and Aspirations, CRSW = Control and Relevance of Schoolwork, FSL = Family Support for Learning, PSL = Peer Support for Learning, TSR = Teacher/Student Relationships

Model 1: Demographic Model. The 9th Grade Persistence Demographic Model used the same demographic variables as the 9th Grade Enrollment Demographic Model, with the addition of regional variables as school-level variables. In the Demographic Persistence Model, 9th graders from higher SES backgrounds, (p <0.001) those who attended private or Catholic schools (p <0.001), and females (p <0.01) were more likely to persist at college. Students from the Western region (p <0.001) and the Southern region (p <0.05) were less likely to persist at college.

Model 2: Academic Model. The Academic Model retained all of the variables in the Demographic Model, and included student Math and English GPAs as academic variables. Both the AIC and BIC fit statistics decreased when comparing the Academic Model to the Demographic Model, indicating an improved model fit. In the academic model, students with higher English GPAs (p <0.001) were more likely to persist at college. Similar to the Demographic Model, students from higher SES backgrounds (p <0.01) and students who attended private or Catholic schools (p <0.001) were more likely to persist at college, while students from the Southern (p <0.05) and Western (p <0.01) regions of the country were less likely to persist at college.

Model 3: Financial Model. The Financial Model retained all of the variables from the Academic Model, with the inclusion of the affordability beliefs item. When comparing the fit statistics from the Academic Model to the Financial Model, AIC decreased slightly while BIC increased, indicating that the Financial Model is not an improvement of fit over the Academic Model. In the Financial Model, students who believed they could afford college were neither more nor less likely to have persisted at college. All significant variables in the Academic Model remain significant in the Financial Model.

Model 4: Behavioral Engagement Model. The Behavioral Engagement Model included all variables in the Financial Model and the addition of the School Engagement Scale (Ingles et al., 2011). When comparing the fit statistics from the Behavioral Engagement Model to the fit statistics from the Financial Model, both the AIC and BIC increased, indicating that the addition of the School Engagement scale did not improve model fit to the data. All variables with significant odds ratios in the Financial and Academic models remained significant to the same degree in the Behavioral Engagement Model.

Model 5: Cognitive/Affective Engagement Model. The Cognitive/Affective Engagement Model retained all of the variables from the Behavioral Engagement Model, and added two cognitive engagement composites (Future Goals and Aspirations, Control and Relevance of Schoolwork) and three affective engagement composites (Family Support for Learning, Peer Support for Learning, Teacher/Student Relationships). When comparing the Cognitive/Affective Engagement Model fit statistics to those of previous models, the AIC decreased compared to all previous models, while the BIC increased compared to the Financial and Academic Models. This may be due to the fact that the BIC is a more conservative fit statistic and penalizes more heavily than the AIC for the addition of more variables. In the Cognitive/Affective Engagement Model, students who reported higher levels of peer support for learning ($p < 0.01$), students from higher SES backgrouds($p < 0.05$), students who attended private or Catholic schools ($p < 0.001$), and students with higher English GPAs ($p < 0.001$) were more likely to persist at college. Students from the Southern ($p < 0.01$) and Western ($p < 0.001$), regions of the US were less likely to persist at college.

Final Model. Table 8 shows the Final Model for the 9th Grade Cohort Persistence Model. In the Final Model, variables were tested for significance using the Rao-Scott Likelihood Ratio

Chi-Squared Test and variables that were not found to be significant were removed from the model. Both the AIC and BIC for the Final Model decreased when compared to previous models, indicating that the Final Model has the best fit to the data. In the Final Model, students from higher SES backgrounds (p <0.01), students who attended private or Catholc schools (p <0.001), students with higher English GPAs (p <0.001), and those who reported higher levels of peer support for learning in high school (p <0.01) were more likely to persist at college. Students from the Western (p <0.01) and Southern ((p <0.05) regions of the US were less likely to persist at college.

Table 8. Odds Ratios and Fit Statistics for the 9th Grade Final Persistence Model

	Final Model
(Intercept)	0.74
SES	1.37**
Female	1.08
Asian	1.33
Black	3.30
Hispanic	1.56
Multiracial	2.14
White	2.08
Private or Catholic School	3.41***
Midwest	0.72
South	0.62*
West	0.44**
Math GPA	1.21
English GPA	2.03***
Peer Support for Learning	1.29**
AIC	3317
BIC	3368

***p<0.001; **p<0.01; *p<0.05

11th Grade Cohort Models

For the 11th grade cohorts, models were created to examine both persistence and enrollment outcomes. For each outcome, the same five models were used as the 9th grade

models: Demographic, Academic, Financial, Behavioral Engagement and Cognitive/Affective Engagement. A final model was also created by removing variables found not to be significant using a Rao-Scott Likelihood Ratio Test from the model. As previously described in the methods, due to differences in data collected during each wave of the HSLS:09 study, items and variables differ slightly between the 9th grade and 11th grade models. In the 11th grade models, odds ratios are calculated for each variable, and AIC and BIC are used to evaluate model fit.

11th Grade Cohort Enrollment Model

Table 9 displays the odds ratios and fit statistics for the 11th Grade Enrollment Models

Table 9. Odds ratios and fit statistics for the 11th grade enrollment models

	Demographic	Academic	Financial	Behavioral Engagement	Cognitive/Affective Engagement
Intercept	3.00 *	0.22 *	0.22 *	0.26 *	0.51
SES	2.52 ***	1.96 ***	1.77 ***	1.79 ***	1.59 ***
Female	1.82 ***	1.25 *	1.31 **	1.26**	1.17
Asian	3.44 *	2.18	2.38	2.35	2.34
Black	1.17	1.77	1.80	1.83	1.65
Hispanic	1.39	1.65	1.80	1.83	1.95
Mulitracial	1.03	1.13	1.25	1.30	1.39
White	1.13	1.00	1.07	1.10	1.17
Private or Catholic School	3.97 ***	2.81 ***	2.67***	2.61 ***	2.50 ***
Suburban	1.14	1.04	1.04	1.04	0.97
Town	0.81	0.76 *	0.76 *	0.76 *	0.78
Rural	0.93	0.82	0.82	0.80	0.81
Midwest	0.95	0.90	0.94	0.93	0.87
South	0.80	0.86	0.88	0.87	0.74 *
West	0.85	0.84	0.90	0.91	0.86
English GPA		2.28 ***	2.21 ***	2.13 ***	1.88 ***
Math GPA		1.44 ***	1.43 ***	1.38 ***	1.27**
Cost Estimate			1.09 *	1.10*	1.04
Affordability Beliefs			1.35 ***	1.34 ***	1.26 ***
Behavioral Engagement				1.20 ***	1.12 *
FGA					1.53 ***
PSL					1.25***
TSR					0.98
CRSW					1.00
AIC	10759	9505	9382	9341	9032
BIC	9703	9297	9256	9248	9136

***p<0.001; **p<0.01; *p<0.05

FGA = Future Goals and Aspirations, CRSW = Control and Relevance of Schoolwork, PSL = Peer Support for Learning, TSR = Teacher/Student Relationships

Model 1: Demographic Model. The Demographic Model contained student-level demographic variables including SES, sex, and racial/ethnic group membership, and school level variables, including school region, school locale, and whether the school is under public of private/Catholic control. In the 11th grade enrollment Demographic Model, students from higher SES backgrounds (p <0.001), females (p <0.001), Asian students (p <0.05), and students who attended private or Catholic schools (p <0.001), were more likely to enroll in college.

Model 2: Academic Model. The Academic Model retained all of the demographic variables and included student Math and English GPAs. When comparing fit statistics from the Academic Model to the Demographic Model, both AIC and BIC decreased, indicating and improved model fit. In the Academic Model, students with higher Math GPAs (p <0.001) and English GPAs (p <0.001), students from higher SES backgrounds (p <0.001), females (p <0.05), and students who attend private or Catholic schools (p <0.001) were more likely to enroll in college. Students from towns (defined as locations that rise above rural population thresholds but are still distant from metropolitan areas) were less likely to enroll in college (p <0.05).

Model 3: Financial Model. The Financial Model included all variables from the Academic Model. It also included the Cost Estimate composite, which asked the students to estimate the cost of attending various types of postsecondary institutions, and an item asking students the extent to which they believed they could afford to go to college. When comparing fit statistics from the Financial Model to the Academic Model, both AIC and BIC decreased, indicating that the inclusion of the financial variables improved model fit to the data. In the Financial Model, students who believed they could afford college (p <0.001) and who estimated a higher cost of attending college (p <0.05) were more likely to enroll in college. Similar to the previous models, students from higher SES backgrounds (p <0.001), females (p <0.01), students

who attended private or Catholic schools (p <0.001), and students with higher Math GPAs (p <0.001) and English GPAs (p <0.001) were more likely to enroll in college. Students from towns were less likely to enroll in college (p <0.05).

Model 4: Behavioral Engagement Model. In the Behavioral Engagement Model, all variables were retained from the Financial Model, and the Student Behavior Scale (Ingles et al., 2013) was included. The Student Behavior Scale is an NCES created composite that asked students to rate how often they came to class prepared, how often they skipped class, and how often they had been suspended from school. Responses were coded so that higher scores on the Student Behavior Scale reflected higher levels of behavioral engagement. A Student Engagement Scale was not collected for the 11th grade cohort, though the Student Behavior Scale contains the same items as the 9th grade cohort and includes the additional items about skipping class and school suspensions. When comparing the fit statistics from the Behavioral Engagement Model to the Financial Model, both AIC and BIC decreased, indicating that the Behavioral Engagement Model offered an improved fit to the data. Students who reported higher levels of behavioral engagement were more likely to enroll in college (p <0.001), as were students who believed they could afford college (p <0.001), had higher Math and English GPAs (p <0.001), attended private of Catholic schools (p <0.001), and came from higher SES backgrounds (p <0.001). Female students (p <0.01) and students who provided higher college cost estimates (p <0.05) were also more likely to enroll in college, while students from towns were less likely to enroll in college (p <0.05).

Model 5: Cognitive/Affective Engagement Model. The Cognitive/Affective Engagement Model included all of the variables from the Behavioral Engagement Model, and included two cognitive engagement composites (Future Goals and Aspirations and Control and

Relevance of Schoolwork) and two affective engagement composites (Peer Support for Learning and Teacher/Student Relationships). A Family Support for Learning composite could not be created from available survey data for the 11th grade cohort. When comparing fit statistics from the Cognitive/Affective Model to the Behavioral Engagement Model, both AIC and BIC decreased, indicating that the addition of cognitive and affective engagement variables improved model fit. In the Cognitive/Affective Engagement Model, students who reported higher levels of peer support for learning (p <0.001) and future goals and aspirations (p <0.001) were more likely to enroll in college. Similar to the behavioral engagement model, students from higher SES backgrounds (p <0.001), those who attended private or Catholic schools (p <0.001), students who believed they could afford college (p <0.001) and students with higher English GPAs (p <0.001) were more likely to enroll in college. Students with a higher math GPA (p <0.01) and who reported higher levels of behavioral engagement (p <0.05) were still more likely to enroll in college. In the Cognitive/Affective Engagement Model, gender and school locale no longer significantly predicted college enrollment, though students from the Southern region of the US were less likely to enroll in college (p <0.05).

Model 6 : Final model. Table 10 displays the odds ratios and fit statistics for the 11th Grade Cohort Enrollment Final Model. In the Final Model, variables found to be not significant using the Rao-Scott Likelihood Ratio Test were removed from the model. School region, teacher/student relationships, and control and relevance of schoolwork were found to be not significant, and were therefore removed from the model. When comparing fit statistics from the Cognitive/Affective Engagement Model, AIC remained constant and BIC decreased. As the Final Model is the more parsimonious model, it represents the model that best fits the data for the 11th grade persistence models. In the Final Model, students who reported higher levels of peer

support for learning (p <0.001), future goals and aspirations (p <0.001), and behavioral engagement (p <0.05) were more likely to enroll in college. Similar to previous models, students who believed they could afford college (p <0.001), had higher Math GPAs (p <0.001) and English GPAs (p <0.001), attended private or Catholic schools (p <0.001) and those from a higher SES background (p <0.001) were more likely to enroll in college.

Table 10. Odds ratios and fit statistics for the 11th grade final enrollment model

	Final Model
Intercept	0.42
SES	1.59 ***
Female	1.17
Asian	2.33
Black	1.57
Hispanic	1.91
Mulitracial	1.36
White	1.16
Private or Catholic School	2.53 ***
Suburban	0.99
Town	0.78
Rural	0.79
English GPA	1.88***
Math GPA	1.28 ***
Cost Estimate	1.05
Affordability Beliefs	1.25 ***
Behavioral Engagement	1.11 *
Future Goals and Aspirations	1.51 ***
Peer Support for Learning	1.24 ***
AIC	9032
BIC	9100

***p<0.001; **p<0.01; *p<0.05

11th Grade Persistence Models

Table 11 displays the odds ratios and fit statistics for the 11th Grade Cohort Persistence Models. As in the previous models, AIC and BIC are used to evaluate model fit.

Table 11. Odds ratios and fit statistics for the 11th grade cohort persistence models

	Demographic	Academic	Financial	Behavioral Engagement	Cognitive/Affective Engagement
Intercept	9.02 ***	1.68	1.67	1.83	2.33
SES	1.51 ***	1.30 **	1.23 *	1.23 *	1.17
Female	1.33*	1.05	1.09	1.08	1.06
Asian	1.61	0.99	0.97	0.96	0.97
Black	1.44	1.49	1.49	1.49	1.49
Hispanic	0.79	0.72	0.73	0.73	0.77
Multiracial	1.10	0.97	0.96	0.96	1.06
White	1.30	0.96	0.96	0.97	1.03
Private/Catholic School	3.38***	2.88 ***	2.83 ***	2.80 ***	2.69 ***
Suburban	0.86	0.83	0.84	0.84	0.81
Town	1.08	1.01	1.03	1.02	1.07
Rural	1.11	1.03	1.05	1.04	1.05
Midwest	0.78	0.74	0.77	0.78	0.74
South	0.74	0.76	0.80	0.80	0.74
West	0.60 *	0.60 *	0.65	0.66	0.65
English GPA		1.69 ***	1.65 ***	1.61 ***	1.53 ***
Math GPA		1.29	1.29	1.27	1.20
Cost Estimate			1.20	1.20	1.16
Affordability Beliefs			1.14 *	1.14	1.10
Behavioral Engagement				1.11	1.09
FGA					1.17
PSL					1.24 **
TSR					1.03
CRSW					1.00
AIC	4703	4525	4511	4511	4490
BIC	4622	4557	4565	4571	4587

***p<0.001; **p<0.01; *p<0.05

FGA = Future Goals and Aspirations, CRSW = Control and Relevance of Schoolwork, PSL = Peer Support for Learning, TSR = Teacher/Student Relationships

Model 1: Demographic Model. The Demographic Model contained all demographic variables used in the previous models, including sex, SES, racial/ethnic group membership, and school control (private/Catholic vs. public), region, and locale. In the Demographic Model, students who came from higher SES backgrounds (p >0.001), females (p >0.05), and students who attended private or Catholic schools (p >0.001) were more likely to persist at college. Students who lived in the Western region of the US were less likely to persist at college (p >0.05).

Model 2: Academic Model. The Academic Model retained all demographic variables and added in student Math and English GPAs as academic variables. When comparing fit statistics between the Demographic and Academic Models, both the AIC and BIC decreased in the Academic Model, indicating an improved model fit. In the Academic Model, students with higher English GPAs were more likely to persist at college (p >0.001). Similar to the Demographic Model, students from higher SES backgrounds (p >0.01) and those who attended private or Catholic schools (p >0.001) were more likely persist at college, while students from the Western US were less likely to persist at college (p >0.05).

Model 3: Financial Model. In the financial model, the cost estimate composite and affordability belief item were added to the demographic and academic variables. The AIC decreased in the Financial Model when compared to the Academic Model, while the BIC increased. This indicates that the addition of the financial variables may not improve model fit to the data. In the Financial Model, students who believed they could afford college were more likely to persist at college (p >0.05), as were students with higher English GPAs (p >0.001), students who attended private or Catholic schools (p >0.001), and students from higher SES backgrounds (p >0.05).

Model 4: Behavioral Engagement Model. In the Behavioral Engagement Model, the Student Behavior Scale (Ingles et al., 2013) was added to the variables present in the Financial Model. When comparing the fit statistics from the Behavioral Engagement Model to those of previous models, AIC remained constant from the Financial Model, while BIC increased from both the Financial and Academic models. This indicates that the addition of the Student Behavior Scale did not improve model fit to the data. In the Behavioral Engagement Model, students who attended private or Catholic school (p >0.001), those with higher English GPAs (p >0.001), and students from higher SES backgrounds (p >0.05) were more likely to persist at college.

Model 5: Cognitive/Affective Engagement Model. The Cognitive/Affective Engagement Model retained all of the variables from the Behavioral Engagement Model and included two cognitive engagement composites, future goals and aspirations and control and relevance of schoolwork, and two affective engagement composites, peer support for learning and teacher/student relationships. When comparing the fit statistics of the Cognitive/Affective Engagement Model to those of the previous 11th grade persistence models, AIC decreased while BIC increased in comparison to all models except the Demographic Model. While the AIC decrease indicates an improved model fit, the BIC increase indicates a worsening model fit, though BIC is a more conservative fit statistic that penalizes more heavily for the inclusion of additional variables. In the Cognitive/Affective Engagement Model, students who reported higher peer support for learning (p >0.01), had higher English GPAs (p >0.001), and attended private or Catholic schools (p >0.001) were more likely to persist at college.

Model 6: Final Model. In the Final Model, variables that were identified as not significant via the Rao-Scott Likelihood Ratio Test were removed from the model. Variables removed included school locale, school region, control and relevance of schoolwork, and

teacher/student relationships. When comparing the fit statistics from previous model to the Final Model, both AIC and BIC decreased, indicating that the Final Model provides the best fit to the data. In the Final Model, students who reported higher levels of peer support for learning (p >0.01), had higher English GPAs (p >0.001), and those who attended private or Catholic schools (p >0.001) were more likely to persist at college.

Table 12 displays the odds ratios and fit statistics for the 11th grade cohort final persistence model.

Table 12. 11th grade persistence Final Model odds ratios and fit statistics.

	Final Model
Intercept	1.59
SES	1.15
Female	1.06
Asian	0.98
Black	1.55
Hispanic	0.77
Multiracial	1.10
White	1.11
Private/Catholic School	2.78***
English GPA	1.50 ***
Math GPA	1.23
Cost Estimate	1.18
Affordability Beliefs	1.11
Behavioral Engagement	1.10
FGA	1.16
PSL	1.23 **
AIC	4465
BIC	4529

CHAPTER 5

DISCUSSION

The purpose of this study was to examine the extent to which various demographic, academic, financial, and engagement factors contributed to postsecondary persistence and enrollment across a 9th grade and 11th grade cohort of students. Current research supports student engagement as an important contributor to both secondary and postsecondary completion (Reschly & Christensen, 2006; Robbins et al., 2004, 2006; Sinclair et al., 1998), though currently there is a gap in the research when looking at what role engagement at the secondary level has on postsecondary enrollment and persistence. Our study also attempted to account for other variables that have been identified by previous research as contributing to postsecondary enrollment and persistence, including demographic data, academic achievement, and beliefs around affordability of college. We included these variables to understand how engagement works within the college decision-making process.

The importance of demographic, academic, financial and engagement variables differed both between cohorts and models. Students who attended private or Catholic schools were significantly more likely to enroll in and persist at college in both the 9th grade and 11th grade cohorts. Across all cohorts and models in this study, attending a private or Catholic school was the most consistently positive predictor of postsecondary enrollment and persistence. Students attending private schools were more likely to enroll and persist in postsecondary institutions in both the two previous Secondary Longitudinal Studies, the National Education Longitudinal Study of 1988 and the Educational Longitudinal Study of 2002 (Bozick & Lauff, 2007; Lauff &

Ingels, 2013; Sanderson, et al., 1996). This might be due to the fact that students who attend private and Catholic schools are likely to have parents with more economic resources who can afford private school tuition, as well as a stronger commitment to education, as they are willing to pay for or seek financial aid for their children to attend private schools.

Students from higher SES backgrounds were more likely to both enroll in college and persist at college in the 9th grade cohort. In the 11th grade cohort, students from a higher SES background were more likely to enroll in college, though SES did not significantly predict postsecondary persistence. This is likely due to less variation in SES among the college-going population, as studies indicate students from higher SES backgrounds attend college at higher rates than students with lower SES backgrounds (Cahalan et al., 2016; Lotkowski, Robbins, & Noeth, 2004). A recent report on postsecondary college enrollment and persistence by the Pell Foundation also found that while students from higher SES backgrounds are more likely to both attend and persist at college, the gap for persistence between higher SES and lower SES students is lower than the gap for enrollment (Cahalan et al., 2016). This may help explain why SES was less important for persistence than enrollment in our study.

Although female students were more likely to attend college in some of the models, and this was significant in the 9th grade enrollment final model (p >0.05) the significance of demographic factors such as race and gender generally decreased as more variables were included in the model. The decrease in significance of demographic factors, particularly race/ethnicity once SES is accounted for, has been documented in other published research with the NELS data set when examining high school dropout (Rumberger, 1995; Reschly & Christensen, 2006). For school-level demographic variables, students in the 9th grade cohort from rural areas were less likely to enroll in college (p >0.05), and students from the 9th grade cohort

from the Southern (p >0.05) and Western (p >0.01) regions of the US were less likely to persist in college. Lower rates of college attendance for rural school students has recently been documented in both the academic literature and popular press (Marcus & Krupnick, 2017; NSC Research Center, 2016) with recent articles citing the fact that college recruiters often do not visit rural high schools. For the Western and Southern regions of the Untied States, these regions have higher rates of poverty that the Midwest and Northeast region (U.S. Census Bureau, 2016), which may be one reason why students from these states were less likely to persist at college.

When examining academic variables, students with higher math and English GPAs were significantly more likely to enroll in postsecondary institutions, however only English GPAs were predictive of postsecondary persistence. This might be due to the fact that higher GPAs, and overall academic preparedness, have been identified by the research literature as significant predictors of college enrollment and persistence (Belfield & Crosta, 2012; Brown et al., 2008; Lesnick et al., 2010; Robbins et al., 2004, 2006). The discrepancy between the importance of English and Math GPA scores might be because once at college skills such as reading comprehension, critical thinking, and writing are necessary for success in a wide range of classes beyond English classes. Mathematics skills might be more course specific and less likely to impact college persistence as students who do not have strong math skills might opt to not take mathematics courses.

For financial variables, affordability beliefs significantly predicted college enrollment in both the 9th grade and 11th grade models (p >0.001). Students who believed they could afford college were more likely to enroll, suggesting financial education and resources to obtain financial aid might be an important point of intervention to improve rates of college attendance. Students in the 11th grade cohort who provided higher estimates of the cost of college were no

more or less likely to persist and enroll in college, and in the 11th grade enrollment financial and behavioral engagement models, students who reported higher costs of college were statistically more likely to enroll in college (p >0.05). This might be due to the fact that a large number of students reported that they did not know how much college cost instead of providing a numerical estimate. It's possible that students who were willing to provide a numerical estimate, regardless of the number, had plans to attend college and were more likely to think about the future of their education.

When looking at engagement variables, behavioral engagement was a significant predictor of postsecondary enrollment for the 11th grade enrollment model (p >0.05) though not for the persistence model, and in the 9th grade model it was identified by the LRT test as an insignificant variable and removed from the final model. These results come as a surprise, as previous research indicates that behavioral engagement is a strong indicator of school completion and postsecondary enrollment. This might be due to differences in how behavioral engagement was measured in the 9th and 11th grade cohorts. The 9th grade behavioral engagement scale, the NCES-created School Engagement Scale, asked students to state how often they attended class late or unprepared, rating their responses as often, sometimes, never or rarely. The 11th grade measure of behavioral engagement, the NCES-created Student Behavior Scale, asked students these same questions, but also included attendance and discipline data, asking students how often they were unprepared for class, absent, skipped class or had been suspended from school. Eleventh grade students were also asked to provide frequencies in their responses: 10 times or more, 7-9 times, 3-6 times, 1-2 times, or never. Previous research finding behavioral engagement important to postsecondary enrollment and persistence has included attendance and behavioral data (Fraysier, Reschly, & Appleton, 2019). The non-significance of behavioral engagement in

the 9th grade cohort might be due to the fact that the measure only reported participation, while the 11th grade cohort scale measured all three indicators of behavioral engagement suggested by Reschly and Christenson (2012): participation, attendance, and behavior. For the persistence models, the participants in these models were derived from students who had already reported imminent plans to enroll in postsecondary institutions. Therefore the population in the 11th grade persistence model might have already had a high level of high school behavioral engagement, and we might expect that other variables would be more influential in the decision to persist at college.

When examining cognitive and affective engagement, future goals and aspirations and peer support for learning both emerged as significant predictors of postsecondary enrollment for the 9th and 11th grade cohorts (p >0.001), and 11th grade students who reported higher levels of peer support for learning were also more likely to persist at college (p >0.01). Future goals and aspirations also emerged as a significant predictor of postsecondary enrollment in the 9th grade cohort (p >0.05) and in the 11th grade cohort (p >0.001). This is consistent with previously published research on postsecondary enrollment and persistence (Fraysier et al., 2019). The importance of future goals and aspirations is also consistent with findings from Lovelace et al. (2014, 2017) that indicates cognitive and affective engagement, particulary higher levels of future goals and aspirations, significantly increases the chances of on-time high school completion and reduces the changes of high school dropout. In summary, this research suggests that encouraging students to have future goals and aspirations could be an important point of intervention for encouraging college enrollment. Finally, family support for learning emerged as a significant predictor of postsecondary enrollment in the 9th grade cohort (p >0.01). Family support for learning could not be measured due to limited content from the survey questions for

the Second Follow-up. Although a similar study did not find family support for learning as a significant predictor of postsecondary retention in a 9th or 11th grade cohort (Fraysier, et al., 2019), previous research has identified family support for learning a factor that contributes to high school completion (Fall & Roberts, 2012; Rumburger et al., 1990).

Limitations

The current study had several limitations that will hopefully be addressed in future research. One limitation is that the engagement scales were constructed using pre-existing survey data. Although reliability coefficients were found to be acceptable for all scales, the scales were created based on pre-existing survey questions. Because the scales were not formulated to specifically measure behavioral, cognitive, and affective student engagement, they might not be as accurate a representation of students' engagement as a theoretically-driven, engagement-specific survey measure. Another limitation of the current study is that self-reported survey items measured persistence and enrollment. Further research could examine these finding with more objective indicators of postsecondary persistence and enrollment, for example using information from a data base for postsecondary enrollment and persistence as opposed to student self-report. Additionally, data that examined institutional factors for schools attended and other post-secondary variables that might have influenced students' outcomes and perceptions (e.g., military service, family care burdens, postsecondary school selectivity or financial aid availability) were not included in the models. Future research should examine the role of both life event and postsecondary institutional factors, and how these may enhance or dampen the effects of student engagement.

Directions for Future Research

The current study produced interesting findings towards understanding the many complex reasons students choose to enroll in and persist at college; however, many avenues exist for further exploration through future research. One direction for future research includes examining whether engagement variables remain significant for postsecondary enrollment and persistence when scales are created explicitly with the purpose of measuring various aspects of student engagement. This approach might help gain further insight into the importance of behavioral engagement, specifically when it comes to attendance and student discipline data. Future research may also explore the extent to which engagement variables remain significant within specific populations that were not considered within this study, for example first-generation college students and students with disabilities.

The current study did not include postsecondary institutional variables, such as selectivity, financial aid availability, or for-profit versus nonprofit status into the analysis. Future research could examine how these variables interact with and are influenced by student engagement, potentially incorporating Tinto's theory of social and academic integration (1975). Researchers could explore the extent to which social and academic integration contibute to postsecondary retention above and beyond high school engagement levels and the extent to which secondary and postsecondary engagement are related. For example, are more engaged high school students more likely to attend certain types of postsecondary institutions, and does this contribute to higher rates of persistence? Additionally, student engagement might influence whether a student seeks out financial aid, which could affect persistence rates.

Future research should also explore the role of future goals and aspirations and peer support for learning in postsecondary enrollment and persistence. Understanding what types of goals and aspirations are most impactful, for example long-term career goals versus short-term

college planning goals, might provide more insight into possible points of intervention. Similarly, researchers might wish to inform interventions through an understanding of which types of peer support are most meaningful to postsecondary outcomes. Future research may also want to identify specific aspects of private/Catholic school attendance and higher English GPAs in contributing to postsecondary enrollment and persistence.

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