Assets and Access: An Examination of the Transition from High School to College

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ASSETS AND ACCESS:

AN EXAMINATION OF THE TRANSITION FROM

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ABSTRACT

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Americans are more educated than ever, and high educational attainment has long been associated with positive outcomes for individuals and society as a whole. However, one-third of high school students do not enroll in post-secondary education immediately after graduation, thereby reducing potential benefits. A thorough understanding of college enrollment patterns is needed to develop and enhance interventions that will effectively promote immediate college enrollment.

Extant literature on college access focuses largely on contextual factors that influence college enrollment, such as families, schools, and classrooms. Given that context is only one component of development, additional research on the role of the individual may be especially useful for understanding more fully the transition from high school to college. For this dissertation, theoretical approaches from higher education and developmental psychology were combined to provide a new framework for exploring immediate college enrollment. The variables of interest included indicators of college readiness (e.g., academic preparedness and sources of college information) and three internal assets: self-regulation, school engagement, and expectations for academic success.

College enrollment patterns were examined using data from the Education Longitudinal Study of 2002, which surveyed students nationwide in 2002 (Grade 10),

2004 (Grade 12), 2006, and 2012. A series of multinomial regression equations revealed significant main effects and indirect effects of internal assets on college enrollment through college readiness variables, but no interaction effects between internal assets and college readiness variables. Analyses also provided support for previous findings related to racial/ethnic and socio-economic group differences, as well as school-level contextual factors. The findings from this study have valuable implications for college access programs: internal assets appear to be driving college readiness, not merely bolstering it, and should be a focus for interventional efforts. Additional research across applied settings for youth is needed to replicate and extend the findings from the current study, to evaluate applicable measurement standards, and to propose reform in practice and policy.

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Chapter 1: Introduction

Census data show an increase in educational attainment over the last 50 years, making it clear that Americans are now more educated than ever (U.S. Census Bureau, 2012). Despite this increase though, it remains that only about two-thirds of the 15 million American high school students graduate and immediately go on to college (Arnold, Lu, & Armstrong, 2012; Aud et al., 2012). This means that approximately 5 million students do not pursue higher education with their peers at the conclusion of high school; this is problematic for three reasons. First, individuals who delay enrollment in post-secondary programs have been found to have lower levels of educational attainment than those who immediately enroll (Goldrick-Rab, 2007; Rowan-Kenyon, 2007). If adolescents do not start college in a timely manner, they may not ever enroll in or complete a post-secondary program. Second, individuals who delay post-secondary enrollment are missing out on the benefits associated with higher education such as high-quality jobs, high salaries, and high satisfaction with life (Dale & Krueger, 2011; Grossman & Kaester, 1997; OECD, 2013). Third, society is missing out on the benefits of an educated population. For example, having a highly educated workforce may help reduce the number of jobs that are outsourced and improve economic stability (Louie, 2007; Sawyer, 2008). Considering these gross drawbacks associated with delaying a post-secondary education, increasing immediate college enrollment (ICE) should be a priority for individuals and society as a whole.

Knowing that post-secondary education (PSE) promotes both individual and societal well being makes accessibility an important and popular research topic. The transition from high school to college is often studied under the umbrella term, "college

access," which encompasses individual, familial, academic, and financial components. Though studied by both higher education researchers and social sciences researchers, few studies explicitly aim to include both educational and social/psychological variables in their investigations of post-secondary enrollment. In the field of higher education, predictors of college access include but are not limited to academic preparedness (Perna, 2005, 2006), educational aspirations (Roderick, 2006), college knowledge (Conley, 2008; Roderick, Nagaoka & Coca, 2009), parental involvement (Bell, Rowan-Kenyon, & Perna, 2009; Perna & Titus, 2005; Tierney & Auerbach, 2005), school-managed strategies (e.g., tracking; Roderick, Coca, & Nagoka, 2011), and demographic characteristics (Walpole, 2007).

In the field of psychology, researchers have been concerned with identifying psychological components related to college access such as self-regulation, school engagement, and academic expectations. Ley and Young (1998), for example, found that regular admission students had significantly higher self-regulation scores than underprepared students (i.e., those who took remedial courses upon entry into post-secondary programs), illustrating that self-regulation skills may help high school students become prepared for college coursework. Similarly, Roderick and colleagues' research (e.g., Roderick, 2006; Roderick et al., 2011) posits that internal variables, such as academic expectations and engagement, may bolster the association between high school resources (e.g., high-quality counselors) and ICE.

While much is known about factors associated with college access, empirical data and current statistics illustrate that existing programs and practices have had limited success in preparing today's youth for post-secondary enrollment (Baum, Kurose, &

McPherson, 2013; Goldrick-Rab, 2007). For example, Aud et al. (2012) found that only 27% of high school seniors surveyed in 2004 completed high-level academic coursework sufficient for college admission; this number looked similar a decade later when ACT (2014) documented that only 26% of seniors met college readiness benchmarks. Moreover, high school students sometimes lack the resources necessary for understanding the college and financial aid application process, such as high-quality counselors and involved parents (Goldrick-Rab, 2007; Perna, 2006).

Current programming that seeks to increase ICE may lack effectiveness for multiple reasons; two of these are flawed implementation and content. It is possible that the individuals who deliver content to adolescents are not conveying the information well; instructors may be unclear in their delivery, or the students may not be receptive to the format through which information is communicated. Moreover, programs may be delivering content that, while beneficial for some outcomes and populations, does not impact ICE among all participants. Socioeconomic status (SES) is one area where this may be especially applicable, as students from low-SES families may need to understand the financial reality of PSE before they can be receptive to academically based content. A thorough understanding of college enrollment patterns is needed to develop and enhance interventions that will effectively promote ICE and the associated benefits.

Extant literature on college access and enrollment focuses largely on contextual factors that influence ICE, such as families, schools, and classrooms. Given that context is only one component of development, additional research on the role of individual characteristics may be especially useful for understanding more fully the transition from high school to college. Furthermore, researchers from different fields and disciplines

seldom work together, meaning there is little research on ICE that incorporates multiple theoretical perspectives.

In order to fill these gaps in the literature, this dissertation combines theoretical approaches from higher education and developmental psychology to provide a new framework for investigating ICE that includes individual-level variables. It is hypothesized that psychological constructs from developmental psychology (i.e., those that are internal to the person) may be working in conjunction with factors described by higher education researchers in previously unidentified, yet meaningful ways. By simultaneously examining how both college readiness (academic preparedness and sources of college information) and psychological variables (self-regulation, school engagement, and academic expectation) are associated with ICE, we may gain insights on how to promote ICE among all students.

Enrollment is especially important for studying educational attainment because it precedes persistence and success. It is important to note, however, that the theories and literature on college persistence and success differ from access and enrollment in fundamental ways, and therefore are beyond the scope of this dissertation.

Chapter 2: Literature Review

The primary goal of this dissertation is to investigate the ways in which two college access variables, academic preparedness and college knowledge, and three developmental psychology variables, self-regulation, school engagement, and academic expectations, are associated with immediate college enrollment (ICE). The college access variables were selected for inclusion because they are studied most frequently in the literature and have strong empirical support in predicting ICE (e.g., Allen, Bonous-Hammarth, & Suh, 2003). The developmental psychology variables were selected because they have been linked to multiple measures of academic achievement as well as positive youth development more broadly (e.g., Conley, 2008; Lerner et al., 2005). This chapter explores the literature that informs this study, including trends and benefits of post-secondary education (PSE), theoretical approaches for studying post-secondary enrollment, and the variables of interest listed above.

Post-Secondary Education

Post-secondary education (PSE) has garnered attention since the 1940s when the government enacted policies aimed at increasing educational attainment; the most notable example is the G.I. Bill, which was introduced in 1944 (Barrow, Brock, & Rouse, 2013). In recent decades, post-secondary enrollment has increased and research has revealed beneficial economic, social, and psychological outcomes of PSE, thus reaffirming the importance of high educational attainment (Baum et al., 2013). Moreover, taxpayers are often interested in returns on educational investments and governmental spending on education, which currently exceeds $160 billion (Barrow et al., 2013). This section

reviews current and historical PSE enrollment statistics and trends, and details some of the ways in which PSE is beneficial to both individuals and society.

Statistics and Trends

The Census of 1850 was the first to begin tracking educational statistics and did so in a rudimentary way. These early surveys have evolved into the advanced measures of educational attendance and attainment that are currently administered by the U.S. Census Bureau (Davis & Bauman, 2013). The findings from over 150 years of data illustrate an increase in school attendance at all levels, with more detailed data collected since the 1940s showing an increase in PSE specifically. In 1955, fewer than 5 million people were enrolled in PSE, which means that college students made up only 6% of all American students. However, increases in enrollment over the next decades were consistent and large, resulting in approximately 20 million college students in 2011. This equates to 26% of all American students; the fact that college students now make up more than one quarter of students from preschool to college suggests that higher education is valued far more now than in 1955 (Davis & Bauman, 2013).

In addition to general increases in enrollment, several specific trends (presented in Table 1) are emerging in regard to college student characteristics (Davis & Bauman, 2013). For example, women's participation in PSE was consistently lower than males' until 1979. At that time, the number of women enrolled in PSE surpassed the number of men enrolled, and women have remained the majority almost every year since then. On a few occasions, researchers found no statistical difference between the number of men and women enrolled in PSE. Another individual characteristic on which changes in PSE trends are visible is race. White students have always been the majority in PSE, and hold

steady at 60%. However, census data show small but significant increases in post-secondary enrollment among minority students, with Black (15%) and Hispanic (15%) students now making up 30% of all college students (Davis & Bauman, 2013).

Table 1. Enrollment Demographics 1990 – 2010

	1990	2000	2010
Undergraduate Students			
Male	5,380,000	5,778,000	7,835,000
Female	6,579,000	7,337,000	10,244,000
White	1,147,000	1,272,000	1,329,000
Black	155,000	216,000	289,000
Hispanic	52,000	159,000	272,000
Full-time	6,976,000	7,923,000	18,079,000
Part-time	4,983,000	5,232,000	6,627,000
Public	9,710,000	10,539,000	13,704,000
Private	2,250,000	2,616,000	4,374,000
Four-year institution	6,719,000	7,207,000	10,398,000
Two-year institution	5,240,000	5,948,000	7,681,000

SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary and Secondary Education," 1990-91 through 2011-12; Parent and Family Involvement in Education Survey of the National Household Education Surveys Program (NHES), 2012; Private School Universe Survey (PSS), 1995-96 through 2011-12; National Elementary and Secondary Enrollment Projection Model, 1972 through 2023; Integrated Postsecondary Education Data System (IPEDS), "Fall Enrollment Survey" (IPEDS-EF:90-99); and IPEDS Spring 2001 through Spring 2013, Enrollment component.

Beyond changing trends in student characteristics, institutional characteristics have also changed, often providing more diverse opportunities to students (Hainline, Gaines, Feather, Padilla, & Terry, 2010). In the past, college was viewed as a four-year public or private institution from which privileged students obtained bachelor's degrees

(Baum et al., 2013). However, post-secondary institutions grew is size and number after World War II, and society embraced curricular shifts that fostered alternative degree programs, such as two-year associates degrees and certificate programs for specialized vocations. With the addition of these programs to existing institutions, as well as the creation of new degree-granting institutions, the percentage of programs that require two years or less to complete, and thus the number of students enrolled in them, increased greatly through the 1960s and 1970s. Since then, community colleges have continued to be a noteworthy sector of PSE (Baum et al., 2013; Davis & Bauman, 2013).

Understanding the impact two-year programs have on increasing educational attainment is important for consideration in this study, as such programs may be both helpful and detrimental. For students who do not plan to enroll in a four-year program, two-year programs provide an opportunity to increase educational attainment from high school diploma to associate's degree (Tierney & Venegas, 2009). This is aligned with the origins of community colleges in that they were created to meet the expanding needs of young people preparing for the workforce. As factory jobs declined, a high school diploma became insufficient for obtaining a job that would provide financial stability for an individual or family (Reynolds, Stewart, MacDonald, & Sischo, 2006). Thus, two-year programs help students increase their qualifications for employment by extending their education beyond high school. In contrast, these same two-year programs may hinder educational attainment among students who plan to eventually enroll in a four-year degree program. When these students report starting in two-year programs as a "stepping stone" to a four-year program, they rarely transfer and complete the bachelor's degree,

thus decreasing educational attainment (Alfonso, 2006; Brint, 2003; Brint & Karabel, 1989; Wang, 2009, 2013).

In sum, three main educational trends are clear from the literature on educational attainment: (1) More people are going to college than before; (2) Women and minorities are participating in PSE at greater rates than in the past; and (3) Post-secondary institutions are diverse in size, curriculum, and degree offerings. With these trends in mind, the next section details the benefits associated with enrolling in PSE.

Benefits associated with PSE

The statistics and trends detailed above provide ample support for the continued investigation of American PSE. It is important, moreover, to deepen our understanding of the outcomes associated with PSE in an effort to promote well-being among all members of society. Extant literature illustrates that PSE is associated with desirable economic, physical, and psychological outcomes for individuals as well as society as a whole (Goldrick-Rab, 2007; Louie, 2007; Sawyer, 2008). Moreover, future generations benefit from PSE, as high parental educational attainment is associated with youths' academic achievement and a high-quality home environment (e.g., Magnusson, 2007). Even though not all Americans are students themselves or have children who are students, these social outcomes make studies on PSE relevant to all members of society and provide support for continued research on this topic.

The most-cited benefit relates to the "earnings gap," which illustrates that educational attainment is significantly and positively associated with lifetime earnings (Baum et al., 2013; Oreopoulos & Petronijevic, 2013). For example, individuals with a college degree make, on average, $1 million more in lifetime earnings than their peers

who only hold a high school diploma (Barrow et al., 2013; Dale & Krueger, 2002; U.S. Census Bureau, 2012). Census data have illustrated that the widening of the earnings gap over the last 40 years is attributed to America's changing employment characteristics, such as changes in supply of labor and demand for skilled workers (Day & Newburger, 2002). In 1975, people made roughly the same wages regardless of how much education they had achieved; the supply of labor did not typically demand high-skilled workers. Now, jobs often require more advanced skills that are obtained through higher education, and thus wages differ based on educational attainment to a greater degree. Highly educated individuals have greater starting salaries and superior earnings trajectories across their careers than their lower-educated counterparts. Additionally, increases in the minimum wage have not kept up with inflation, and the labor unions that advocate for low-wage workers have declined. For these reasons, PSE is beneficial because it is associated with higher earnings (Day & Newburger, 2002).

Non-monetary benefits of employment are plenty, and, on occasion, actually are "monetary" in that they reduce the employee's overall expenditures (Oreopoulos & Salvanes, 2011). For example, some employers provide their employees with medical insurance, pension contributions, paid vacations, and the like as fringe benefits. Though these goods and services are not acquired at the expense of the employee, they lower overall spending and thereby possess monetary value. Fringe benefits are positively correlated with educational attainment, implying that highly educated employees receive more fringe benefits than their peers with lower levels of education (Oreopoulos & Salanes, 2011; Pascarella & Terenzini, 2005).

Other non-monetary benefits of higher education are physical and psychological in nature, as highly educated people are, in general, happier, healthier, and more productive than people with lower levels of education (McMahon, 2004; Mortenson, 2000). Moreover, they tend to have positive attitudes and values (Goldrick-Rab, 2007), experience greater job satisfaction, and are viewed by employers as having skills and abilities that are superior to individuals who have only completed high school. Researchers hypothesize that navigating the unique experiences and challenges of college has lasting outcomes on how young people interact with the adult world, and might play a role in explaining these differences (McMahon, 2004; Oreopoulos & Petronijevic, 2013; Pascarella & Terenzini, 2005).

Social outcomes associated with PSE are also desirable. High educational attainment contributes to enhancing economic welfare and the development of a competitive labor market (McMahon, 2004). McMahon's (2004) extensive review of social and external benefits of PSE reveals that social benefits are often manifested in the form of tax revenue and reduced public spending. High educational attainment is positively associated with high earnings, which means greater income tax revenue; it is also associated with low unemployment, welfare, and crime rates, meaning reduced governmental spending in these areas. These benefits are detailed in Appendix A (McMahon, 2004).

Theoretical Models

In addition to understanding why access to PSE is important, recognizing the theoretical perspectives through which researchers examine access is also essential. For the past few decades, researchers from multiple disciplines have taken an interest in the

transition from high school to college, and thus it is necessary to differentiate the unique facets of their perspectives. To date, the college access literature has employed two primary theories to organize findings and generate new ideas about accessing post-secondary education in the US (Walpole, 2007). The first theory is drawn from sociology and highlights Bourdieu's (1977) work on the role of education in social mobility and social class reproduction. The second theory stems from economics and suggests that cost-benefit analyses predict post-secondary enrollment (Becker, 1993; Manski & Wise, 1983). These models are explained in more detail next, and a third model is proposed as a way to extend current perspectives.

Sociological Models

The status attainment model (Jencks, Crouse, & Mueser, 1983; Sewell, 1971) argues that educational attainment is the key to social mobility, but existing cultural and institutional norms prohibit mobility and instead reproduce existing social classes as each generation progresses through life. Considering this model in terms of PSE specifically, the individual has the agency to select, apply to, and choose to attend college, but success is bounded by the capital he or she possesses. Members of higher social stratifications generally have more experiences, resources, and initial knowledge (i.e., capital) than members of lower classes (i.e. middle- and working-classes), and therefore have greater opportunities for accessing PSE. In simpler terms, the status attainment model states that poverty begets poverty and wealth begets wealth (Jencks et al., 1983; Sewell, 1971).

Sociological theories such as the status attainment model reflect historical tenets of social structures, and are largely influenced by sociologist Pierre Bordieu. Drawing from Marxist conflict theory in which society is viewed as consisting of two classes of

people – one dominant and one dominated - Bordieu (1977) posited that cultural capital was the key to social mobility. More specifically, he focused his attention on the cultural resources that an individual could use to interact with society in a way that would increase his or her social standing. Winkle-Wagner (2010) summarizes, "one can exchange cultural knowledge, skills, abilities, norms, preferences, or mannerisms for social rewards such as acceptance, recognition, inclusion, or even social mobility" (p. 5). As Bordieu's (1977) theory of social reproduction of inequality developed, educational attainment emerged as a critical form of cultural capital due to the fact that it can be acquired voluntarily (previous conceptions suggested cultural capital could only be acquired through birth into an upper-class family). Bordieu (1977) found that increasing education provided another pathway to higher social status, thereby empowering lower-class members of society with an opportunity for upward mobility based on individual agency.

Christopher Jencks' (1972) seminal book on inequality, as well as more recent empirically based research (e.g., Gaddis & Lauen, 2014; Reeves, 2012) and public attention to programs that seek to rectify SES-based educational inequalities (e.g., The Harlem Children's Zone, KIPP Academy) illuminate the severity and profundity of social inequalities. Extant literature on educational inequality focuses primarily on school and family contexts. Public schools in low-income neighborhoods, for example, have fewer tax dollars for education, lower expenditures per student, teachers with minimal training and education, and larger class sizes than public schools in higher-income neighborhoods (Card & Krueger, 1992; Jencks, 1972; Jencks & Mayer, 1990). Moreover, growing up in a low-income family is associated with increased stress, having fewer resources in the

home that encourage cognitive stimulation, and having parents with low educational attainment (McLoyd, 1998). In contrast, high-income students have many assets and resources that promote positive educational outcomes. These status-based differences contribute to the intergenerational transmission of inequalities and social reproduction (Sewell, 1971).

Sociological models, in sum, suggest that social structures determine status. In the classic sense, social and economic standing is inherited at birth. In broader conceptualizations, social and economic standing limits the extent to which status can be augmented with education; the interaction with society is constrained by the resources available in the person's context regardless of his or her agency. According to sociological models then, high school students in poor contexts should not be able to use internal assets to increase their likelihood of ICE.

Economic Models

As sociologists embraced the status attainment model and its focus on social structures, economists reframed the study of college access in a way that placed a greater emphasis on individual agency. In economic models, PSE is viewed as an investment, and understanding the decision to enroll requires the exploration of potential costs and benefits. In other words, economists adopt a "rational choice" approach, arguing that adolescents choose their educational paths by selecting the option that has the fewest costs and greatest benefits (Becker, 1993; Manski & Wise, 1983). The human capital model exemplifies this perspective.

Human capital refers to the knowledge and abilities a person possesses, and is commonly measured by years of schooling an individual has completed (Becker, 1962).

In essence, educational attainment is positively associated with knowledge acquisition, and experiences within the learning context provide opportunities for skill development, thus attainment often serves as a proxy for intellectual and social abilities. The human capital model also draws on valuation and investment theory to explain PSE as a rational choice. High school students must evaluate the costs of acquiring higher education and weigh them against the expected benefits in order to decide if going to college is a sound investment. If the benefits outweigh the costs, human capital theory affirms that investing in PSE is rational.

Although models that use cost-benefit analyses appear to provide a clear-cut and methodological way to make informed decisions about ICE, they may, in fact, be oversimplifying the processes at work. Adolescents are neither economists nor experts at conducting cost-benefit analyses, and may not know how to accurately assess the value of potential choices (i.e., enrolling in PSE or entering the workforce). Economic models also tend to neglect the role of individual and group differences. For example, extant research (e.g., Bell et al., 2009; Tierney & Venegas, 2009) suggests that low-SES youth focus on short-term consequences and fail to grasp the magnitude of long-term returns of higher education (e.g., lifetime earnings). To this group, entering the workforce and increasing earnings is a more rational choice than enrolling in PSE and increasing expenditures and debt (Tierney & Venegas, 2009). Though this rationalization is founded on economic principles, decisions based on incomplete data may result in less than optimal outcomes.

According to economic models then, high school students should be able to identify ICE as the post-secondary path with the most benefits and fewest costs, and pursue that path by augmenting internal and contextual assets. Unfortunately, incomplete

data are the norm as few students receive comprehensive education on analyzing the costs and benefits of ICE. Without consideration of all potential consequences, cost-benefit analyses are likely to be flawed (Tierney & Venegas, 2009).

This theoretical summary illustrates that existing college access models are supported in the field as acceptable perspectives, and focus on the replication of economic inequalities through socially determined pathways such as access to resources - students born into wealthy families have more and better resources, and rational decisions are made when students have resources that help them make accurate valuations of costs and benefits. However, utilizing theoretical frameworks that primarily attend to social structures could be problematic, as such studies may be omitting important individual factors, and thus telling an incomplete story of the transition from high school to college.

Presently though, college access theory is evolving into a broader conceptualization that takes an interdisciplinary approach to research, such as including systems theories from psychology. For example, some higher education researchers (e.g., Perna, 2006; Tierney & Venegas, 2009) have developed quasi-ecological theories that take into account multiple contexts. Arnold and colleagues (2012) have proposed an ecological model of college readiness informed by Bronfenbrenner's bioecological model of human development (Bronfenbrenner & Morris, 1998). Their model focuses on nested levels of the environment and how the individual influences and is influenced by processes occurring in each level. These new models offer the chance to investigate more fully the complex relations and processes that are occurring in the multiple individual and contextual systems of students' lives.

The Positive Youth Development (PYD; Lerner et al., 2005) model is similar to

Arnold and colleagues' (2012) model in that it considers the bidirectional relationships between individuals and contexts, but adds specificity to the understanding of individual characteristics. Informed by the developmental assets framework, the PYD Thriving model contributes to the literature by identifying three internal strengths from developmental psychology that may be applicable to college access research: self-regulation, school engagement, and academic expectations.

Psychological Model

The Positive Youth Development (PYD) movement rejects the deficit perspective that dominated psychological research on adolescents in previous decades, and instead focuses on the ability of youth to grow and flourish (Lerner, Phelps, Forman, & Bowers, 2009). Lerner and colleagues (2005) popularized the PYD Thriving Model (shown in Figure 1), which asserts that positive outcomes occur when adaptive developmental regulations emerge or can be fostered between the plastic, developing young person and features of his or her context. When both the individual and the context benefit from these bidirectional transactions (most notably represented as individual ← → context relations), PYD ensues.

The Developmental Assets Framework (Leffert, Benson, Scales, Sharma, Drake, & Blyth, 1998) informs the first piece of the model, which shows that an individual's internal strengths interact with ecological assets. This framework (Leffert et al., 1998) identifies 40 assets, defined as "a set of 'building-blocks' that, when present, appear to enhance important developmental outcomes" (Leffert et al., 1998, p. 209). Assets are categorized as relating to external characteristics (e.g., support, empowerment, boundaries and expectations, and constructive use of time) or internal characteristics

(commitment to learning, positive values, social competencies, and positive identity;

Leffert et al., 1998) and may be substantively different than factors of PSE already

identified by higher education researchers.

Figure 1. The PYD Thriving Model
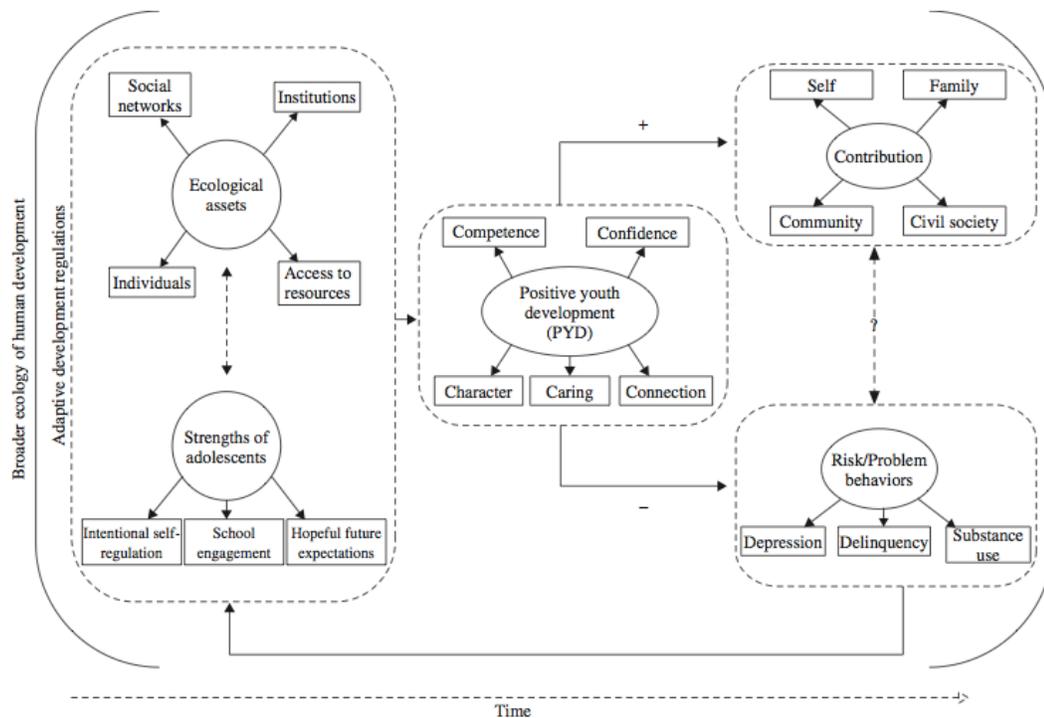
Source: The Institute for Applied Research in Youth Development, Tufts University.

The second piece of the model consists of indicators of positive development;

these are referred to as the "five C's" of PYD, and include competence, confidence,

character, connection, and caring. *Competence* is a positive view of one's action in

domain-specific areas including the social and academic domains. *Confidence* is an

internal sense of overall positive self-worth, identity, and feelings about one's physical

appearance. *Character* involves respect for societal and cultural rules, possession of

standards for correct behaviors, a sense of right and wrong, and integrity. *Connection*

involves a positive bond with people and institutions that are reflected in healthy, bidirectional exchanges between the individual and peers, family, school, and community in which both parties contribute to the relationship. *Caring* is the degree of sympathy and empathy, that is, the degree to which participants feel sorry for the distress of others. This definition of PYD is supported by research from the 4-H Study of PYD (Lerner et al., 2005), and consists of qualities and characteristics that are applicable to college access and enrollment. The present study identifies ICE as a positive developmental outcome, as it is a developmentally appropriate measure of social and academic competence.

The final part of the model depicts two domains in which PYD is manifested over time: increased contribution and reduced risk behavior. The review of PSE trends presented above exemplifies the ways in which ICE is associated with these domains (e.g., increased general well being and decreased crime and unemployment). As a whole, this strengths-based model informs the present study, with the goal of identifying additional psychological factors, or internal assets, that promote ICE.

Enrollment Factors drawn from Higher Education

Thus far, this chapter has explicated the relevance and benefits of increasing access to PSE, and described theoretical perspectives applicable to college access research. Using these theories, extant higher education literature identifies a number of predictors of college access, including academic preparedness (Perna, 2005, 2006), college knowledge (Conley, 2008), educational aspirations (Roderick, 2006), family involvement (Bell et al., 2009; Perna & Titus, 2005; Tierney & Auerbach, 2005), school-managed strategies (e.g., tracking; Roderick et al., 2011), and demographic characteristics (Walpole, 2007), among others. Importantly, two themes have emerged

about the transition from high school to college: (1) high school students are underprepared for college curricula (Bedsworth, Colby, & Doctor, 2006); and (2) high school students have incomplete knowledge about the process of researching, applying to, and enrolling in PSE (Perna, 2005). The constructs that define these issues are most often referred to as academic preparedness and college knowledge, respectively, and high levels of each have been found to be predictive of college access and enrollment (Louie, 2007).

The solid empirical support for these relationships warrants the inclusion of academic preparedness and college knowledge in the present study. For example, Akerhielm, Berger, Hooker, and Wise (1998) investigated factors of post-secondary enrollment using data from the National Education Longitudinal Study. Their analyses on over 13,000 students revealed that taking advanced math and science courses in high school and having high standardized test scores were each positively associated with post-secondary enrollment, especially in four-year institutions. Further, information about college and financial aid were also positively associated with post-secondary enrollment; implications recommended bolstering academic preparedness and college knowledge early in high school. These factors drawn from the higher education literature are reviewed in detail next; other important contextual and demographic variables are not at the center of this dissertation but are included as covariates.

Academic Preparedness. Academic preparedness refers to the mastery of subject matter that is required for successfully participating in non-remedial college curricula, and it is often recognized as a strong predictor of college enrollment and educational attainment (Bedsworth et al., 2006; Perna, 2005). For many years, researchers have

examined grade point averages (GPA), standardized test scores, and scores on college entrance exams as indicators of academic preparedness; however, these have recently faced criticism due to methodological weaknesses (Perna, 2005). On the contrary, course history during the high school years has emerged as the most dependable predictor of college enrollment and success (Adelman, 1999; Bedsworth et al., 2006). It is necessary to review these methodological concerns to identify potential problems with conclusions from previous research, and to explicate the importance of adopting course history as a primary measure of academic preparedness.

Utilizing grades to measure preparedness and compare students is a complex process that lacks objectivity and effectiveness in predicting post-secondary educational success (Bedsworth et al., 2006; Sedlacek, 2011). Although the nation agrees, for the most part, on a set of skills that should be taught to students (i.e. Common Core standards), grades that are subjectively assigned by teachers may not accurately reflect mastery of the content standards. This is especially true in low-performing schools where social promotion is rampant and students receive passing grades even if they do not demonstrate proficiency (Hauser, 2000). Furthermore, grading systems are not universal and complicate the mathematical calculations associated with grade comparisons. Scales vary in unit (point-system versus integer or percent system), range (ability to exceed 4.0 or 100%), and use of weighting procedures (adding value to grades based on completion of advanced coursework); therefore, raw grades and grade point averages (GPAs) lack validity and reliability and should be used with caution (Adelman, 1999; Bedsworth et al., 2006).

In contrast to teacher-based evaluations (i.e., grades), state competency tests and college entrance exams such as the SAT and the ACT should, in theory, provide a standardized way to evaluate the academic preparedness of students. Comparing students based on standardized scores alleviates the issue of measurement inconsistencies and allows for simpler mathematical analyses. Unfortunately, this measure of preparedness has flaws as well. The validity of standardized measures is often called into question, with opponents of large-scale exams arguing that they measure test-taking skills more than accurately reporting students' intellectual skills and abilities or mastery of subject matter (Bedsworth et al., 2006). Moreover, there is a significant disconnect between what is measured on these exams and what constitutes readiness for post-secondary coursework. Adequate or "passing" performance on these exams may not translate into post-secondary readiness and enrollment (Adelman, 1999; Bedsworth et al., 2006).

Despite the fact that GPA and standardized test scores may not be methodologically sound, they are still commonplace in current studies. To strengthen studies though, researchers are often combining these with another measure of academic preparedness - course history. For example, Enberg and Allen (2011) included advanced coursework and standardized test scores in their measure of academic preparedness to predict college enrollment. Multinomial logistic regression analyses on longitudinal data revealed that students with high academic preparedness were more likely to enroll in a four-year PSE program than a two-year PSE program, and more likely to enroll in a two-year PSE program than not enrolling at all. This composite measure of academic preparedness represents one of the many ways in which high school coursework is being utilized in contemporary research.

To elaborate, high school course history, or coursework, refers to the classes students complete while enrolled in high school, and certain coursework patterns are prevailing as reliable predictors of college access, enrollment, persistence, and completion (Perna, 2005). These patterns are typically characterized by certain subject areas, such as math and science, and take into consideration the quality and quantity of courses completed (Adelman, 1999; Altonji, 1992; Hearn, 1992). Data from the National Assessment of Educational Progress (NAEP) illustrate that enrollment in math and science has been increasing for the past two decades (Aud et al., 2012). The most common thresholds are Algebra II or above for math, and chemistry or physics and above for science.

ACT (2014) suggests that states provide explicit recommendations for coursework to ensure that students are taking courses that follow patterns of college readiness. For example, ACT (2014) encourages graduation requirements to be stated as, "Three years of science, including rigorous courses in Biology, Chemistry, and Physics." This specificity removes the ambiguity of "three years of science" in which students may select coursework that leaves them ill-prepared for what they will encounter in post-secondary contexts.

Because advanced coursework is key, it seems logical that a college prep track would increase students' post-secondary enrollment; however, tracking must be approached with caution. Adelman (1999) notably stated that these courses may not actually be rigorous, and thus being labeled "college prep" does not equate to "advanced." Instead, specific courses, especially those that promote critical thinking and analytical writing skills, better describe "advanced" or "rigorous" (Roderick et al., 2009;

Venezia & Jaeger, 2013). The number of rigorous courses students take is also associated with college preparedness, enrollment, and success, meaning measures of both quality and quantity of coursework are essential for studying educational attainment (Adelman, 1999; Altonji, 1992; Hearn, 1992).

Coursework appears to be a strong, if not the strongest, indicator of academic preparedness; however, there are some limitations to this measure. The availability of courses should always be considered due to the fact that some students may lack advanced course options (Deil-Amen & Turley, 2007; Perna, 2005). Students in schools that offer few or no advanced courses (e.g., high-level science and math courses or honors and Advanced Placement courses) encounter an intensity ceiling; they can only take as many rigorous courses as the school offers.

It is also important to take into account state coursework patterns. The discord between high school graduation requirements and college admissions prerequisites complicates students' desire and ability to seek more advanced classes. Students may be fulfilling the requirements provided to them by their high schools but failing to enroll in courses that maximize their preparedness for post-secondary academics. Understanding the discrepancy between what high school students need to know to successfully access PSE and what they actually know is studied under the umbrella term, "college knowledge" and is described next (Deil-Amen & Turley, 2007; Perna, 2005).

College Knowledge. Along with academic preparedness, literature on college access has elucidated the importance of "college knowledge," which refers to the knowledge and practical skills necessary to seek out information and complete novel tasks relating to researching and applying to PSE (Conley, 2008). This construct is

comprised of skills and information that Tierney and Jun (2001) categorize into three areas of accessing PSE: eligibility, application, and financing. Without substantive knowledge in these areas, college access and enrollment is likely to be limited (Conley, 2008).

The first category is eligibility. In order to apply to college, students must meet specific criteria set forth by the higher educational institution. Common requirements include college entrance exam score (i.e., SAT or ACT score) and the completion of prerequisite coursework. In 1983, the National Commission on Excellence in Education communicated that high school students should have foundational knowledge in the Five New Basics: English, Math, Science, Social Studies, and Computer Science (U.S. Department of Education, 1983). They recommended modifying graduation requirements so that students receive four years of English, three years of math, science, and social studies, and one-half year of computer science, as this coursework pattern is similar to the prerequisites of many colleges. However, some post-secondary institutions may have additional requirements, such as two years of foreign language education. Ignorance of one requirement can mean ineligibility, especially among selective colleges (Altonji, 1992).

More recent research on high school coursework and college eligibility comes from Conley's (2003) Standards for Success project. This study analyzed the alignment between state high school assessments and indicators of college success using data from the Association of American Universities member institutions. The results of the study identified a comprehensive set of standards known as the Knowledge and Skills for University Success (KSUS), in which key structures and concepts are detailed for six

subjects: English, math, science, social studies, world languages, and the arts. This empirically based documentation of coursework objectives and standards elucidates areas that promote academic readiness, and thus eligibility, for post-secondary education (Brown & Conley, 2007; Conley, 2003).

Once students meet eligibility requirements, they must complete the application for admission; this can be a complex process that involves numerous entities. Students must provide basic demographic and logistical information, and often, write an essay or answer questions about their desire for enrolling in PSE. They seek out information from other people as well. Family members may need to provide background information (e.g., level of parental education), and teachers, mentors, and/or community members provide support in the form of official letters of recommendation. The application process includes obtaining and managing this information, entering it into application forms in full, and submitting the completed product before the deadline (Bergerson, 2009; Conley, 2008).

The Stanford University Bridge Project (Venezia & Kirst, 2005) illustrates some of the ways in which high school students and their families are "confused or misinformed" (p. 300) about how to complete college admissions applications. Among the concerns this mixed methods study revealed are inequalities in the resources available to high school students. For example, some high schools in the study had traditional counselors *and* specialized counselors devoted to assisting students in their transition to college, while other high schools only had traditional counselors who tried to fit in college counseling as their schedules allowed. Furthermore, some high schools had links with post-secondary institutions in the community thereby allowing students to

participate in college visits or interact with recruiters on the high school campus. School-based resources such as these were especially meaningful to students who do not receive college information at home. The study concluded that when college access resources are scarce, information or assumptions about applying to PSE may be incorrect or identified too late (Venezia & Kirst, 2005).

In addition to eligibility and application procedures, understanding options for financing PSE is important before and during the application process, and can be a daunting task. Students may investigate potential costs of attending prospective colleges before deciding if they will apply, and must solidify financing sources prior to enrollment. If financial assistance is necessary, students will need to fill out applications for institutional or third-party aid, secondary to admissions applications. Financial aid applications are difficult to navigate and usually involve information that may not be easily accessible before submission deadlines, such as parental tax information. Moreover, understanding the various types of aid adds to the complexity of financing a post-secondary education. High school students may not be able to differentiate between scholarships, grants, subsidized loans, unsubsidized loans, work-study programs, and other sources of aid (Bergerson, 2009).

Descriptive case studies conducted by Perna and Steele (2011) elucidate grave misconceptions about financial aid policies and procedures. Drawing from interviews and focus groups with high school students and their parents, the researchers concluded that "few students or parents at any school have accurate or complete knowledge of college prices or financial aid" (p. 909). In general, participants believed PSE is expensive and had little knowledge of the amount of financial aid available. This is problematic because

the published price of college often does not equal the net price for which students and families are responsible. An interesting finding to note, however, is that participants who lived in places where state aid programs are highly accessible (e.g., Georgia's HOPE Scholarship program and Florida's Bright Futures program) knew more about the realities of college costs and financial aid. From these findings it is clear that increasing the amount of accurate and comprehensible information that high school students and their families receive could help ameliorate erroneous perceptions (Perna & Steele, 2011).

Research has shown that students (especially low-income) not only lack college knowledge, but also are unaware that they should be looking for it (Deil-Amen & Turley, 2007; Perna, 2005). Accordingly, many scholars have called for an equal dissemination of college knowledge that is accessible early enough in the high school years that students and their parents can adequately process the information (e.g., Tierney & Venegas 2009; Venezia & Kirst, 2009). Beginning in the 1960s, the government began taking a greater interest in increasing access to college and developed relevant programs and initiatives. For example, the Higher Education Act of 1965 spoke to the public desire to develop a more educated population, and programs like Upward Bound, Talent Search and Support Services were introduced with the goal of increasing post-secondary enrollment. These three government-funded programs, also known as TRIO, targeted students who faced barriers to higher education, and paved the way for future programming (Bergerson, 2009).

Some researchers (e.g., Arnold et al., 2012 and Conley, 2008) have adopted the term "college readiness" to describe academic and college knowledge in research and

discussions on college access and enrollment. From this perspective, students need both components in order to be "ready" for PSE. This encompasses academic preparation for college-level coursework (i.e., no remedial courses upon college entry) and the college knowledge necessary for matriculating to PSE. In the present study, the independent and combined terms are both utilized.

The findings described above largely necessitate changes at the contextual level. This makes sense because many individual characteristics included in these studies, such as race/ethnicity and gender, are static and unchanging, thus making interventions impractical. In addition to promoting college readiness in contexts (i.e. families, schools, policy) however, directing attention to the development of more malleable individual characteristics, such as internal psychological traits, could serve as a way to substantially increase college access and enrollment as well. The growing literature on non-cognitive skills (Sedlacek, 2008), 21st century skills (Venezia & Jaeger, 2013) and grit (Duckworth, Peterson, Matthews, & Kelly, 2007) provide support for the inclusion of these non-traditional variables in future college access research. It is proposed in this dissertation that increasing attention to assets from developmental psychology that operate within the individual may provide insights for creating more effective college access programs. These are described next.

Enrollment Factors drawn from Psychology

The higher education literature asserts that academic preparedness and college knowledge are critical for accessing and enrolling in college; however, some researchers have questioned whether these factors paint a complete picture. Perna (2006), for example, stated that increasing the quantity and quality of academic preparation and

college information that high school students receive is indeed necessary, but may not be sufficient for significantly increasing ICE. Because psychology focuses on the individual, investigating ICE with a psychological lens may yield new information that differs from extant literature based on sociological and econometric perspectives. Thus, reviewing and critically evaluating psychological literature may help identify additional factors of college access or enhance existing knowledge on factors from higher education.

A few psychologists (e.g., Duckworth et al., 2007; Sedlacek, 2008) have empirically demonstrated that constructs from counseling and developmental psychology are in fact associated with post-secondary outcomes. The psychological factors that are emerging in college access studies include self-control, self-appraisal or self-monitoring, study skills, time management, problem solving, persistence and perseverance, among others (Conley, 2008; Duckworth et al., 2007; Roderick et al., 2009; Sedlacek, 2011). These are similar in that they all reflect internal skills and abilities of the individual (depicted in the PYD model as "internal assets"). They differ, however, in terminology, with common references being "non-cognitive skills" (Sedlacek, 2011), "grit" (Duckworth et al., 2007), and "21st century skills" (Venezia & Jaeger, 2013). This discord complicates discussion and collaboration among and between researchers and disciplines. If researchers from both higher education and psychology agree that college access studies would benefit from the inclusion of psychological variables in future research, it is imperative that specific constructs and terms be established.

One of the most common labels for psychological variables is "non-cognitive skills" (Heckman, 2000; Roderick, 2006; Sedlacek, 2008). This label is inappropriate because these skills actually require many cognitive functions such as problem solving,

memory, and metacognition (Roderick et al., 2009). Duckworth coined the term "grit" to describe what she calls "perseverance and passion for long term goals" (Duckworth et al., 2007; p. 1087). Here, the term is meant to acknowledge the fact that many goals entail some adverse task through which the individual must persist. This label is also problematic because it suggests these skills are associated with something negative, which is not always the case. A new label is necessary that takes into account the fact that psychological variables can have a positive connotation in which cognitive functions promote development. Therefore, the set of skills and abilities that are internal to the individual and contribute to positive development will be referred to as internal assets throughout this dissertation; this label more accurately captures the characteristics of the construct.

Extant literature identifies multiple internal assets that are associated with positive development. Sedlacek's (1998) Non-Cognitive Questionnaire (NCQ) for example, consists of eight assets, such as positive self-concept, realistic self-appraisal, and long-range goals (Noonan, Sedlacek, & Veerasamy, 2005). Duckworth's (Duckworth et al., 2007) two-factor grit scale includes consistency of interests and perseverance of effort. Though a comprehensive review of all conceptualizations of internal assets is beyond the scope of this study, two general conclusions can be drawn from the main findings of seminal research. First, definitions of internal assets often include some indicator of self-regulation. Whether the researchers investigate study skills, time management, effort, or some other internal asset, an individual must choose to engage in a behavior and inhibit any opposing demands. Second, internal assets often highlight temporality. For example, persistence, perseverance, and planning all require some measure or concept of time.

Building on these two tenets of internal assets may help identify specific psychological variables for studying college access.

Literature on positive youth development (PYD) provides an ideal base from which potential assets of college access and enrollment can be defined. Returning to the PYD perspective is important because it examines internal assets from developmental psychology, while simultaneously taking into consideration the developmental stage of life. Lerner and colleagues' (Lerner et al., 2005) work on youth across the nation has shown consistently that three internal assets, self-regulation, school engagement, and hopeful future expectations, promote positive development across a multitude of outcomes. The extensive empirical support for these three assets in the psychological literature base suggest that they may help fill the gap in the higher education literature, and "paint" the full picture of college access and enrollment. Thus, self-regulation, school engagement, and academic expectations are selected as the internal assets for the present study and are reviewed next.

Self-Regulation. Self-regulation refers to the ability to control one's own actions (Zimmerman, 1994), and may play an important role in college access due to the fact that an individual's cognitive and behavioral actions directly influence academic success (Miller & Byrnes, 2001). For example, self-regulation is at the center of several PSE enrollment indicators, including the ability to complete classwork and homework, study for exams, research post-secondary options, obtain, fill out, and submit college and financial aid applications, among others (Sedlacek, 2011). It is possible that increasing self-regulation skills may be an effective way to promote ICE. Furthermore, extant literature provides empirical support for the associations between self-regulation and

positive outcomes during the transition to college (e.g., Ley & Young, 1998), thus

validating the inclusion of self-regulation in college access research and college readiness

interventions.

Ley and Young (1998) investigated the role of self-regulation in remedial

education at college entrance. In their study, they compared students who began college

as regular admission students to students who were labeled "underprepared" and required

to complete lower-level remedial coursework before proceeding to normal college level

courses. Results indicated that regular admission students had significantly higher self-

regulation scores than underprepared students, illustrating that self-regulation skills may

influence high school students' preparedness for college coursework.

Similarly, Ramdass and Zimmerman (2011) found that self-regulatory behaviors

measured during homework activities predicted increased academic engagement and

achievement among participants ranging from elementary age to college students. The

self-regulatory skills in this study, such as time management, goal-setting, and the ability

to manage distractions, were positively correlated with successfully completing

homework. The researchers also point out the need for considerations based on

developmental stage, and provide suggestions for promoting self-regulation among

various ages and settings (Ramdass & Zimmerman, 2011).

Empirical work with adolescents from the 4-H Study of PYD (Lerner et al., 2005)

has revealed links between SOC, a specific measure of self-regulation, and various

measures of PYD (i.e., competence, confidence, character, connection, and caring;

Urban, Lewin-Bizan, & Lerner, 2010). SOC stands for the Selection, Optimization, and

Compensation of goals and represents self-regulatory behaviors. Findings revealed that

low-income youth with high SOC scores were capable of taking advantage of and benefitting from limited resources in their environments (Urban et al., 2010); this suggests that self-regulation may be particularly important when contexts are poor.

School Engagement. School engagement is a complex construct consisting of the behaviors, cognitions, and emotions associated with school specifically, and education in a broad sense (Fredricks, Blumenfeld, & Paris, 2004; Li & Lerner, 2011). The degree to which a student is engaged in school is malleable and changes over time, with current trends illustrating that the engagement of high school students is lower than that of elementary and college school students (Martin, 2009). School engagement is relevant to the present study because it is correlated with indicators of college access, such as grades and academic competence (Li & Lerner, 2011), as well as overall academic achievement (Fredricks et al., 2004; Sciarra & Seirup, 2008). Recent efforts at the classroom and school levels have aimed to increase school engagement and its associated positive educational outcomes (Lippman & Rivers, 2008). For example, teachers have facilitated classroom engagement by encouraging student autonomy (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003), and schools have strengthened students' attachment to school by improving perceptions of school climate and safety (Bryan, Moore-Thomas, Gaenzle, Kim, Lin, & Na, 2011). Due to the fact that this construct is malleable and in need of attention during the high school years (Martin, 2009), school engagement is an important internal asset for inclusion in the current study.

Extant literature (e.g., Fredricks et al., 2004; Li & Lerner, 2011) states that school engagement has high construct validity and typically falls into three dimensions. Behavioral engagement refers to participation in class or school activities; emotional

engagement refers to reactions to teachers, classmates, and the school as a whole; and cognitive engagement refers to investing in learning subject material and valuing education broadly. Though measures vary slightly, most school engagement items tap the constructs of belongingness and participation in the school community (i.e., academic, social, and extracurricular activities) and are predictive of positive developmental outcomes across adolescence and early adulthood (Choy, Horn, Nuñez & Chen, 2000; Fredricks et al., 2004; Li & Lerner, 2011).

Wang and Eccles (2011) examined the link between school engagement and educational success in a diverse group of adolescents in grades 7, 9, and 11, and found that more engaged youth had higher grades and educational aspirations. However, school engagement scores decreased in each wave of the study, and the three dimensions differentially predicted educational success. As expected, analyses revealed that the behavioral and cognitive dimensions of engagement significantly predicted both grades and aspirations. An unexpected finding emerged with emotional engagement, in that it did not significantly predict the educational outcome variables. This could mean that the emotional dimension, or "feelings" component, is not as influential as behavioral and cognitive engagement in determining educational achievement; or, there may be something else impacting the study, such as methodological inconsistencies in the engagement subscales (Wang & Eccles, 2011).

Choy and colleagues (2000) used the National Educational Longitudinal Study of 1998 (NELS) to investigate the associations between school engagement and post-secondary enrollment behaviors. The participants included students who had known risk factors of dropping out of high school (e.g., low-income, parents with low educational

attainment), and were grouped based on intensity of risk factors. The researchers compared participants who enrolled in PSE with those who did not enroll in PSE, and found that engagement served as a protective factor among those students who were identified as having a moderate-to-high risk of dropping out. This finding suggests that future research should investigate interaction effects, as school engagement (and possibly other internal assets) may be more meaningful to some students than others (Choy et al., 2000).

Academic Expectations. Expectations for academic success are important for accessing college, as they are the foundation on which one's actions are built. While aspiring to PSE is valuable, students who perceive PSE as an attainable goal are more likely to take action than those who have high aspirations without the corresponding high expectations (Roderick, 2006). In other words, individuals who desire to increase their educational attainment but do not internally believe it can be achieved have high aspirations and low expectations; this combination contributes to the aspiration-attainment gap, where stated goals do not materialize into successful outcomes. Translating high aspirations into high expectations is a necessary step for narrowing this gap (Gregory & Huang 2013; Roderick, 2006).

Encouraging more students to aspire to higher education is one possible way to increase interest in PSE. However, aspirations alone may not be enough to increase actual enrollment, and research has demonstrated how expectations may be a more powerful driver of enrollment. For example, Tierney and Venegas (2009) explained that students with low or no educational expectations may "passively opt out" (p. 384) of PSE because they fail to complete the prerequisite coursework. Not seeing college as a feasible option

leaves students in a state of limbo while they decide their post-high school plans; unfortunately, school strategies like tracking all too often make the decision for students. Moreover, because opportunities for accessing college become more limited as high school graduation draws nearer, students whose expectations did not match their aspirations early on may face difficulties actualizing those aspirations (Tierney & Venegas, 2009).

Bedsworth and colleagues (2006) replicated findings that expectations are positively associated with PSE, and notably pointed out that linking educational expectations to career expectations is especially impactful for post-secondary attainment. Even after controlling for academic preparedness, results indicated that high school graduates who link college and career are more than six times as likely to graduate from college (55%) than their peers who do not make this connection (9%). This is yet another example of how an individual-level variable (expectations) serves as an asset for increasing PSE (Bedsworth et al., 2006).

Similarly, Beal and Crockett (2010) found that "future-oriented cognitions" significantly predicted educational attainment in a longitudinal study of rural students. Future-oriented cognitions were operationalized as occupational aspirations and expectations, thus replicating the Bedsworth and colleagues' (2006) finding that educational expectations and attainment are linked with career outcomes. It is possible that expectations for both proximal (i.e., PSE) and distal (i.e. career) ambitions are at the center of educational attainment. It is important to note, however, that parents and teachers may influence these internal cognitions, and that understanding the person-in-context is an ongoing aspect of developmental research.

The 4-H Study of PYD (Lerner et al., 2005) once again strengthens support for the examination of expectations from a developmental psychology orientation. While expectations reviewed thus far have been academically based, Schmid and colleagues (2011) guided research towards a new conceptualization referred to as hopeful future expectations. The temporal element remains, but they add the notion of hope into the definition of expectations. Though this is different terminology, it resembles the difference between aspirations and expectations, or between expectations as a general construct and career-focused expectations (as described above in Bedsworth et al., 2006 and Beal & Crockett, 2010) in that they each have a somewhat basic component and a stronger, more influential form that appears to be driving change.

Demographic and High School Factors

The factors from the fields of higher education and developmental psychology described above serve as the variables of interest for the present study. As in all research however, there are innumerable factors that contribute to outcomes. For the present study, additional variables known to be associated with ICE are included as covariates; their influence is indeed important, but not the focus of the research questions. The following is a brief review of these factors; additional information on measurement is provided in the method section when applicable.

Demographic Information.

Three demographic characteristics are consistently presented as influential to ICE: socioeconomic status (SES), race/ethnicity, and gender (Walpole, 2007). Students from high-SES families and neighborhoods have more high-quality resources than their peers from other social classes (Deil-Amen & Turley, 2007). Studies that examine racial group

differences generally find that Black and Hispanic youth have a harder time accessing

PSE than their White and Asian peers (Bailey & Dynarski, 2011). In regard to gender,

males historically dominated higher education, but females have represented the majority

of college students in more recent times (Day & Newburger, 2002; Peter & Horn, 2005).

Understanding variations based on these factors may help illuminate to which groups

interventions should be targeted.

School Characteristics.

Within the school context, attitudes and values held by students and faculty often

influence post-secondary outcomes. When learning is valued and going to college is the

norm, students tend to have more resources and greater access to college. These values

and resources, along with feelings of belongingness, perceptions of safety, and positive

student-teacher relationships comprise school climate (Deil-Amen & Turley, 2007;

Perna, 2005). The financial characteristics of the school, such as funding source (public

or private) and school-level SES are also linked to student outcomes, with low-income

schools faring worse than those with more financial resources (Deil-Amen & Turley,

2007; Tierney & Jun, 2001).

Interdisciplinary Studies

Thus far, the theoretical perspectives described above emphasized disparate

agents of change (individuals or contexts), and the literature review presented research

separately by discipline, including higher education (academic preparedness and college

knowledge) and psychology (self-regulation, school engagement, and academic

expectations). Though limited, there is some research that investigates that ways in which

these variables are tied together using an interdisciplinary perspective. Such studies are

few in number but provide valuable insights for future interdisciplinary inquiries, and helped guide the development of this dissertation.

Allen, Bonous-Hammarth, and Suh (2003), for example, included multiple variables in their mixed-methods study on college enrollment. Quantitative analyses were conducted on data from approximately 1,500 applicants to the Gates Millennium Scholarship, and 56 recipients participated in qualitative focus groups. Results (p. 20) indicated that "the successful transitions of these scholars into college hinged on their academic preparation, internal motivation, and access to key sources of support (parents, friends, school personnel, scholarship programs)." This is a clear example of how academic and college knowledge, internal assets, and contexts are all important for understanding college enrollment patterns. Moreover, the qualitative findings highlighted the role of internal assets as drivers of change: "In some cases, these students went beyond their limited knowledge about college and college access to college-educated people to petition teachers and counselors for information to build connections among friends and greater networks of support in school" (p. 20). Consequently, these findings from over a decade ago have considerable implications for studying the pathway to college, as internal assets may be driving college readiness variables, which in turn predict college enrollment (Allen et al., 2003).

Another qualitative inquiry of post-secondary enrollment underscored the function of theoretical perspectives (Smyth & Banks, 2012). Interviews and focus groups with students, counselors, and principals in Irish secondary schools revealed that college enrollment decisions were based on individual agency, but that agency was bounded by school and family contexts. Thus, the authors called for an integration of the social

reproduction theory and the rational choice theory to more accurately assess factors of college enrollment (Smyth & Banks, 2012). Drawing from this study, adopting a theoretical perspective that unifies individual and contextual variables appears to be necessary for interdisciplinary research (i.e., research that includes internal assets and college readiness in a way that implicates individuals and contexts as agents of change).

Kautz and Zanoni (2014) recently assessed the effectiveness of a high school intervention, OneGoal, that was developed to foster non-cognitive skills among disadvantaged students. Independent variables included cognitive (academic), non-cognitive (internal assets), and "other factors" (i.e., college knowledge), and dependent variables included various measures of positive development. Data from multiple sources (e.g., OneGoal program, Chicago Public Schools, census data) were obtained for over 2,300 students in Chicago public high schools. Results indicated the OneGoal program was associated with positive academic achievement in high school, college enrollment and persistence, and few arrests. Excluding non-cognitive variables from analyses would have grossly underestimated the intervention effects, thereby providing another substantiation for the importance of non-cognitive, or *internal*, assets and interdisciplinary studies (Kautz & Zanoni, 2014).

In sum, there is a vast literature on college-going that examines one or two constructs that may be affecting enrollment. However, a literature search on academic (ERIC), psychological (PsychInfo), and public (Google Scholar) databases reveals few interdisciplinary studies on college enrollment. Little is known about the ways in which internal assets and college readiness variables, and individuals and contexts simultaneously operate to predict college enrollment. Allen and colleagues (2003)

illustrated a need for quantitative studies that examine causal pathways to college

enrollment, yet few have emerged. Investigations of broader topics such as academic

achievement in general are available, but there is an indisputable need for

interdisciplinary studies on college enrollment specifically. The present study seeks to fill

this gap.

Present Study

This literature review has demonstrated that factors of college readiness from

higher education and internal assets from developmental psychology are significant

predictors of ICE when analyzed independently. Few studies have examined these factors

simultaneously though, meaning less is known about how they may work together. For

example, Conley (2008) identified four facets of college readiness (key cognitive

strategies, key content, academic behaviors, and contextual skills and awareness) but did

not specify any interrelations; Sedlacek (2011) posited that non-cognitive variables could

be combined with college readiness variables but did not explain how they might interact.

The present study seeks to fill this gap and provide insights on how internal assets and

college readiness factors operate together to influence post-secondary enrollment.

In an effort to contribute new ideas to the college access literature base, this study

proposes an interdisciplinary approach to studying immediate college enrollment that

fuses existing college access perspectives with PYD theory. The PYD perspective is ideal

for the present study because it allows for the inclusion of internal and contextual assets,

while simultaneously attending to the relevance of developmental stage and the

complexity of transitions. Specifically, PYD theory posits a bidirectional relationship

between individuals and contexts, in which internal assets influence experiences in

contexts, and contexts influence how internal assets are manifested. The continuous

interactions between these two systems affect later development, as defined by the Five

C's (Lerner et al., 2005). Drawing from college access theories (e.g., Arnold et al., 2012;

Perna, 2004) academic and college knowledge variables are included in the

interdisciplinary model adopted for the present study.

The conceptual model (shown in Figure 2) illustrates the incorporation of PYD

theory, which posits that assets surround individuals in a way that may promote positive

outcomes over time. The assets in the conceptual model include empirically supported

variables from the higher education literature (factors of college readiness) and the

developmental psychology literature (self-regulation, school engagement, and academic

expectations). Specifically, the social and economic bases of college access theories

drawn from higher education map onto the conceptual model through academic

preparedness and college knowledge. Social structures determine the quality and quantity

of resources and information that promote educational preparation and provide accurate

tools for rational decision-making. Furthermore, the developmental perspective maps

onto the conceptual model in that particular strengths of the individual are emphasized; it

is not simply that the individual operates as an agent of change (i.e., making a rational

decision), but that the individual has strengths on which he or she can capitalize to

promote positive development.

As depicted, it is unclear the ways in which assets are linked to each other, only

that they are linked. Academic preparedness and college knowledge may represent social

structures that moderate the association between the internal assets and ICE; or, these

college readiness variables could be previously unidentified mediators of the association

between the internal assets and ICE. By combining these in one model, this study explores both of these possible linkages by investigating whether or not internal assets interact with or underlie readiness factors of ICE. Confirmation of a relationship would yield new and valuable information on the high school-to-college transition, and impact the development of programs for students approaching this transition. In sum, the goal of this dissertation is to explore *how* factors of college readiness and internal assets may be working together to promote ICE. Two research questions address this goal:

1. Do internal assets interact with academic factors to predict college enrollment?

   • It is hypothesized that three internal assets, self-regulation, school engagement, and academic expectations, bolster the association between college readiness and ICE. This hypothesis proposes moderation (Figure 3).

2. Do internal assets predict academic factors, which in turn predict college enrollment?

   • It is hypothesized that three internal assets, self-regulation, school engagement, and academic expectations, drive college readiness, which in turn predicts ICE. This hypothesis proposes mediation (Figure 4).

Figure 2. The Conceptual Model of the Present Study
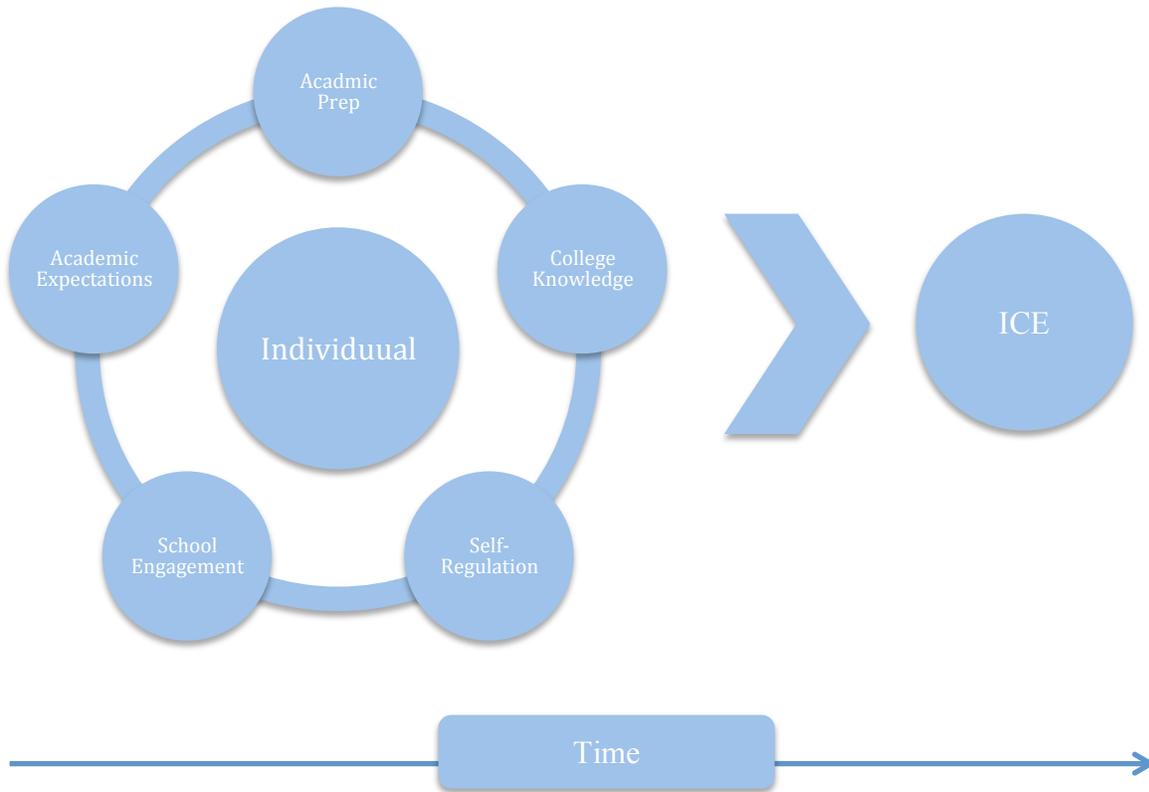
Figure 3. Moderation Model
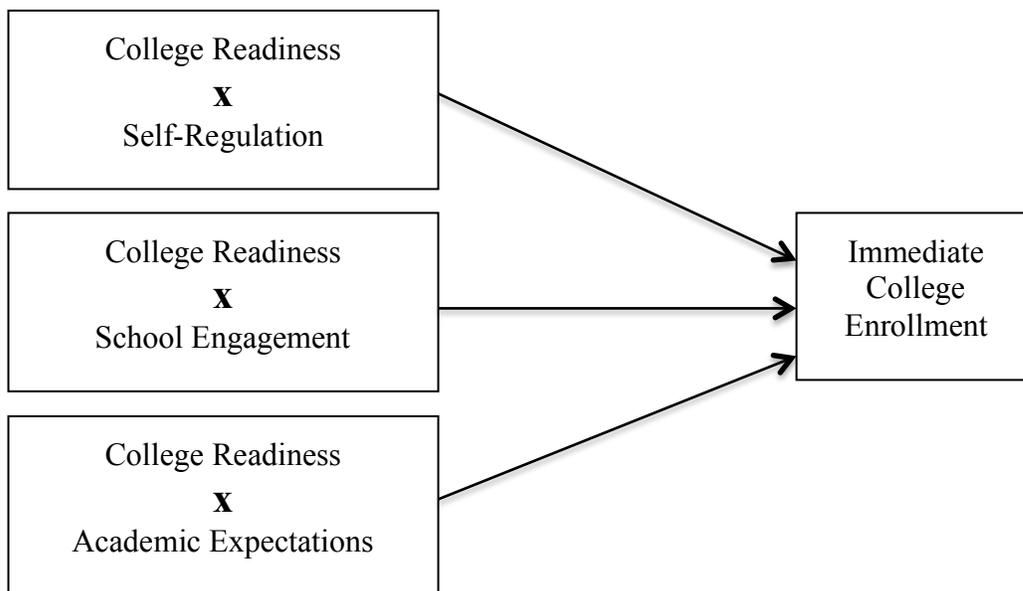
Figure 4. Mediation Model
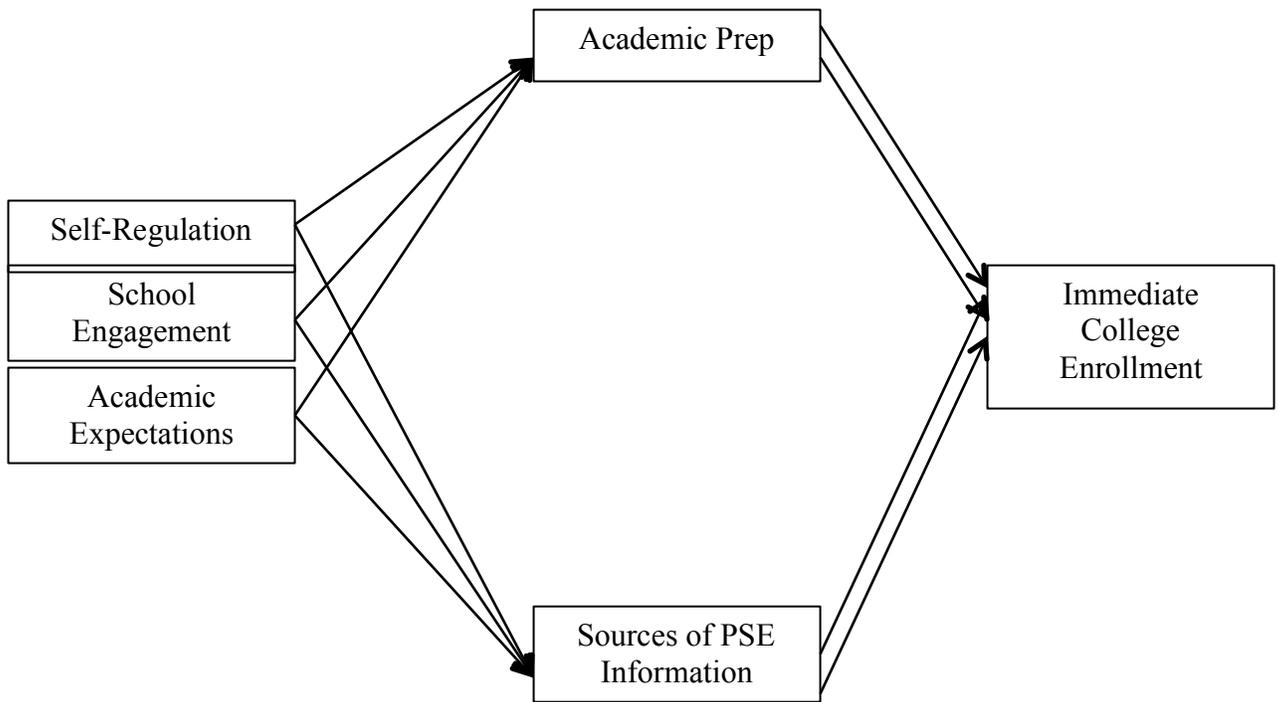
Chapter 3: Method

Participants

The data for this dissertation were drawn from the Education Longitudinal Study of 2002 (ELS:2002), a multi-level, national dataset that was designed to examine the transition from high school to college and the world of work. The ELS:2002 is the fourth major longitudinal study sponsored by the National Center for Education Statistics (NCES) of the U.S. Department of Education and closely resembles the research purposes and designs of its three predecessor studies (NLS-72, High School & Beyond, and NELS:88). The ELS:2002 employed a multi-stage sampling frame in which high schools were first selected based on 24 strata, followed by random sampling of approximately 26 tenth grade students within each high school. These participants, as well as their parents, teachers, librarians, and principals completed surveys resulting in the Base Year dataset.

The Base Year (BY) sample included over 15,000 tenth graders from approximately 750 schools; Asian students and private schools were oversampled to allow statistical power for group comparisons (weighting is described under *procedures*). The First Follow-Up (F1) continued data collection in 2004 when students were in the twelfth grade. In addition to surveys, archival data such as transcripts, college entrance exam scores, and attendance records were acquired. The Second Follow-Up (F2) took place in 2006 and followed students two years post-high school, gathering data on their entrance into post-secondary education and/or the world of work. Of the 14,159 participants remaining in the sample at F2, 89% provided data on their post-secondary education and hence were included in the analytic sample (N=12,648). A Third Follow-

Up (F3) was completed in 2012, eight years after their completion of high school. These data were not available at the start of this dissertation but two items from F3, "ever enrolled in PSE" and "educational attainment," were used to help define outcome groups after the data became available. Response rates for all waves are shown in Table 2.

Table 2. ELS:2002 Student Response Rates, Base Year through Third Follow-Up.

Survey	Eligible	Participated	Weighted %	Unweighted %
Base Year	17,591	15,362	87.3	87.3
First Follow-Up	16.515	14,989	88.7	90.8
Second Follow-Up	15,892	14,159	88.4	89.1
Third Follow-Up	15,724	13,250	83.8	84.3

Source: Ingels, S.J., Pratt, D.J., Wilson, D., Burns, L.J., Currivan, D., Rogers, J.E., and Hubbard-Bednasz, S. (2007). Education Longitudinal Study of 2002: Base-Year to Second Follow-up Data File Documentation (NCES 2008-347). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Demographic Variables. Tenth grade participants reported on a number of demographic variables of interest in the base year, including gender and race/ethnicity, coded categorically to distinguish White participants from those identifying as Hispanic, Black, Asian, Native American, or mixed race. Parents reported their highest level of education in categories ranging from less than high school diploma to advanced degree, as well as total family income in the past year in categories ranging from $0 to $5,000 to $200,000 or more. Income categories were recoded into dollar amounts using midpoints to create a continuous measure of family income. Participants were mostly White (62%) and from middle-SES families; many parents had attained at least some college and the average family income was just under $62,000. Males and females were approximately equal in this study (53% male).

Measures

Immediate College Enrollment. The dependent variable, immediate college enrollment (ICE), was measured using three student-reported items from the second follow-up. In this wave of data collection, which occurred two years post-high school (2006), students reported their matriculation (or lack thereof) to a post-secondary institution on the basis of timing, intensity, and program level. Timing of enrollment consisted of three groups: immediate, delayed, or none. *Immediate* was operationally defined as enrolling by the fall of 2004, which represented the first educational term after high school graduation. *Delayed* was operationally defined as enrolling between the spring of 2005 and the last wave of data collection in 2012 (F3), at which point students reported if they had ever attended a post-secondary institution. Intensity of enrollment indicated if students attended full-time or part-time, and program level described if the participant enrolled in a four-year program or a program that was expected to be completed in less than four years (hereafter referred to as "two-year" or "community college").

Distinguishing the outcome groups based on all three of these variables was useful because different combinations of shared characteristics were substantively different in predicting ultimate educational attainment. The researcher investigated multiple combinations of timing, intensity, and program level, and their associations with attainment at F3 to create categories of post-secondary enrollment. After identifying which combinations uniquely predicted ultimate attainment and attending to concerns regarding sample size and conceptual relevance, three outcome groups emerged: (1) Immediate, full-time enrollment in a four-year program, hereafter referred to as

immediate college enrollment (ICE), n = 5,579; (2) Other enrollment, which included students whose enrollment was delayed, part-time, or in a two-year program, n =5,325; and (3) No post-secondary education by F3, eight years post high school, n = 1744. The iterative process by which these groups were formed is detailed in Appendix B.

Self-Regulation. In the base year, students reported on self-regulatory behaviors such as, "keeps studying even if material is difficult" and "works as hard as possible when studies." Responses ranged from 1 to 4 and included "almost never," "sometimes," "often," and "almost always." NCES statisticians used factor analysis to create a composite measure of self-regulation with these items. The resulting five-item Effort and Persistence scale (derived from O'Neil & Herl, 1998) was reproduced for the current study by averaging items into a composite variable ($\alpha = 0.88$).

School Engagement. Students also reported on their experiences and behaviors in the classroom. For example, three items addressed frequencies of behaviors, such as "how many times cut/skip class" and "how often goes to class without homework done." Responses ranged from 1 "never" to 4 "10 or more times" or from 1 "never" to 4 "usually." Other items summarized cognitive and emotional connections with school, such as "classes are interesting and challenging" and "has nothing better to do than school." Responses for these items ranged from 1 "strongly agree" to 4 "strongly disagree."

These items were combined through factor analysis to create a measure of school engagement for the present study. First, items were reverse coded if needed so that high values indicated positive school engagement. Next, all items that resembled Fredricks' (2004) school engagement scale were included in a factor analysis. Two factors emerged:

Factor 1 (n=12) was retained, and Factor 2 (n=2) was dropped due to having too few variables and poor links to other measures of school engagement (e.g., Fredricks et al., 2004, Sciarra & Seirup, 2008). The final school engagement variable consisted of the mean of all Factor 1 variables ($\alpha = 0.74$), as no factors emerged for behavioral, emotional, or cognitive subscales.

Expectations for Academic Success. During tenth grade (BY), students reported their expectations for academic success. NCES statisticians developed a composite measure for this construct through factor analysis. The four-item "control expectation scale" (derived from Pintrich, Smith, Garcia, & McKeachie, 1993) included items such as "can learn something really hard" and "can get no bad grades if decides to," and responses ranged from 1 "almost never" to 4 "almost always." This scale was reproduced for the current study by averaging scores on the four items ($\alpha = .83$).

College Readiness. Data on college readiness were collected from youth reports and transcripts during F1, when students were seniors. Three items tapped into aspects of college readiness (Conley, 2008; Perna, 2005). The first item, advanced coursework, assessed whether each student had completed a course in each of the following subjects: Chemistry, Physics, Algebra II, Trigonometry, PreCalculus, and Calculus, which replicated extant operational definitions in the field (e.g. Perna, 2005). A dummy variable was created for each advanced course and indicated if the student ever completed a course in that subject. The six advanced course dummy variables were summed, resulting in a composite measure of advanced coursework that ranged from 0 to 6.

The second variable that assessed academic preparation for college was drawn from previous NCES longitudinal studies (e.g., NELS:88, Hafner, Ingels, Schneider,

Stevenson, & Owings, 1990) and examined math ability. Students responded to items that examined mastery of developmentally appropriate subject material in mathematics during F1. Survey items were applicable to all students as they evaluated general knowledge that was taught in most schools instead of isolated factual knowledge that may have varied by classroom and school. NCES statisticians transformed the math battery scores into quartiles for public use, which were coded such that Quartile 1 reflected the bottom scores. The quartile variable was included in the current study, as the raw math scores were not available in the unrestricted dataset. Advanced coursework and math scores fit together ($\alpha = 0.67$) and thus were standardized and averaged into a new composite variable representing academic preparedness.

The third variable assessed whether or not students sought out information about college, which reflects an element of college knowledge (Conley, 2008). Students reported the sources they utilized for acquiring college information, including high school staff or resources, friends and family, college staff or resources, and libraries (high school, public, college). Each source was dummy coded, resulting in 13 college information sources. These variables were summed to create a "sources of college information" count variable that ranged from 0 to 13, then centered before analyses were conducted.

School Context Covariates. Four variables regarding the high school context were included in the present study as covariates. During the base year, school administrators indicated if their school was funded by public (78%), Catholic (13%), or other private (9%) sources, as well as reported the percent of students eligible for the federal free lunch program (FLP). These covariates were coded categorically to distinguish public schools

from Catholic or other privately funded schools, and to compare high-SES schools (i.e., those with few FLP-eligible students) to schools with lower SES (i.e., more FLP-eligible students). Students in schools with 0-5% of students eligible for the federal FLP (i.e., the highest-SES) served as the reference group; other categories included 6-10%, 11-20%, 21-30%, 31-50%, 51-75%, and 76-100% of students eligible for FLP.

Administrators also reported on the academic climate of their schools through items such as "student morale is high" and "teachers press students to achieve." Responses ranged from 1 "not at all accurate" to 4 "very accurate." NCES researchers used factor analysis to create a composite measure of academic climate that resulted in a five-item scale (Hafner et al., 1990). This scale was reproduced in the current study by averaging the five items ($\alpha = 0.87$).

The fourth and final school context covariate was reported by students in the base year, and tapped into the relationships between students and teachers. For example, items included "students get along well with teachers" and "teachers are interested in students;" responses ranged from 1 "strongly agree" to 4 "strongly disagree." NCES statisticians used factor analysis to combine these items into a five-item student-teacher relations scale (Hafner et al., 1990). To reproduce this scale for the current study, four of the five items were reverse coded so that high scores indicated high-quality student-teacher relationships, then all items were averaged ($\alpha = 0.73$). A summary of all measures is shown in Table 3, and full scales are detailed in Appendix C.

Table 3. Measures

Construct	Measure(s)	(n)	α	Wave
Demographics	Race, Gender, SES	4	n/a	BY
School Characteristics		4	n/a	-
Sector	Public, Catholic, Private	n/a	n/a	BY
School SES	Free Lunch Eligible (%)	n/a	n/a	F1
Academic Climate	ELS Composite	5	.87	BY
Student-Teacher Relations	ELS Composite	5	.73	BY
Self Regulation	Effort and Persistence	5	.88	BY
School Engagement	Composite	12	.74	BY
Academic Expectations	Expectations	4	.83	BY
Academic Preparedness	Courses, Math scores	2	.67	F1
Sources of PSE info	Count variable	1	n/a	F1
ICE	Post-Secondary Enrollment	1	n/a	F2

Procedures

Preliminary data cleaning procedures managed outliers and confirmed assumptions of normality. Though few outliers were identified, the variables in the present study were top- and bottom-coded so that outliers were changed to a value that was four standard deviations above and below the mean of the variable, respectively. A missing value analysis revealed that data were missing at random (MAR) and missingness was non-monotone. Across all cells in the data, the average level of missingness was 14.76% and Table 4 shows the percent of missing values by variable. The largest amount of missing values within variables was 34% for both self-regulation and academic expectations.

Table 4. Missing Values

Variable	% Missing
Enrollment Group	-
College Readiness	6
Self Regulation	34
School Engagement	32
Academic Expectations	34
Academic Climate	18
Student-Teacher relations	14
Family Income	-
Parent's highest level of education	-
School SES	8
Gender	< 1
Race	5
School Sector	-

Inter-correlations for the independent variables of interest were reviewed to check multicollinearity before running the analytical models. Table 5 shows that self-regulation and academic expectations were moderately correlated, thus models assessed variance inflation factors to determine if multicollinearity threatened the validity of the models. Multiple imputation procedures involving chained equations were employed to ameliorate nonresponse bias. A total of 20 imputations were utilized to investigate the research questions in a series of multinomial logistic regressions. Due to the nature of multinomial logistic regression, it was necessary to run and analyze two models for a comprehensive interpretation of each hypothesis. The first model utilized the "No PSE" group as the base, which allowed for comparisons with the "ICE" group and the "Other PSE" group. The second model utilized "Other PSE" as the base, thus allowing for a comparison with the "ICE" group. All analyses incorporated sampling weights and survey weights to account for sampling and design effects; these included pweights, primary sampling units, and strata.

Table 5. Inter-Correlations

	1	2	3	4	5	6	7	8	9	10	11	12
Enroll	1.0000											
SelfReg	0.2376	1.0000										
SchlEng	0.2534	0.4186	1.0000									
AcExpect	0.2741	0.7245	0.3358	1.0000								
AcadPrep	0.5318	0.2337	0.2599	0.3240	1.0000							
Sources	0.3160	0.2214	0.1892	0.1932	0.2835	1.0000						
Gender	0.0913	0.0878	0.1630	-0.0184	-0.0454	0.0948	1.0000					
Income	0.3247	0.0827	0.0355	0.1298	0.3297	0.1248	-0.0336	1.0000				
ParEduc	0.3662	0.1126	0.1000	0.1521	0.3514	0.1664	-0.0174	0.4527	1.0000			
SchlSES	0.3036	0.0492	0.0245	0.0841	0.3001	0.1140	-0.0158	0.3861	0.3230	1.0000		
Climate	0.2236	0.0623	0.0443	0.0734	0.2204	0.1189	-0.0029	0.2452	0.2457	0.4170	1.0000	
STrelate	0.1813	0.2912	0.3870	0.2455	0.1810	0.1420	0.0280	0.0598	0.0766	0.0993	0.1213	1.0000

Main Effects Models

The first pair of multinomial logistic regression models examined the main effects of all variables of interest, along with demographic and school-context covariates, on ICE. Self-regulation, school engagement, academic expectations, academic preparedness and sources of college readiness were entered into the model as the variables of interest. The covariates in the model included gender, race, parental education, family income, school-level SES, academic climate, student-teacher relations, and school sector. This main effects model was represented with the following equation:

$$ENROLL = \beta_0 + \beta_1 SelfReg + \beta_2 SchlEng + \beta_3 AcExpect + \beta_4 AcadPrep$$
$$+ \beta_5 Sources + \beta_6 Gender + \beta_7 Race + \beta_8 ParentEd + \beta_9 FAMincome$$
$$+ \beta_{10} SchlSES + \beta_{11} AcadClim + \beta_{12} StuTeaRel + \beta_{13} Sector + e$$

Interaction Models.

The second set of multinomial logistic regressions investigated whether or not the internal assets (self-regulation, school engagement, and academic expectations) bolstered the association between college readiness and ICE. Six interaction terms, represented as the product of coefficients, were added to the main effects model to test the moderation hypothesis. These included (1) Academic Preparedness x Self-Regulation, (2) Sources of College information x Self-Regulation (3) Academic Preparedness x School Engagement, (4) Sources of College information x School Engagement (5) Academic Preparedness x Academic Expectations, (6) Sources of College information x Academic Expectations; all variables were centered before creating interaction terms to reduce multicollinearity.

Individual variables of interest as well as demographic and school-level covariates were

also centered and retained in the moderation model as shown in the following equation:

$$
\begin{aligned}
ENROLL = \beta_0 +\ & \beta_1 AcadPrep * SelfReg + \beta_2 AcadPrep * SchlEng + \beta_3 AcadPrep \\
& * AcExpect + \beta_4 Source * SelfReg + \beta_5 Source * SchlEng \\
& + \beta_6 Sources * AcExpect + \beta_7 SelfReg + \beta_8 SchlEng + \beta_9 AcExpect \\
& + \beta_{10} AcadPrep + \beta_{11} Sources + \beta_{12} Gender + \beta_{13} Race \\
& + \beta_{14} ParentEd + \beta_{15} FAMincome + \beta_{16} SchlSES + \beta_{17} AcadClim \\
& + \beta_{18} StuTeaRel + \beta_{19} Sector + e
\end{aligned}
$$

Mediation Models.

The final set of analyses tested the hypothesis that college readiness variables

serve as a mediator between internal assets (self-regulation, school engagement, and

academic expectations) and ICE. The researcher used the causal steps method described

by Baron and Kenny (1986) and a series of Sobel-Goodman tests to examine indirect

effects of the variables of interest in predicting post-secondary enrollment. Specifically,

ordinary least squares (OLS) and multinomial logistic regressions that included

demographic and school-level covariates were used to obtain path coefficients. In Step 1,

college readiness variables were regressed on self-regulation, school engagement, and

academic expectations (a paths):

$$AcadPrep = \beta_0 + \beta_1 SelfReg + \beta_2 SchlEng + \beta_3 AcExpect + \beta_4 Sources$$
$$+ \beta_5 Gender + \beta_6 Race + \beta_7 ParentEd + \beta_8 FAMincome + \beta_9 SchlSES$$
$$+ \beta_{10} AcadClim + \beta_{11} StuTeaRel + \beta_{12} Sector + e$$

$$Sources = \beta_0 + \beta_1 SelfReg + \beta_2 SchlEng + \beta_3 AcExpect + \beta_4 AcadPrep$$
$$+ \beta_5 Gender + \beta_6 Race + \beta_7 ParentEd + \beta_8 FAMincome + \beta_9 SchlSES$$
$$+ \beta_{10} AcadClim + \beta_{11} StuTeaRel + \beta_{12} Sector + e$$

In Step 2, ICE was regressed on college readiness variables with all other variables remaining in the model (b path). The path coefficients from these three equations were entered into a Sobel calculator to obtain the indirect effects of self-regulation, school engagement, and academic expectations on ICE.

$$ENROLL = \beta_0 + \beta_1 AcadPrep + \beta_2 Sources + \beta_3 SelfReg + \beta_4 SchlEng$$
$$+ \beta_5 AcExpect + \beta_6 Gender + \beta_7 Race + \beta_8 ParentEd$$
$$+ \beta_9 FAMincome + \beta_{10} SchlSES + \beta_{11} AcadClim + \beta_{12} StuTeaRel$$
$$+ \beta_{13} Sector + e$$

Chapter 4: Results

Descriptive Statistics

Descriptive statistics were averaged across the 20 multiple imputation datasets

and are presented in Tables 6 and 7. On average, students registered in fewer than three

advanced courses and sought college information from fewer than five sources. School

engagement had the highest mean among the internal assets and academic climate had the

highest mean among school-context covariates. Among the 85% of participants who

enrolled in post-secondary education between 2004 and 2012, the *ICE* and *Other*

enrollment patterns were represented about equally. Similarly, the sample included

roughly equal numbers of males and females. Most students were from White middle-

class families, and attended public schools with less than 50% of students eligible for the

federal Free Lunch Program (FLP), which indicates that school-level SES was typically

moderate to high.

Table 6. Weighted Descriptive Statistics: Predictors

Variable	Unstandardized Means (SD)	Range
Academic Preparedness	N/A (standardized)	
Math Quartile	2.55 (1.13)	1-4
Advanced Courses	2.75 (1.86)	0-6
Sources of information	4.82 (2.59)	0-13
Self Regulation	2.76(.78)	1-4
School Engagement	3.00(.46)	1-4
Academic Expectations	2.82(.79)	1-4
Academic Climate	3.86(.72)	1-4
Student-Teacher relations	2.90(.46)	1-4

Table 7. Weighted Descriptive Statistics: Demographics

Variable	Frequency
Enrollment Group	
ICE	41%
Other Enrollment	44%
No PSE	15%
Gender	
Male	53%
Female	47%
Race	
White	62%
African American/Black	13%
Hispanic	15%
Mixed Race	5%
Asian	4%
Native American	1%
Parent's highest level of education	
Less than high school	6%
Completed HS or GED	20%
Some College	34%
Bachelor's Degree	23%
Advanced Degree	18%
School SES: Free Lunch Eligible	
0-5%	24%
6-10%	11%
11-20%	19%
21-30%	16%
31-50%	15%
51-75%	9%
76-100%	6%
School Sector	
Public	91%
Catholic	5%
Other Private	4%

Average Family Income: $61,876.63 (SD= $48,645.10)

Main Effects

The first set of multinomial logistic regression models examined the main effects of all variables on post-secondary enrollment, and included statistics on variance inflation factors (VIF). Though inter-correlations initially suggested multicollinearity could be a problem, the VIF statistics in Table 8 alleviated this concern as the largest variance inflation factor was 2.30. The academic community generally considers a VIF under 10 to be acceptable (Robinson & Schumacker, 2009) so analyses proceeded as planned.

Table 8. Variance Inflation Factors

Variable	VIF	1/VIF
Self Regulation	2.30	0.43
School Engagement	1.40	0.72
Academic Expectations	2.21	0.45
College Readiness	1.37	0.73
Family Income	1.36	0.74
Parent Education	1.33	0.75
School SES	1.31	0.76
Academic Climate	1.19	0.84
Student-Teacher Relations	1.21	0.83
Gender	1.05	0.96
Mean VIF	1.47	

Table 9 presents the coefficients, standard errors, and relative risk ratios of the models, which reveal multiple significant main effects on post-secondary enrollment. Relative risk is the probability of being in one group divided by the probability of being in another group, and is interpreted based on a one-unit change (unstandardized) or one-standard deviation change (standardized) in the independent variable. The results of this study are organized so that students in the ICE group are compared to students in the

other and no PSE groups, and are interpreted such that a one-unit change in the independent variable is associated with an increase (RRR greater than one) or decrease (RRR less than one) in the likelihood of being in the ICE group in comparison to the other or no PSE groups. These are described below.

Beginning with the variables of interest, a few interesting findings emerged. First, self-regulation was not significantly associated with group membership; none of the multinomial regression coefficients approached p-values less than .10. Conversely, school engagement, academic preparedness, and sources of college information were all associated with enrollment group. A one-unit increase in school engagement was associated with a 67% higher likelihood of being in the ICE group in comparison with the other PSE group, and two times more likely to be in the ICE group in comparison with the no PSE group. Moreover, a one-unit increase in school engagement was also associated with a 25% higher likelihood of being in the other PSE group in comparison to the no PSE group. In sum, increases in school engagement scores were significantly associated with membership in the ICE group over all other groups, and in the other PSE group over the no PSE group.

Expectations for academic success were significantly associated with enrollment group membership as well. A one-unit increase in expectations was associated with a 41% higher likelihood of ICE in comparison with no PSE, but this variable was not significantly associated with differences within enrollment (i.e., ICE versus other PSE). Though, a one-unit increase in expectations was associated with a 28% higher likelihood of being in the other PSE group in comparison to the no PSE group. These results

indicate that school engagement was significantly associated with enrollment when no PSE served as the comparison group.

As expected, academic preparedness and quantity of sources of college information were both significantly associated with post-secondary enrollment. The most notable was academic preparedness, as increasing preparedness by one point made students three times as likely to be in the ICE group over the other PSE group, and five times as likely to be in the ICE group over the no PSE group. Similarly, students were 1.5 times more likely to be in the other PSE group over the no PSE group. For sources of college information, a one-unit increase was associated with a 12% higher likelihood of ICE in comparison to other PSE, a 31% higher likelihood of ICE in comparison to no PSE, and a 16% higher likelihood of other PSE in comparison to no PSE.

Demographics. All demographic characteristics were associated with ICE as well. In comparison to females, males were 37% more likely to be in the ICE group versus the other PSE group, more than two times as likely to be in the ICE group versus the no PSE group, and 73% more likely to be in the other PSE group versus the no PSE group. In comparison to white students, minorities experienced varying patterns of PSE enrollment. African American students were 24% more likely to be in the ICE group versus the other PSE group in comparison to Whites. The likelihood of other PSE versus no PSE group was nonsignificant. Hispanic students had a 34% lower likelihood of ICE versus other PSE, and a 28% higher likelihood of other PSE versus no PSE. The likelihood of ICE versus no PSE group was nonsignificant. Asian students were two times as likely to be in the ICE group versus the no PSE group, and had an 81% higher likelihood of other PSE versus no PSE. The likelihood of ICE versus other PSE was nonsignificant. In the final

comparison to white students, identifying as mixed race was associated with a 37% lower likelihood of ICE versus no PSE, a 32% lower likelihood of other PSE versus no PSE.

Indicators of socioeconomic status were significantly associated with enrollment group membership. A one-unit increase in family income was associated with a 10% higher likelihood of ICE versus other PSE, a 20% higher likelihood of ICE versus no PSE, and a 9% higher likelihood of other PSE versus no PSE. Students' post-secondary enrollment was also associated with parents' educational attainment. In comparison to the parental education level of completing college, having parents who did not complete high school was associated with 47% lower likelihood of ICE versus other PSE, a 77% lower likelihood of ICE versus no PSE, and a 56% lower likelihood of other PSE versus no PSE. Moreover, having parents who only completed high school or GED was associated with 42% lower likelihood of ICE versus other PSE, a 73% lower likelihood of ICE versus no PSE, and a 54% lower likelihood of other PSE versus no PSE.

In comparison to having parents who completed college, having parents with some college experience was associated with 35% lower likelihood of ICE versus other PSE, a 52% lower likelihood of ICE versus no PSE, and a 26% lower likelihood of other PSE versus no PSE. In comparison to having parents who completed college, having parents with an advanced degree was associated with a 24% higher likelihood of ICE versus other PSE, but comparisons among other enrollment groups were nonsignifcant.

In terms of school characteristics, a few significant results emerged, with the highest relative risk ratios occurring in comparisons between sectors of education. In comparison to attending public schools, students in Catholic schools were 46% more likely to be in the ICE group versus the other PSE group, 5 times as likely to be in the

ICE group versus the no PSE group, and almost 3.5 times as likely to be in the other PSE group versus the no PSE group. Other private (non-Catholic) school students had an 84% higher likelihood of ICE versus no PSE (at the trend level of significance, $p <.10$) and were two times as likely to be in the other PSE group versus the no PSE group in comparison to public school students. The student-teacher relations scale was nonsignficant in all comparisons, and the academic climate scale was only statistically significant when comparing ICE to other PSE. In this case, a one-unit increase in academic climate was associated with a 15% higher likelihood of ICE in comparison to other PSE (a trend was observed when comparing ICE to no PSE; $p < .10$).

Students who attended schools in which 11-75% of the students were eligible for FLP were less likely to be in the ICE group than the other or no enrollment groups in comparison to students who attended schools with 0-5% FLP eligibility (i.e. high-SES schools). The results for schools with greater than 75% of students eligible for FLP (i.e. low-SES schools) varied in statistical significance when comparing the likelihood of membership in one enrollment group versus another. Specifically, attending a school in the lowest SES category was associated with a 16% lower likelihood of ICE versus other PSE (nonsignificant), a 45% lower likelihood of ICE versus no PSE ($p <.05$), and a 34% lower likelihood of other PSE versus no PSE ($p <.10$). School-level SES appears to be associated with post-secondary enrollment, but only when comparing enrollment to no enrollment.

Table 9. Main Effects Model

Variable	ICE vs. Other PSE		ICE vs. No PSE		Other PSE vs. No PSE	
	Coef. (SE)	rrr	Coef.(SE)	rrr	Coef. (SE)	rrr
Self-Regulation	.091 (.065)	1.095	.050(.107)	1.051	-.041(.093)	.960
School Engagement	.510*** (.083)	1.665	.736***(.122)	2.087	.226*(.105)	1.253
Academic Expectations	.094 (.067)	1.098	.343**(.119)	1.409	.249*(.103)	1.283
Academic Preparedness	1.201*** (.050)	3.323	1.592***(.082)	4.914	.391*** (.066)	1.479
Sources of College Info	.117***(.015)	1.124	.267***(.026)	1.306	.150***(.022)	1.162
Gender – Male	.316***(.060)	1.373	.867***(.087)	2.380	.550***(.074)	1.733
Family Income	.098***(.015)	1.102	.183***(.022)	1.201	.086***(.018)	1.090
Academic Climate	.138*(.062)	1.148	.143[+](.084)	1.154	.005(.066)	1.005
Student-Teacher Relations	.055(.081)	1.057	.188(.123)	1.207	.133(.100)	1.142
Sector (Public omitted)						
Catholic	.380**(.116)	1.462	1.607***(.257)	4.986	1.227***(.254)	3.410
Other Private	-.113(.198)	.893	.607[+](.351)	1.835	.720*(.315)	2.055
Race/Ethnicity (White omitted)						
Black/African American	.215*(.105)	1.240	.388[+](.150)	1.473	.172(.118)	1.188
Hispanic	-.415*** (.111)	.661	-.168 (.154)	.846	.247*(.122)	1.280
Asian	.130(.140)	1.139	.726**(.238)	2.066	.595**(.222)	1.813
Mixed Race	-.074(.163)	.929	-.462*(.209)	.630	-.388*(.171)	.678
Native American	-.245(.375)	.783	-.455(.462)	.635	-.210(.358)	.810
Parent Ed (Bachelor's omitted)						
Less than HS	-.637***(.162)	.529	-1.464***(.231)	.231	-.827***(.185)	.437
HS Diploma or GED	-.537***(.099)	.584	-1.321***(.155)	.267	-.784*** (.132)	.457
Some College	-.428*** (.076)	.652	-.730*** (.137)	.482	-.302* (.123)	.739
Advanced Degree	.214*(.096)	1.239	.080(.185)	1.083	-.134 (.184)	.874

School SES (0-5% FLP omitted)

6-10% FLP Eligible	-.239(.156)	.788	- .281(.207)	.755	-.043(.177)	.958
11-20% FLP Eligible	-.293*(.127)	.746	-.544**(.176)	.581	-.251(.164)	.778
21-30% FLP Eligible	-.370**(.123)	.691	- .510**(.192)	.600	-.141(.171)	.869
31-50% FLP Eligible	-.265* (.134)	.767	-.515**(.187)	.597	-.250(.171)	.779
51-75% FLP Eligible	-.740***(.178)	.477	-.976***(.220)	.377	-.236(.180)	.790
76-100% FLP Eligible	-.179(.199)	.836	-.595*(.281)	.551	-.416[+](.243)	.660
Constant	-.015(.109)	.985	1.814***(.176)	6.135	1.829***(.171)	6.227

Interaction Effects

The second set of multinomial logistic regression models assessed college readiness variables as moderators of the associations between internal assets and ICE. Each readiness variable was interacted with each of the internal assets. Table 10 displays the coefficients, standard errors, and relative risk ratios of the moderation models. Notably, no significant interactions emerged after holding all other variables in the model constant.

Table 10. Interaction Effects Model

Variable	ICE vs. No PSE		ICE vs. Other PSE		Other PSE vs. No PSE	
	Coef. (SE)	rrr	Coef.(SE)	rrr	Coef. (SE)	rrr
PREPxREGULATE	.041(.141)	1.042	.060(.087)	1.062	-.019(.129)	.981
PREPxENGAGE	.054(.163)	1.056	.121(.110)	1.129	-.067(.143)	.935
PREPxEXPECT	-.091 (.143)	.913	-.081(.091)	.922	-.010(.128)	.990
SOURCExREGULATE	-.017(.052)	.984	-.022(.031)	.978	.006(.050)	1.006
SOURCExENGAGE	-.008(.060)	.992	-.011(.036)	.990	.002(.052)	1.002
SOURCExEXPECT	-.011 (.047)	.989	-.016(.030)	.984	.005(.048)	1.005
Self-Regulation	.035 (.132)	1.036	.082(.069)	1.085	-.047(.125)	.955
School Engagement	.697*** (.163)	2.007	.501***(.084)	1.651	.196(.156)	1.216
Academic Expectations	.362** (.134)	1.436	.116[+](.068)	1.123	.247*(.121)	1.280
Academic Preparedness	1.579*** (.084)	4.849	1.200***(.051)	3.318	.379*** (.069)	1.462
Sources of College Info	.272***(.027)	1.312	.120***(.015)	1.127	.152***(.024)	1.164
Gender – Male	.863***(.087)	2.371	.312***(.060)	1.367	.551***(.074)	1.735
Family Income	.184***(.022)	1.202	.098***(.015)	1.103	.086***(.018)	1.090
Academic Climate	.145[+](.084)	1.156	.140*(.062)	1.150	.005(.066)	1.005
Student-Teacher Relations	.188(.123)	1.207	.054(.081)	1.056	.134(.100)	1.143
Sector (Public omitted)						
Catholic	1.604***(.257)	4.972	.376** (.116)	1.457	1.228***(.254)	3.414
Other Private	.606[+](.352)	1.833	-.116(.200)	.890	.722*(.316)	2.058
Race/Ethnicity (White omitted)						
Black/African American	.396**(.149)	1.485	.228*(.104)	1.255	.168(.119)	1.183
Hispanic	-.169 (.154)	.844	-.415***(.112)	.661	.245*(.122)	1.278
Asian	.727**(.236)	2.069	.132(.140)	1.141	.595**(.221)	1.813
Mixed Race	-.462.*(.209)	.630	-.072(.162)	.931	-.390*(.170)	.677
Native American	-.456(.464)	.634	-.247(.375)	.781	-.209(.357)	.811

Parent Ed (Bachelor's omitted)						
Less than HS	-1.463***(.231)	.232	-.635***(.163)	.530	-.829***(.185)	.437
HS Diploma or GED	-1.324***(.155)	.266	-.539***(.099)	.583	-.785*** (.132)	.456
Some College	-.733*** (.137)	.480	-.431*** (.076)	.650	-.302* (.123)	.740
Advanced Degree	.078(.185)	1.081	.211*(.096)	1.234	-.133 (.184)	.876
School SES (0-5% FLP omitted)						
6-10% FLP Eligible	-.284(.208)	.753	-.244(.157)	.784	-.040(.178)	.961
11-20% FLP Eligible	-.543**(.176)	.581	-.295*(.128)	.745	-.249(.165)	.780
21-30% FLP Eligible	-.512**(.194)	.599	-.373**(.124)	.688	-.139(.172)	.871
31-50% FLP Eligible	-.518** (.188)	.596	-.268*(.134)	.765	-.250(.171)	.779
51-75% FLP Eligible	-.977***(.220)	.376	-.743***(.178)	.476	-.235(.181)	.791
76-100% FLP Eligible	-.594*(.282)	.552	-.179(.200)	.836	-.415[+](.244)	.660
Constant	1.828***(.179)	6.221	-.001(.110)	1.001	1.827***(.172)	6.216

Indirect Effects: College Readiness

In preparation for mediation analyses, ICE was regressed on internal assets (Table 11) and college readiness variables (Table 12) in separate models that included covariates. The final set of multinomial logistic regression models assessed whether or not college readiness variables mediated the association between internal assets and ICE. Path coefficients and standard errors (presented in Figure 5) were entered into a Sobel calculator to obtain indirect effects (presented in Table 12). These statistics reveal mediation in five of the six pathways examined in the study.

For path 1, self-regulation was associated with lower academic preparedness, and academic preparedness was associated with higher likelihoods of ICE over other PSE and no PSE. For path 2, self-regulation was positively associated with sources of college information, which in turn was associated with higher likelihoods of ICE over other PSE and no PSE. For paths 3 and 4, school engagement was associated with higher academic preparedness and sources of college information, which were each, in turn, associated with higher likelihoods of ICE over other PSE and no PSE. For path 5, academic expectations were associated with higher academic preparedness, and academic preparedness was, in turn, associated with higher likelihoods of ICE over other PSE and no PSE. For path 6, academic expectations were not significantly associated with sources of college information; though, sources of college information were significantly associated with higher likelihoods of ICE over other PSE and no PSE.

Table 12 illustrates that the indirect effects reached statistical significance for Paths 1-5, meaning academic preparedness and sources of college information served as mediators. Path 6 was not statistically significant, indicating that sources of college

Table 11. Internal Assets and covariates

Variable	ICE vs. Other PSE		ICE vs. No PSE		Other PSE vs. No PSE	
	Coef. (SE)	rrr	Coef.(SE)	rrr	Coef. (SE)	rrr
Self-Regulation	.058 (.060)	1.060	.056(.101)	1.057	-.002(.090)	.998
School Engagement	.827*** (.079)	2.287	1.179***(.115)	3.250	.312**(.101)	1.421
Academic Expectations	.404*** (.061)	1.498	.726***(.107)	2.067	.322**(.095)	1.380
Gender – Male	.154**(.052)	1.166	.731***(.078)	2.076	.577***(.073)	1.781
Family Income	.142***(.014)	1.153	.240***(.020)	1.272	.098***(.017)	1.103
Academic Climate	.174**(.059)	1.190	.194*(.080)	1.214	.020(.064)	1.020
Student-Teacher Relations	.117 (.073)	1.124	.292**(.110)	1.339	.175(.095)	1.191
Sector (Public omitted)						
Catholic	.485***(.116)	1.624	1.833***(.251)	6.255	1.348***(.253)	3.851
Other Private	-.047 (.171)	.954	.734*(.348)	2.084	.781*(.320)	2.184
Race/Ethnicity (White omitted)						
Black/African American	-.131 (.096)	.877	.017(.136)	1.017	.148(.115)	1.160
Hispanic	-.632*** (.105)	.531	-.445** (.142)	.641	.187(.117)	1.206
Asian	.423**(.138)	1.528	1.161***(.246)	3.192	.737**(.226)	2.090
Mixed Race	-.098(.150)	.907	-.468*(.196)	.626	-.370*(.166)	.691
Native American	-.555(.362)	.574	-.854+(.439)	.426	-.299(.342)	.742
Parent Ed (Bachelor's omitted)						
Less than HS	-.919***(.152)	.399	-1.845***(.213)	.158	-.925***(.180)	.396
HS Diploma or GED	-.701***(.090)	.496	-1.539***(.145)	.215	-.837*** (.131)	.433
Some College	-.526*** (.070)	.591	-.841*** (.131)	.431	-.315* (.122)	.730
Advanced Degree	.365***(.091)	1.441	.258 (.181)	1.295	-.107 (.184)	.899
School SES (0-5% FLP omitted)						
6-10% FLP Eligible	-.284*(.136)	.753	- .332(.194)	.717	-.048(.178)	.953
11-20% FLP Eligible	-.373**(.119)	.688	-.642***(.166)	.526	-.268(.160)	.765
21-30% FLP Eligible	-.485***(.113)	.616	- .644***(.180)	.525	-.159(.168)	.853

|						
31-50% FLP Eligible	-.476*** (.125)	.621	-.773***(.176)	.462	-.297(.167)	.743
51-75% FLP Eligible	-.851***(.159)	.427	-1.106***(.203)	.331	-.255(.178)	.775
76-100% FLP Eligible	-.379^{+}(.196)	.684	-.769**(.280)	.464	-.389 (.237)	.677
Constant	.409***(.099)	1.505	2.017***(.161)	7.522	1.609***(.165)	4.998

Table 12. College Readiness Factors and covariates

Variable	ICE vs. Other PSE		ICE vs. No PSE		Other PSE vs. No PSE	
	Coef. (SE)	rrr	Coef.(SE)	rrr	Coef. (SE)	rrr
Academic Preparedness	1.275*** (.049)	3.579	1.720***(.078)	5.586	.445*** (.063)	1.561
Sources of College Info	.129***(.015)	1.137	.287***(.025)	1.333	.158***(.022)	1.172
Gender – Male	.383***(.060)	1.467	.947***(.087)	2.578	.564***(.073)	1.758
Family Income	.095***(.015)	1.100	.181***(.022)	1.198	.085***(.018)	1.089
Academic Climate	.128*(.062)	1.137	.128 (.084)	1.137	.000(.066)	.999
Student-Teacher Relations	.286***(.073)	1.331	.558***(.111)	1.747	.272**(.093)	1.313
Sector (Public omitted)						
Catholic	.347**(.115)	1.414	1.573***(.255)	4.822	1.227***(.252)	3.410
Other Private	-.138(.195)	.871	.573 (.351)	1.774	.711*(.315)	2.036
Race/Ethnicity (White omitted)						
Black/African American	.256*(.106)	1.292	.481**(.235)	1.618	.225[+](.119)	1.252
Hispanic	-.403*** (.110)	.668	-.133 (.152)	.875	.270*(.121)	1.310
Asian	.128 (.136)	1.137	.732**(.235)	2.080	.604**(.221)	1.829
Mixed Race	-.083 (.163)	.921	-.473*(.206)	.623	-.391*(.170)	.677
Native American	-.216 (.368)	.806	-.404(.454)	.668	-.188 (.362)	.829
Parent Ed (Bachelor's omitted)						
Less than HS	-.632***(.164)	.532	-1.461***(.231)	.232	-.829***(.184)	.436
HS Diploma or GED	-.548***(.099)	.578	-1.330***(.156)	.264	-.783*** (.132)	.457
Some College	-.429*** (.076)	.651	-.726*** (.136)	.484	-.297* (.123)	.743
Advanced Degree	.221*(.095)	1.247	.097(.087)	1.102	-.123 (.184)	.884
School SES (0-5% FLP omitted)						
6-10% FLP Eligible	-.220(.155)	.803	- .260(.204)	.771	-.041(.175)	.960
11-20% FLP Eligible	-.268*(.127)	.765	-.509**(.174)	.601	-.242(.165)	.785

21-30% FLP Eligible	-.344**(.122)	.709	- .465*(.189)	.628	-.121(.170)	.886
31-50% FLP Eligible	-.222 (.133)	.801	-.452*(.182)	.637	-.230(.169)	.774
51-75% FLP Eligible	-.704***(.177)	.495	-.918***(.221)	.399	-.214(.181)	.808
76-100% FLP Eligible	-.126 (.198)	.882	-.517[+](.278)	.596	-.391(.242)	.676
Constant	-.067(.108)					

information do not act as a mediator in the association between academic expectations and ICE. Table 12 also reveals that Path 1 (self-regulation → academic preparedness → ICE) has a negative indirect effect, while the other paths all have positive indirect effects. This is important for interpreting the main effects and is discussed in Chapter 5.

Figure 5. Indirect Effects
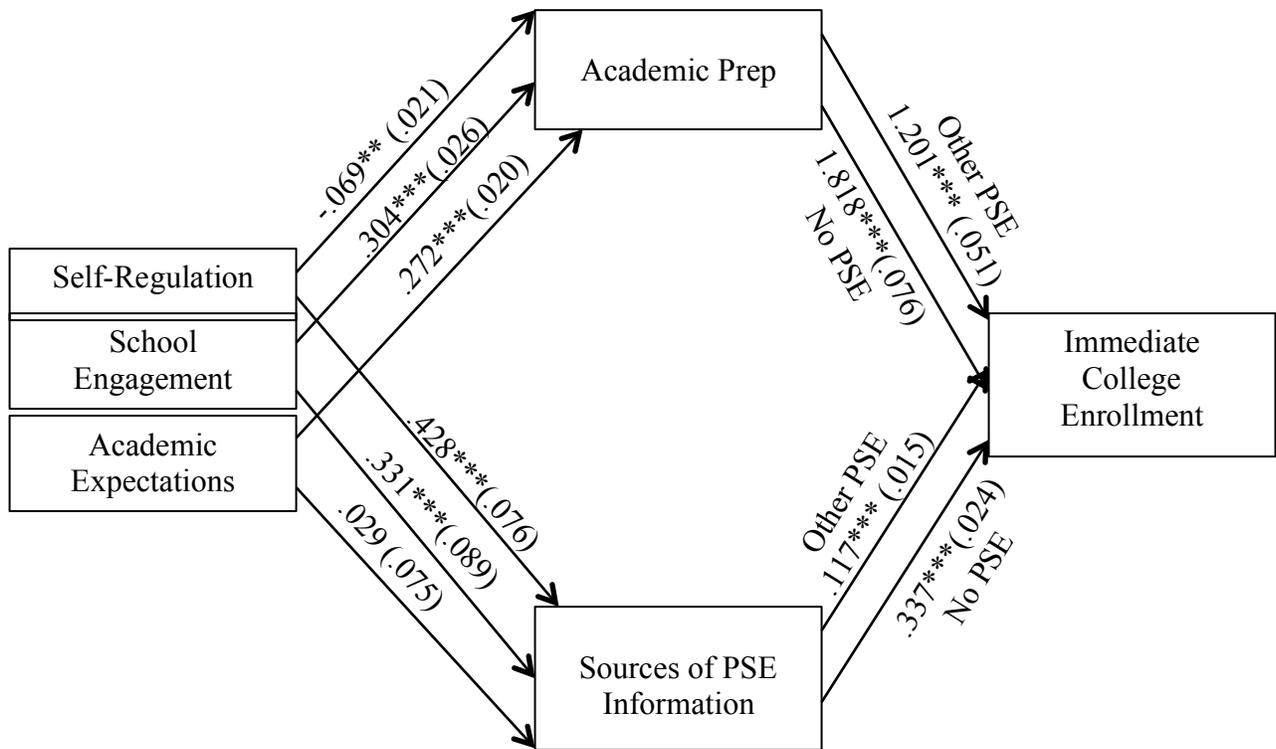
Table 13. Indirect Effects

Mediation Path	Indirect Effect (SE)	
	ICE vs. Other PSE.	ICE vs. No PSE
1. Self-Regulation → Academic Prep → PSE	-3.255** (0.025)	-3.255**(0.039)
2. Self- Regulation → Info Sources → PSE	4.646*** (0.011)	5.348*** (0.027)
3. School Engagement → Academic Prep → PSE	10.513*** (0.035)	10.505*** (0.053)
4. School Engagement → Info Sources → PSE	3.357*** (0.012)	3.595*** (0.031)
5. Academic Expectations → Academic Prep → PSE	11.835*** (0.028)	11.823*** (0.042)
6. Academic Expectations → Info Sources → PSE	0.386 (0.009)	0.387 (0.025)

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

Chapter 5: Discussion

As enrollment in post-secondary programs has become more normative for American adolescents, researchers have paid greater attention to the transition from high school to college. Many studies have examined student preparedness for matriculating to PSE, both academically and practically; however, less is known about the psychologically based developmental skills that are necessary for this transition. The goal of this study was to enhance and encourage discussion on the relevance of internal assets in promoting immediate college enrollment. Results replicated findings from previous college access studies and endorsed the application of the developmental assets framework (Leffert et al., 1998) and the PYD Thriving Model (Lerner et al., 2005). Moreover, the findings presented a substantial contribution to the literature by identifying variables drawn from developmental psychology as factors of ICE. Importantly, this study concluded that self-regulation, school engagement, and expectations for academic success operate indirectly through college readiness variables in their associations with post-secondary enrollment patterns. This finding has meaningful implications for practice and policy as college access programs and initiatives may have higher success rates if more attention is placed on these assets.

Using a large, national sample of adolescents followed from tenth grade to two years post-high school, the present study sought to understand more fully the transition from high school to college by taking into account multiple theoretical perspectives and including variables from interrelated disciplines. The main effects models replicated previous findings that college readiness is associated with ICE. Specifically, results showed that students who took advanced courses and scored in the top quartiles on

standardized tests of math ability were more likely to have immediate, full-time enrollment in a four-year post-secondary program than another or no enrollment pattern. Furthermore, acquiring information about college was significantly associated with ICE, with a greater quantity of sources being associated with a higher likelihood of ICE when compared to other or no enrollment, and with other enrollment when compared to no PSE. These findings provide support for K-16 models (e.g., Venezia & Kirst, 2005) that link high school and college curricula and call for a collaborative distribution of college information among various levels of education.

At present, the connections between secondary education and post-secondary education are weak, and researchers have begun advocating for curricular standards and expectations that align the two levels (Barrow et al., 2013). The results from the present study suggest that ameliorating the discord between high school graduation requirements and post-secondary entrance requirements could be a promising first step to increasing ICE. Moreover, a K-16 model, which proposes connecting the K-12 system with higher education, has the potential to reduce issues associated with course-based eligibility for PSE by embedding expectations and requirements in secondary schooling. Unfortunately, this is unlikely as there are few incentives for collaboration between these two entities (Goldrick-Rab, Carter, & Winkle Wagner, 2007; Kirst & Venezia, 2006).

The findings on internal assets and their associations with post-secondary enrollment were mixed. Most notable were the nonsignificant main effects of self-regulation. Previous research provides ample support for an association between self-regulation and positive developmental and academic outcomes among adolescents (e.g., Lerner et al., 2005; Ramdass & Zimmerman, 2011) and college students (e.g. Ley &

Young, 1998; Sedlacek, 2011), but the current study failed to replicate these findings. This does not necessarily mean that self-regulation is not important for ICE; rather it elucidates a need for further investigation. It is possible that the collinearity between self-regulation and academic expectations was a more pervasive problem than the VIF statistics suggested, that the measure focused too closely on academic self-regulation than broad or domain-general self-regulatory skills, or more likely, that the conflicting indirect effects cancelled each other out and resulted in nonsignificant main effects. The indirect effect of Path 1 (self-regulation → academic preparedness → ICE) was negative, and the indirect effect of Path 4 (self-regulation → sources of college information → ICE) was positive, meaning the indirect effects could be neutralizing the main effect of self-regulation on ICE.

A second notable finding on the internal assets was that expectations for academic success were nonsignificant when comparing ICE to other PSE, but statistically significant when comparing both enrollment groups to no PSE. This suggests that high expectations for academic success increase the likelihood of enrollment in general, but are not significantly associated with the specific pattern of actual enrollment (ICE or other PSE). Moreover, the mediation results reveal that expectations for academic success are not significantly associated with sources of information, which could mean that students have inadequate information on college options. If students do not have enough sources of information from which they can learn about post-secondary programs, they may not understand the importance of immediately enrolling full-time in a four-year program, regardless of their expectations for academic success. Conclusions concerning the remaining internal asset, school engagement, are aligned with PYD theory

and extant literature in that school engagement is associated with higher likelihoods of being in the ICE group over the other PSE and no PSE groups, and higher likelihoods of being in the other PSE group over the no PSE group.

Additional findings from this research highlight the importance of the school context and echo the work of Engberg and Wolniak (2010). School-level socioeconomic status, school sector, and academic climate were all significantly associated with ICE. Interestingly, academic climate emerged as a significant factor associated with the type of enrollment – ICE or other – but did not affect outcomes when comparisons were made with the "no enrollment" group. This suggests that academic climate only matters to students who eventually enroll in PSE, and creating more positive climates may encourage ICE, but likely will not increase overall post-secondary enrollment.

Reflecting PYD (Lernet et al., 2005) and multidimensional theories (Arnold et al., 2012; Conley, 2008; Perna, 2005) that argue characteristics of both individuals and context shape experiences that affect an individual's development, this study examined if internal assets and college readiness variables operated together through moderation or through mediation. Two major contributions to the literature emerged from this work.

First, the nonsignifcant moderation models imply that internal assets are not interacting with college readiness variables, as each variable only operated independently when predicting ICE. This is substantively significant because it suggests that college access programs may be impactful even if they do not target both college readiness *and* internal assets. Second, the results illustrate that college readiness variables operated as mediators in the associations between internal assets and ICE; the one exception was that sources of PSE information did not mediate the association between academic

expectations and ICE. In other words, self-regulation, school engagement, and academic expectations generally appear to be influencing ICE through academic preparedness and sources of PSE information. Thus, efforts to increase ICE that focus only on readiness may be omitting foundational internal assets that drive outcomes. Instead of targeting the mediator variable through which internal assets are manifested (i.e., college readiness), this study concludes that greater increases in ICE may result from augmentation of the internal assets themselves. Strategies for achieving this are presented below under implications.

Limitations. As with any study, the present study had a number of limitations. The most pervasive limitation was that this research was constrained by the use of secondary data. While secondary data analysis has many strengths (e.g., sample size, generalizability), issues with measurement and construct validity were an ongoing concern in this study. For example, sources of college information was the only variable that resembled college knowledge, but more detailed variables are necessary to assess true college knowledge. Obtaining data on the quality of sources, along with measures of comprehension and retention of information, would provide a better assessment of college knowledge.

Furthermore, measures of the internal assets reflected items from previous NCES studies, as opposed to normed and validated scales used in more contemporary research. The self-regulation measure specified academic actions instead of broad, domain-general self-regulatory behaviors, and the expectations for academic success construct was more closely related to expectations of academic ability (or academic self-efficacy) than the traditional expectation item which asks the highest level of education the student expects

to achieve. Including data from multiple sources (i.e., students, administrators, transcripts) may have helped increase construct validity, but only when multiple reports were available. If validity was compromised, the constructs in this study may not have been accurately assessed, and results may be flawed.

In addition, collinearity between self-regulation and expectations for academic success, though ruled out as a threat (see VIF statistics in Table 8 and factor loadings in Appendix D), may have weakened the statistical power and coefficient estimates. These issues complicate the interpretation of findings, and illustrate a need for additional research that utilizes more traditional measures of college knowledge, self-regulation, and academic expectations.

Another limitation of the present study concerns omitted variable bias. One important variable, grades, was not available in the unrestricted data that were used for this dissertation. Though grades lack objectivity and a universal unit of measurement, they may still help explain the association between internal assets and ICE in that grades influence and are influenced by expectations for academic success. Including grades could yield more nuanced results. Similarly, neighborhood characteristics were not available. While many demographic and contextual variables were included, it is possible that the effects of neighborhoods, or any other unknown variable, may in fact be contributing to PSE enrollment patterns. The current study is at the forefront of research on psychological factors associated with ICE, and therefore, more research is needed to assuage the limitations faced here and investigate additional internal assets and contexts.

Implications. Today, numerous pre-college programs that seek to increase college access and success are targeted toward underrepresented groups, such as low-income,

minority, and first-generation college students. They vary in specific goals but often seek to foster academic and college knowledge. TRIO programs and the GEAR UP program (Gaining Early Awareness and Readiness for Undergraduate Programs) are the most notable federally funded programs. Other well-known programs funded by non-governmental organizations include the Mathematics, Engineering, Science Achievement program (MESA), Advancement via Individual Determination (AVID), I Have A Dream (IHAD), and the Neighborhood Academic Initiative (NAI). These have had varying levels of success (a detailed review of each of these programs can be found in Swail, 2000 or Swail & Perna, 2002) but current college access, enrollment, and success statistics make it clear that pre-college programs still have room for improvement.

The implications from this study are applicable to multiple entities (e.g., schools, researchers, policymakers) and center around increasing attention to psychologically based internal assets. If internal assets are not working in conjunction with college readiness variables, but rather are manifested through measures of college readiness, interventions, policies, and secondary school practices should reflect that. Furthermore, policymakers should work towards education reform that follows a K-16 model, such as by providing incentives for programming that unites secondary and post-secondary institutions and resources in ways that promote cohesion for students as they transition from high school to college. In K-12 models, there are national standards and objectives for learning that align curricula from one grade to the next (i.e., Common Core). However, this stops once students complete twelfth grade. Adopting a K-16 model would likely encourage exchanges of curricular and general information about college, and possibly increase ICE.

The longitudinal nature of this study revealed that internal assets in tenth grade are influential for later outcomes. An oft-cited problem with college access interventions is that programs are implemented too late (Bonous-Hammarth & Allen, 2005; Perna, 2005). By the time students and their families receive information about college, there is not enough time to adequately prepare for ICE. Consequently, it makes sense for researchers, practitioners, and policymakers to work on improving individual assets at the start of high school or earlier. Li and Lerner (2011) and Marks (2000) have identified possible methods for the development of these assets, which include promoting classroom learning that is linked to real world situations, encouraging a positive orientation toward school, and connecting schools, families, and community resources.

It may also be beneficial to consider the person-in-context at various stages across this transition. Though identified here as an internal asset, academic expectations are largely affected by contexts (Roderick et al., 2011). For example, expectations for academic success at home may look different than expectations for academic success at school, and both of these may look different in tenth grade in comparison to twelfth grade. In order to enhance students' academic expectations, additional considerations of the role of families, teachers, and schools are necessary. In particular, college access programming should seek to foster college-going behaviors and values across these contexts beginning early in adolescence, as this has been effective in previous work (Bonous-Hammarth & Allen, 2005).

Finally, it is imperative that researchers improve the conceptualization and measurement of internal assets. Interdisciplinary research on this topic is inevitable, and a consensus on definitions and measures must be reached in order for future research to be

maximally meaningful. Likewise, studies must be able to replicate findings across data sources and using diverse analytic procedures; researchers, practitioners, and communities should work to increase validity and reliability of measures.

Conclusion. In sum, the present study examined the ways in which college readiness variables and internal assets drawn from developmental psychology simultaneously influenced college enrollment patterns. Results indicated that school engagement and academic expectations, in general, were underlying college readiness, which in turn, was associated with ICE. The conflicting indirect effects of self-regulation on ICE identify a need for future investigation of this asset, and suggest that the nonsignificant main effects should be interpreted with caution. Therefore, the conclusion of this study is that applied settings should seek to enhance internal assets at developmentally appropriate ages. While college readiness variables continue to promote ICE and should not be ignored or abandoned, incorporating these additional internal assets may expand the educational potential of the next generation.

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Appendix A.
McMahon's (2004) Benefits of Post-Secondary Education

I. Externality feedbacks on per capita growth:
    1.1 Higher investment rates in physical capital as education improves stability
    1.2 Higher investment rates in education as education induces income growth
    1.3 Non-market and new technology effects on growth
    1.4 Education's contribution to R&D and to innovation
    1.5 Slower population growth, an indirect effect from private benefits via fertility

II. Education's non-market effects on development
  Population and health effects (controlling for Y, or income)
    1. Better public health
    2. Lower net population growth rates
  Strengthening civic institutions and the rule of law (controlling for Y)
    3. Democratization: authoritarian regimes depend on illiteracy; also greater
      volunteering and financial giving strengthen civic institutions
    4. Human rights: a function of democratization and of education
    5. Political stability: aided by better civic institutions (democratization)
  Lower crime rates (controlling for Y)
    6.1 Lower homicide rates, lower property crime rates
    6.2 Less policing, incarceration, fewer court system and private security costs
  Indirect environmental effects (controlling for Y)
    7. Less forestation (for cooking, less dependence on timber exports)
    8. Less water pollution as education slows population growth
    9. More air pollution (a negative externality of education-induced growth)
  Reduction of poverty and inequality (controlling for Y)
    10. Urban and rural poverty reduction, via smaller families, farm technology
    11. Reduction of inequality, only with wider dissemination of education (indirect
      effects only, via greater stability and less crime)
  Geographic Spillovers
    12. Less migration to urban ghettoes; more assimilation in provinces
    13. More emigration of workers after college (a negative externality)

Appendix B.
Development of Enrollment Groups (DV)

First Iteration:
All possible groups
1. Immediate, full-time, 4-year
2. Immediate, part-time, 4-year
3. Immediate, full-time, 2-year
4. Immediate, part-time, 2-year
5. Delayed, full-time, 4-year
6. Delayed, part-time, 4-year
7. Delayed, full-time, 2-year
8. Delayed, part-time, 2-year
9. No PSE

Second Iteration:
Condensed based on sample size and unique prediction of F3 attainment
Group 1: Immediate, full-time, 4-year
Group 2:
- Immediate, full-time, 2-year
- Immediate, part-time, 4-year
- Immediate, part-time, 2-year
- Delayed, full-time, 4-year
- Delayed, part-time, 4-year
Group 3:
- Delayed, full-time, 2-year
- Delayed, part-time, 2-year
Group 4: No PSE

Third Iteration:
Condensed based on conceptual relevance
Group 1: Immediate, full-time, 4-year
Group 2:
- Immediate, full-time, 2-year
- Immediate, part-time, 4-year
- Immediate, part-time, 2-year
- Delayed, full-time, 4-year
- Delayed, part-time, 4-year
- Delayed, full-time, 2-year
- Delayed, part-time, 2-year
Group 3: No PSE

Appendix C.
Detailed Measures of the Present Study

Construct	Measure	Items
ICE	Enrollment Status	Full-time enrollment in a 4-year PSE program by the fall of 2004
Self Regulation	Effort and Persistence Scale from ELS:2002 n=5, α = .88	Remembers most important things when studies Works as hard as possible when studies Keeps studying even if material is difficult Does best to learn what studies Puts forth best effort when studying
School Engagement	Composite created through factor analysis n=15, α = 0.74	How many times cut/skip classes How many times got in trouble Classes are interesting and challenging Satisfied by doing what expected in class How often goes to class without pencil/paper How often goes to class without books How often goes to class without homework done Gets totally absorbed in mathematics Thinks reading is fun Thinks math is fun Reads in spare time Gets totally absorbed in reading
Academic Expectations	Expectations for Academic Success Scale from ELS:2002 n=4, α = 0.83	Can learn something really hard Can get no bad grades if decides to Can get no problems wrong if decides to Can learn something well if wants to
Academic Preparedness	Composite n=2, α =0.67	Count of advanced courses: math and science Quartile of grade 12 math score

Appendix C. (cont.)

PSE Information Sources	Count	Where have you gone for information about the entrance requirements of various colleges?
		• Guidance counselor
		• Teacher
		• Coach
		• Parent
		• Friend
		• Sibling
		• Other relative
		• College publications or websites
		• College representatives
		• College search guides, publications, or websites
		• High school library
		• Public library
		• College library
Covariate: School Context	Academic Climate Scale (administrator report) n= 5, α = 0.87	Student morale is high Teachers press students to achieve Teacher morale is high Learning is high priority for students Students expected to do homework
Covariate: School Context	Student-Teacher Relations (student report) n=5 α = 0.73	Students get along well with teachers The teaching is good Teachers are interested in students Teachers praise effort In class often feels put down by teacher

Appendix D.
Rotated Factor Loadings for Correlated Internal Assets (greater than .3 displayed)

Variable	Factor 1	Factor 2
Self-Regulation Item 1	.55	.48
Self-Regulation Item 2	.75	
Self-Regulation Item 3	.60	.51
Self-Regulation Item 4	.65	.49
Self-Regulation Item 5	.75	
Expectations Item 1	.35	.61
Expectations Item 2	.31	.67
Expectations Item 3	.33	.61
Expectations Item 4	.39	.71