ABSTRACT

Title of Document: MOTIVATIONAL PROCESSES AND THE PURSUIT OF POSTSECONDARY EDUCATION

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Enrollment in postsecondary education is at an all-time high, and a college education is increasingly seen as a necessity for the majority of students. Prior research has established that several variables account for students' postsecondary enrollment differences, including students' demographic characteristics and their academic achievement. However, despite the wealth of research that shows students' motivation-related beliefs and behaviors are important predictors of academic outcomes and choices, motivation-related theoretical frameworks have rarely been applied to the research examining postsecondary enrollment as an outcome. Therefore, data from the ELS:2002 dataset was used to examine how students' ability beliefs, value for school, postsecondary expectations, and goal-directed behaviors were related longitudinally, as well as how these variables related to students' postsecondary enrollment. Multinomial logistic regression was used to examine whether students' postsecondary expectations changed over time differently for students from different demographic groups. Next, structural equation modeling was used to examine how the full set of motivation-related beliefs and behaviors were related to one another as well as how they predicted postsecondary enrollment. Demographic differences by gender, ethnicity, and SES in the relations between variables were also examined. The results indicate that patterns of

change in postsecondary expectations differentially predicted students' postsecondary enrollment. Specifically, students who reduced their expectations were less likely to be continuously enrolled in college. Further, students' ability beliefs and value for school predicted their postsecondary expectations and goal-directed behaviors which in turn predicted students' postsecondary enrollment. Mean-level differences as well as differences in the relations between variables emerged for students' from different demographic groups. Implications of these findings and directions for future research are discussed.

MOTIVATIONAL PROCESSES AND THE PURSUIT OF POSTSECONDARY EDUCATION

By

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Dedication

To my father, for starting me on the path to a life-long love of learning.

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I could almost write another dissertation on the amount of love and support I have received from family, friends, and colleagues over the years. My family, especially, has been there from the very beginning. Mom, thank you for being one of my biggest supporters and a source of strength and sympathy whenever I needed it. Scott, you are the best brother anyone could ask for and I am so glad that I can count you as a close friend as well as my brother. Aunt Reta and Uncle Mike, thank you for always being there for me and for inspiring me to study education by showing me what devoted educators look like. Finally, Timm, thank you for your unwavering support, your patience, your thoughtfulness, and for indulging my stress-induced pizza and ice cream cravings. I am so lucky to have each and every one of you in my life. I love you all more than words can express.

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Chapter 1: Introduction

Enrollment in postsecondary education is at an all-time high (National Center for Education Statistics (NCES), 2012b). A college education is seen as a necessary step in obtaining higher-level employment by many students, parents, and employers in the United States. It has been projected that by 2018, approximately 60% of U.S. jobs will require some level of postsecondary education (Carnevale, Smith, & Strohl, 2010). Additionally, education is one of the biggest factors impacting individuals' upward social mobility (Crowley & Shapiro, 1982; Domina, Conley, & Farkas, 2011; Richardson & Skinner, 1992), and is thus seen as one of the most important investments for future success in the labor market (Haveman & Smeeding, 2006). The push towards a college education as a requisite for many employment sectors combined with the high numbers of students continuing onto college has prompted this current educational trend to be dubbed the era of "college-for-all" (Domina et al., 2011; Goyette, 2008; Rosenbaum, 2001), a phrase that captures the high expectations for all individuals to aspire to and earn a postsecondary degree.

A major reason for the increased enrollments in college is the importance of degree attainment for a variety of occupations, as well as increased incomes and lower unemployment rates associated with degree attainment. The overall unemployment rate in 2012 for persons aged 25 and older with only a high school diploma was 8.3%. The rate dropped to 6.2% for those with an Associate degree and 4.5% for those with a Bachelor's degree. Additionally, those with an Associate or Bachelor's degree earn, on average, $133 and $414 more per week, respectively, compared to individuals with a high school diploma (U.S. Department of Labor, 2013).

There are many pathways into higher education, but a large percentage of students enroll in postsecondary education directly after high school graduation. This rate, known as the immediate college enrollment rate, increased from 49 to 70 percent between 1975 and 2009 (NCES, 2012b). This is indicative of the overall shift towards more high school graduates attending college.

In the last decade, some students who have not enrolled in postsecondary institutions after high school joined the military (2-3%; Van Horn, Zukin, Szeltner & Stone, 2012), while others entered directly into employment in the service/sales (43.7%), clerical (12.9%), laborer/farmer (12.0%), craftsperson (10.1%), skilled operative (9.8%), or managerial (5.0%) sectors (Ingels, Glennie, Lauff, & Wirt, 2012). These job categories are associated with lower earnings and less occupational prestige (Nakao & Treas, 1994). Postsecondary education offers individuals a bridge to higher status occupations (Griffin & Alexander, 1978; Nakao & Treas, 1994), increased career stability (Jepsen & Choudhuri, 2001), and generally higher incomes (U.S. Department of Labor, 2013), which is increasingly important given recent economic conditions in the U.S.

Access to postsecondary education has become important politically as well as socially, with federal loan programs and other financial aid opportunities becoming a central factor in current political discussions. For example, President Barack Obama embarked on a college affordability bus tour in August of 2013 to discuss his plan to increase college access and affordability for low and middle income American students by making higher education more affordable and increasing financial aid options (Welsch, 2013).

The demographic differences in who goes on to pursue postsecondary education have been extensively reviewed in several publications (see Deil-Amen & Turley, 2007; Goldrick-Rab, Carter, & Wagner, 2007; Long, 2007). Trends over the last 30 years show that, irrespective of other demographic factors, enrollment for Asian students is higher than enrollment for White, Black, and Hispanic students, and enrollment is greater for females than males (NCES, 2012a). The most apparent and pervasive discrepancy is that students from higher SES families enroll in greater numbers than those in low SES families (Long, 2007; Louie, 2007; NCES, 2012a).

Much of the research on postsecondary enrollment has focused on demographic differences in the students that enroll in postsecondary institutions (Goldrick-Rab, 2006; Louie, 2007; Mau & Bikos, 2000). The general pattern since the 1960s has been one of increasing enrollment for women and for individuals from racial and ethnic minority groups (NCES, 2012a). In addition, the implementation of financial aid policies in the 1970s resulted in greater access to higher education for individuals from families with lower socioeconomic status (Ehrenberg, 2004).

While very few studies in the literature have reported effect sizes, studies that do report some sort of effect size indicate that demographic factors such as race, gender, and socioeconomic status, as well as academic factors account for only about a quarter of the variance in students' postsecondary expectations and enrollment (Alon, Thurston & Tienda, 2010; Cheng & Starks, 2002). Further, Baker and Vèlez (1996) reviewed enrollment trends from the 1960s to the early 1990s and found that despite the still pervasive demographic differences in enrollment, there has been a pattern of declining importance of these characteristics in predicting postsecondary enrollment as compared

to academic variables. That is, gender, socioeconomic status, and race and ethnicity were not as predictive of postsecondary enrollment as academic differences among students. However, Baker and Vèlez did not consider the influence of other important academic-related variables such as students' motivation as it relates to students' postsecondary enrollment choices. Therefore, while this body of research does indicate that demographic variables and academic achievement account for some of the variance in students' college enrollment, it does not fully consider additional motivation-related constructs shown to be strong predictors of students' academic choices and outcomes (e.g., Eccles, Vida, & Barber, 2004; Meece, Wigfield, & Eccles, 1990; Musu-Gillette, Wigfield, Harring, & Eccles, 2013; Nagy, Trautwein, Baumert, Koller, & Garrett, 2006; Watt, 2006).

Despite the fact that students' achievement-related beliefs and behaviors are predictive of a wide variety of academic outcomes (for reviews see Wentzel & Wigfield, 2009; Zimmerman & Schunk, 2011), theoretical perspectives on students' academic motivation have rarely been applied to examine the outcome of postsecondary enrollment. In particular, researchers have not adequately explored how beliefs and behaviors in regard to postsecondary education develop over time, relate to one another, and ultimately predict students' postsecondary enrollment. There are a variety of theoretical perspectives on motivational beliefs and academic behaviors; two prominent ones are expectancy-value theory and social cognitive theory. These theories are particularly germane to the present study because they have often been applied in order to understand and explain students' academic choices. The current study therefore applied Eccles and colleagues (1983) expectancy-value theory along with Bandura's (1986)

social cognitive theory to explore how students' school ability beliefs, value for school, expectations for postsecondary education, and goal-directed behaviors both related to one another over time and predicted students' postsecondary enrollment.

Conceptual Framework

One motivation theory that can help frame the beliefs that may serve as precursors to students' postsecondary enrollment is expectancy-value theory. This theory includes a variety of beliefs such as students' self-concept of their ability, expectancies for success, and task values that have been shown to be related to achievement outcomes, such as grades in different subject areas (Meece et al., 1990) and choices, like the number and type of courses students choose to take in high school and college (Eccles et al., 2004; Meece et al., 1990; Musu-Gillette et al., 2013; Nagy et al., 2006; Watt, 2006). Students' self-concept of their ability and their task value measured in high school also predicts their career plans and course of study in college in the domain of math (Nagy et al., 2006; Watt, 2006) and literacy (Durik, Vida, & Eccles, 2006; Watt, 2008). It is clear from a multitude of studies that expectations, ability beliefs, and values significantly predict future educational choices and outcomes. However, only a handful of studies have applied an expectancy-value framework to the examination of students' motivation for postsecondary education (e.g., Diemer & Li, 2012; Eccles et al., 2004; Mello, 2008).

A second major theoretical perspective relevant to college enrollment is Bandura's (1986) social cognitive theory. Studies based in this theory have found that self-efficacy and self-regulatory behaviors are important predictors of educational outcomes (Bandura, 1991; Pintrich, 2000; Schunk & Pajares, 2009; Zimmerman, 2000; 2011). Behavior is a key component of social cognitive theory (Bandura, 1986). In

particular, goal-directed behaviors serve as mediators of a particular goal or plan for the future and the outcome or fulfillment of that goal.

A consideration of students' behaviors adds an important contribution to the expectancy-value framework, especially in regard to postsecondary enrollment. Students must secure information to help guide their application process (Martinez & Cervera, 2012) and take the requisite standardized exams (e.g. SAT/ACT; Klasik, 2012; 2013; U.S. Department of Education, 2013) before they can even apply to postsecondary institutions. Thus, while the internal, motivational characteristics of students predict many academic outcomes and choices, the complexity of the college application and enrollment process requires that students also direct certain behaviors towards their expected college enrollment plans in order to successfully enroll in a postsecondary setting after high school. Given the demonstrated influence motivational and self-regulatory behaviors have on a wide variety of academic choices and outcomes (Wentzel & Wigfield, 2009; Zimmerman & Schunk, 2011) it is quite surprising that there is no clear understanding of how these constructs, taken together, may factor into a student's desire to pursue higher education.

Based on these two theories, a conceptual model was developed that includes students' school ability beliefs, value for school, their educational expectations, and their goal-directed behaviors. Consistent with the research cited above, students' ability beliefs and task value were represented as precursors to students' expectations. Additionally, students' expectations for postsecondary education were examined as predictors of postsecondary enrollment, with goal-directed behaviors considered as

potential mediators of the relation between expectations and enrollment. The full model is presented and explicated in Chapter 2.

Goals of the Current Study

The current study begins to address the gap in our understanding of the motivation-related beliefs and behaviors underlying students' postsecondary expectations and enrollment. The pattern of increased postsecondary enrollment is likely to continue given that a college education has a generally positive impact on a number of future outcomes, including employment options (Griffin & Alexander, 1978; Nakao & Treas, 1994), job stability (Jepsen & Choudhuri, 2001), and salary (U.S. Department of Labor, 2013). Further, most students in middle school and high school aspire to earn a college degree (Bloom, 2007; Goldrick-Rab et al., 2007; Wood, Kurtz-Costes, & Kopping, 2011; Yowell, 2000), but not all those that aspire to earn a degree go on to do so (Diemer & Li, 2012; Glick & White, 2004; Goldrick-Rab, 2006; Majoribanks, 2003). It is therefore essential to gain a better understanding of the longitudinal connections between students' school-related beliefs and behaviors in relation to eventual postsecondary enrollment decisions.

The goals of the current study were threefold. First, this study aimed to examine patterns of change in students' postsecondary expectations from 10th grade to 12th grade, predictors of these patterns of change, and the ways in which these patterns of change predict postsecondary enrollment. Postsecondary expectations are defined as students' expected level of educational attainment. These are akin to expectancies in expectancy-value theory in that expectancies are beliefs about how successful one can be in regard to a particular task (Wigfield & Eccles, 2000), and postsecondary expectations similarly

reflect level of expected success in degree attainment (Bohon, Johnson, & Gorman, 2006; Diemer & Li, 2012). To align with the bulk of other studies on postsecondary enrollment these will be referred to as expectations, rather than expectancies, throughout the current study. Postsecondary expectations are important predictors of postsecondary enrollment (Mello, 2008; Wells, Seifert, Padgett, Park, & Umbach, 2011; Wood et al., 2011), but the literature lacks a clear understanding of how expectations may change over time, what variables influence this change, and how changes in expectations may relate to actual enrollment.

The second goal was to understand how ability beliefs and value for school, postsecondary expectations, and goal-directed behaviors measured in both 10th grade and 12th grade predict postsecondary enrollment. This aspect of the study involved examining how these different constructs related to one another cross-sectionally and longitudinally in order to gain a better understanding of the underlying motivational processes, as well as to understand how these constructs predicted postsecondary enrollment. Finally, due to the demonstrated demographic differences between groups of individuals in their motivation for postsecondary education (Bohon et al., 2006; Cheng & Starks, 2002; Gonzalez, Stein & Huq, 2012), enrollment in postsecondary education (Fuligni & Witkow, 2004; Long, 2007; NCES, 2012b), and relations between motivation and postsecondary enrollment (Kao & Tienda, 1998; Mello, 2008; Trusty, 2002; Wood et al., 2011), the third goal of the study was to examine how motivational processes differed by students' gender, ethnicity, and SES quartile.

Overview of the Relevant Literature

This section provides a brief overview of the studies showing how students' ability beliefs and values relate to their academic choices; these studies will be discussed in more detail in Chapter 2. There are both qualitative and quantitative studies in the literature. Qualitative studies with students who have successfully enrolled in postsecondary education highlight the salience of students' valuing of and expectations for education (Cavazos, Johnson, Fielding, Cavazos, Castro, & Vela, 2010; Hines, Merdinger, & Wyatt, 2005; Richardson & Skinner, 1992). In these studies, students discuss the importance of receiving an education for obtaining their future career goals (Cavazos et al., 2010) and improving their future quality of life in general (Yowell, 2000). Many students expect to pursue postsecondary education (Yowell, 2000) and understand that they must accomplish certain tasks in order to enroll in postsecondary education (Richardson & Skinner, 1992).

While empirical studies have connected one or two of the constructs of interest in the current study together in prior research, so far no study in the literature has considered all of these beliefs and behaviors together in relation to students' postsecondary enrollment choices. However, several constructs of central importance to expectancy-value theory have been explored individually or in combination with one or two other motivation-related constructs in quantitative studies of students' postsecondary expectations and enrollment, as well as in relation to other future-orientated academic choices. Students' ability beliefs are associated with their task values in a given domain (Durik et al., 2006; Simpkins, Davis-Kean, & Eccles, 2006) as well as their educational expectations (Eccles et al., 2004). Further, students' ability beliefs directly predict their

postsecondary enrollment (Fuertes & Sedlacek, 1994; Eccles et al., 2004). Additionally, beliefs about the value of a particular task or domain have been examined in relation to students' educational expectations and their postsecondary enrollment. Students' interest in school and perceived usefulness of school predict their course-taking behaviors (Durik et al., 2006; Simpkins et al., 2006), college major choices (Musu-Gillette et al., 2013), expectations to earn a four-year degree (Domina et al., 2011), their on-time progress in postsecondary enrollment (Wood et al., 2011), and their educational attainment at age 29 (Gottfried, Marcoulides, Gottfried, & Oliver, 2013).

Students' expectations for postsecondary education are often elicited in studies that allow students to respond to open-ended prompts about their future goals and hoped for possibilities (Kerpelman, Shoffner, & Ross-Griffin, 2002; Oyserman, Terry, & Bybee, 2002; Yowell, 2000; 2002) indicating the overall importance of a college education to middle and high school students. Additionally, quantitative studies show that students' expectations for education predict their postsecondary enrollment (Mello, 2008; Reynolds & Burge, 2008; Wells et al., 2011). Some research has also explored the change in students' expectations and aspirations for a college degree over time and found that maintenance of postsecondary expectations and aspirations over time predicted later college enrollment (Hanson, 1994; Trusty & Harris, 1999).

In studies examining postsecondary expectations over time, demographic variables including race, gender, and SES significantly predicted whether or not students maintained or reduced their expectations. Minority students and male students were more likely to have reduced expectations compared to females and White students (Hanson, 1994; Trusty & Harris, 1999) indicating that demographic variables may be

important predictors of students' maintenance or change in educational expectations. What this research has not examined is different patterns of change over time in postsecondary aspirations in a more nuanced way. That is, expectations are generally treated as a dichotomous variable (i.e., students aspire to a four-year degree or they do not) and more nuanced expectations, such as expectations of not completing a four-year degree, have not been considered.

Additionally, the possible demographic differences in how motivational processes predict postsecondary enrollment has not been explored in prior research. Studies of changes in educational expectations and postsecondary expectations in general have also not taken into account students' behaviors in regard to the pursuit of postsecondary education. Specifically, students' information-seeking behaviors are key because students' who talk with counselors, parents, peers or teachers about college are more likely to apply and enroll (Bryan, 2005; Cheng & Starks, 2002; Farmer-Hinton & Adams, 2006; Merdinger, Hines, Osterling, & Wyatt, 2005; Plank & Jordan, 2001; Reddick, Welton, Alsandor, Denyszyn, & Platt, 2011). Gathering information about college also is a key step in successfully applying to college (Cabrera & La Nasa, 2001), and students must apply for college before they can enroll.

Goal-directed behaviors are also important to consider because they have been shown to mediate the relation between ability beliefs, values, and expectations, and postsecondary enrollment-related outcomes (Eccles et al., 2004; Schutz, 1997). However, no studies in the literature could be located that have specifically examined the connection between students' ability beliefs, values, and expectations and their information-seeking behaviors.

Demographic differences have emerged in both the relations between values and expectations as well as students' overall degree attainment expectations. Overall, males report lower expectations for educational attainment (Chang, Chen, Greenberger, Dooley, & Heckhausen, 2006; Wells et al., 2011; Wood et al., 2011). Hispanic students report lower expectations for their postsecondary education than Black (Mello, 2009), White, or Asian students (Alon et al., 2010). Reasons for these differences are discussed in depth in Chapter 2. It is important to note that despite possibly lower expectations for some minority students, expectations to earn a college degree are still predictive of minority students' postsecondary enrollment (Kao & Tienda, 1998). Thus, while research indicates that individual motivation-related constructs differ across different groups of students, little to no research has examined how the overall relations between these constructs may function differently for males and females and individuals from different ethnic groups. The differences that have been observed, and the gaps in this literature will be explored more in depth in Chapter 2.

Additional factors related to postsecondary enrollment outcomes include students' academic preparation and the expectations parents have for students' college enrollment. Students' grade point average (Goldrick-Rab, 2006; Wolniak & Engeberg, 2010) and standardized test scores (Goldrick-Rab, 2006; Heller, 1997; Fuertes & Sedlacek, 1994; Wolniak & Engeberg, 2010) are important predictors of college enrollment. Additionally, school level factors such as the rigor of the curriculum at the school (Engeberg & Wolniak, 2010; Deil-Amen & Turley, 2007; Goldrick-Rab, 2006; Wolniak & Engeberg, 2010) have been shown to influence students' postsecondary enrollment.

Parents' aspirations for their child's education are also important predictors of students' own aspirations in terms of how far they plan to go in school (Cheng & Starks, 2002). Students' whose parents expect them to go to college are more likely to expect a four-year degree (Wells et al., 2011) and persist to graduation (Wintre & Bowers, 2007). High parental expectations for degree attainment have also been shown to have a positive effect on students' likelihood of applying to postsecondary institutions (Cabrera & La Nasa, 2001). Taken together, these studies indicate that academic and social factors are important covariates to include when examining postsecondary outcomes.

Statement of Problem and Research Questions

Although there is some research examining individual motivational and behavioral predictors of postsecondary enrollment, to date there is little to no research on how these constructs are related to one another over time. Further, there is no known research that includes all of the constructs of interest to the current study in predicting postsecondary enrollment patterns. Given the trend towards the increased importance of postsecondary education for occupational choices and socioeconomic status, it is important to understand the factors beyond demographic variables that impact an individual's decision to pursue postsecondary education. Students' expectations for postsecondary education are significant predictors of actual enrollment (Mello, 2008; Wells et al., 2011; Wood et al., 2011); however, we have little knowledge of how other motivational factors may influence students' postsecondary expectations and enrollment. In order to investigate the role that motivational processes play in students' postsecondary enrollment choices, the current study therefore explored the following research questions:

Research Question 1: How do the postsecondary expectations of students change over a two year period prior to high school graduation? This research question was broken into three sub-questions:

RQ1.1: What are common patterns of change in students' postsecondary expectations from 10th grade to 12th grade?

RQ1.2: How do individual-level characteristics such as gender, ethnicity, and SES predict whether individuals maintain or change their postsecondary expectations between 10th and 12th grade?

RQ1.3: How does postsecondary enrollment differ based on the patterns of change?

Research Question 2: How do students' school ability beliefs, value for school, postsecondary expectations and goal-directed behaviors in 10th grade relate to one another and predict students' postsecondary enrollment? This research question was broken into four sub-questions:

RQ2.1: When students are in 10th grade, how do their ability beliefs and values for school in general influence their postsecondary expectations?

RQ2.2: When students are in 10th grade, how do their ability beliefs and values for school in general influence their goal-directed behaviors?

RQ2.3: When students are in 10th grade, how do their postsecondary expectations predict postsecondary enrollment, and do their goal-directed behaviors mediate the relation between their postsecondary expectations and their actual enrollment?

RQ2.4: How does the final proposed model fit for students in 10th grade? How does the final model depicting motivational processes in 10th grade differ by:

- Gender
- Ethnicity
- SES quartiles

Research Question 3: How do students' school ability beliefs, value for school, postsecondary expectations, and goal-directed behaviors over 10th to 12th grade relate to one another over time and predict students' postsecondary enrollment? This research question was broken into four sub-questions:

RQ3.1: How do students' ability beliefs and values for school when students' are in 10th grade influence their postsecondary expectations in 12th grade?

RQ3.2: How do students' ability beliefs and values for school when students' are in 10th grade influence their goal-directed behaviors in 12th grade?

RQ3.3: How do students' postsecondary expectations when they are in 12th grade predict postsecondary enrollment, and do their goal-directed behaviors mediate the relation between their postsecondary expectations and their actual enrollment?

RQ3.4: How does the final proposed model fit for students longitudinally? How does the final model depicting motivational processes longitudinally differ by:

- Gender
- Ethnicity
- SES quartiles

Definition of Terms

Several important terms are used throughout the current study and will be defined here for ease of interpretation in the following chapters.

Motivational processes. The term "motivational processes" is used in the current study to refer to the beliefs and behaviors that are closely tied to motivation. Motivation is a complex, dynamic, and unobservable construct. Motivational processes in this study include students' self-reported beliefs and behaviors in regard to education and postsecondary enrollment. This term encompasses the complex set of relations between the motivation-related constructs defined below.

School ability beliefs. Ability beliefs can be defined as how much skill or capability students' think they have in a given domain (Wigfield & Eccles, 2000). These ability beliefs are predictive of students' expectations for success (Eccles et al., 1983; Wigfield, 1994; Eccles & Wigfield, 2002) as well as their future course of action (Bandura, 1986; 1991; Lent, 2013). The current study uses the broader label of school ability beliefs to refer to students' endorsement that they can perform well in school if they try to do so.

Value for school. Value in this study is school specific and is defined as endorsing school as an enjoyable, useful endeavor. Broadly, task values are defined as qualities that influence whether or not students see a task as worthwhile (Wigfield & Eccles, 1992). Task-value can be further broken down into sub-components. The importance of performing well on a task or in a given domain is labeled attainment value. Intrinsic value refers to how enjoyable or interesting a particular task or domain may be to an individual. Finally, utility value refers to the usefulness of a particular task or domain (Eccles & Wigfield, 2002).

Postsecondary expectations. Within expectancy-value theory, expectancies are defined as an individual's belief that they will achieve success in a particular domain

(Wigfield & Eccles, 2000). Bohon et al. (2006) similarly define expectations as an individual's perceived likelihood of an achievement, thus both expectancies and expectations are beliefs about how successful one can be in regard to a particular task. To align with the bulk of other studies on postsecondary enrollment these will be referred to as expectations, rather than expectancies, throughout the current study. Postsecondary expectations are defined as the expected level of education an individual plans to complete.

Postsecondary aspirations. Postsecondary aspirations are defined as an individual's desired level of higher education (Bohon et al., 2006; Hanson, 1994; Kao & Tienda, 1998). Aspirations are distinct from expectations in that expectations are more indicative of students' actual plans, whereas aspirations capture students' idealized plans. Aspirations are not measured in the current study, but they will be discussed in Chapter 2 due to the important influence they have on postsecondary enrollment (Cabrera & La Nasa, 2001; Majoribanks, 2003) as well as their inclusion with expectations in much of the research on postsecondary education (e.g. Bohon et al., 2006; Hanson, 1994; Kao & Tienda, 1998; Wood et al., 2011).

Goal-directed behavior. In the current study, goal-directed behavior is defined as seeking relevant information about the college process and completing necessary tasks in order to apply to and enroll in postsecondary education. Within social cognitive theory, Bandura (1986) emphasizes the important role that intentions and goals play in self-directed behavior. Specifically, he notes that behavior is often directed towards future outcomes and a necessary component of attaining a distal goal.

Postsecondary enrollment. Students have several options for postsecondary education. The current study defines postsecondary enrollment as any time spent enrolled in a postsecondary setting of any kind. The current study considers both students who do not enroll in postsecondary education as well as several patterns of postsecondary enrollment: immediate and stable enrollment, delayed enrollment, initial enrollment followed by withdrawal, and delayed enrollment followed by withdrawal.

Contributions

This study contributes to the literature on postsecondary enrollment in several ways. First, this study applied motivation-related theoretical frameworks to examine postsecondary choice. Other theoretical models such as status attainment theory and human capital theory are often applied in the literature on postsecondary enrollment (e.g. Alon et al., 2010; Bryan, Holcomb-McCoy, Moore-Thomas & Day-Vines, 2009; Engeberg & Wolniak, 2010; Farmer-Hilton & Adams, 2006; Hanson, 1994; Kao & Tienda, 1998; Mau & Bikos, 2000; Reddick et al., 2011; Trusty, 2002; Trusty & Harris, 1999; Wolniak & Engeberg, 2010). Status attainment theory and human capital theory focus on the availability of resources when examining students' postsecondary enrollment and do not tend to consider students' individual beliefs and behaviors. Only a few studies have explicitly used motivation-related theories to examine how motivation develops over time in relation to students' postsecondary enrollment patterns. The current study offered a model based on theoretical and empirical motivation research to fill this gap.

The current study also examined changes in students' expectations for postsecondary education in more nuanced ways than previous studies have done. While

change in postsecondary expectations has been studied in some longitudinal research (Hanson, 1994; Mello, 2008; 2009; Trusty & Harris, 1999), there is a lack of understanding of the different patterns of possible changes in expectations. This study begins to fill this gap. Additionally the current study examined predictors of stability or change in expectations as well as how patterns of stability and change differentially predicted postsecondary enrollment patterns.

Finally, the current study examined a more complete motivational process model than has previously existed in the literature by including students' school ability beliefs, value for school, postsecondary expectations, goal-directed behaviors, and postsecondary enrollment patterns all in one model. By doing so, the current study adds to our understanding of the cross-sectional and longitudinal connections between these constructs and gives us a better understanding of how they relate to postsecondary enrollment. This study also contributes to our understanding of how motivational processes differ by students' gender, ethnicity, and SES quartile.

Limitations

Although this study begins to fill an important gap in our understanding of the motivational processes underlying students' postsecondary enrollment decisions, there are several limitations to consider. First, the study used a dataset collected by the National Center for Education Statistics. While this dataset offers a number of strengths, such as a large and nationally representative sample of students, the items included in the survey were not always drawn from pre-existing measures. However, exploratory and confirmatory factor analysis procedures confirmed that the items did form scales

consistent with previous literature. Additionally, item wording was closely examined to ensure that it was consistent with other commonly used motivation scales.

Related to this first limitation, a second limitation of using an existing data source is that there are variables that may be important to the conceptual model proposed in the study that cannot be included because they do not exist in the ELS:2002 dataset. Although the proposed model is grounded in theory and supported by empirical research, there may be other constructs related to the motivational underpinnings of students' postsecondary education pursuits that could not be included. Thus, the research questions were limited by the data that was available in the dataset. Additionally, the first wave of data collection began when students were sophomores in high school. For many students, aspirations to obtain a college education begin to develop well before this time (Bohon et al., 2006; Day, Borkowski, Punzo, & Howsepian, 1994; Yowell, 2002) and it is therefore likely that this model does not fully encompass the entire spectrum of longitudinal processes leading to postsecondary enrollment.

A final limitation of the proposed study is that collection of the data began in 2002, which was more than a decade ago. Given the longitudinal nature of the proposed study it is certainly necessary to have data that at least spans several years. However, given the growth in college enrollments even in the past decade (NCES, 2012b) it is possible that the data for the current study may not completely account for the motivational processes and enrollment trends in the current generation of college-bound students. However, many of the motivational processes explored in this study have been examined in the literature for decades and there is little evidence that the relations between these variables have changed significantly over time. Thus, while there may be

contextual variables that uniquely impact the college enrollment decisions of the current generation of college-bound students, it seems unlikely that many of the underlying processes examined in this study would change significantly.

Conclusion

The current study examined the effects of motivational processes on college enrollment by examining the underlying beliefs and behaviors that are predictive of postsecondary enrollment patterns. Given that a college education has a generally positive impact on a variety of future occupational and economic outcomes, it is important to understand the reasons why students are motivated to pursue postsecondary education. In order to explore both the development of motivations for postsecondary education and the predictive relations between these constructs and post-secondary enrollment, a longitudinal study is necessary. Therefore, this study investigated relations over time between expectations for postsecondary education, students' school ability beliefs and value for school, students' goals-directed behaviors, and their postsecondary enrollment patterns.

Chapter 2: Literature Review

The broad array of factors that impact students' pursuit of postsecondary education are increasingly important to study given that enrollment at postsecondary institutions is at an all-time high (NCES, 2012b) and the trend of increased college enrollment is expected to continue in the near future (Haveman & Smeeding, 2006; Ingels et al., 2012). Initial expectations or aspirations for pursuit of a postsecondary education begin well before students actually enroll in a postsecondary institution, with students as young as eight years old expressing a desire to pursue a college education (Day et al., 1994). These earlier expectations and aspirations in regard to a college education are likely important precursors to students' actual postsecondary enrollment. Although the current study focused on the motivational processes predicting pursuit of postsecondary education, the variables influencing postsecondary enrollment are numerous. This chapter summarizes the relevant research regarding the motivational factors that relate to expected or actual pursuit of postsecondary education and also provides a brief review of additional demographic, academic, and social factors shown to effect expectations and aspirations for postsecondary enrollment as well as actual enrollment.

Examination of the trajectory that students follow from high school to postsecondary education has a long history of research based in the fields of sociology, economics, and higher education; however, psychological research on the beliefs and behaviors underlying the important decision to enroll in postsecondary education is lacking. Due to the complexity of the factors involved in an individuals' decision to enroll, or not enroll, in postsecondary education, the literature reviewed in this chapter

comes from a number of different areas of research. The procedure for obtaining literature relevant to the current study as well as the outline of this review is detailed below.

Overview of the Literature

Students have several options for post-secondary education. The most common options include enrollment in a 2-year or 4-year college. In order to select studies for the current chapter, a liberal definition of postsecondary education was used due to the limited research on the motivational precursors to postsecondary enrollment as well as the interest of the current study in examining different patterns of postsecondary enrollment. Therefore, studies were not limited to a particular type of postsecondary education, and studies examining any type of postsecondary setting were selected. Further, the current study is primarily concerned with beliefs and behaviors prior to postsecondary enrollment, thus studies examining both intended and actual enrollment were included in the current review. While every attempt was made to locate longitudinal, prospective studies, some of the studies included in this chapter are cross-sectional and others are retrospective.

For the current review, both the PsycINFO and ERIC databases were searched. Search terms relating to postsecondary education included “college”, “community college”, “postsecondary”, and “university”. Additionally, to locate studies examining whether younger students reported college enrollment as a possibility for the future the terms “transition to” and “desire for” were placed in front of each of the postsecondary institution possibilities. To locate studies specific to the theoretical perspectives used in the current review the search terms, “goal”, “goal-directed”, “self-regulation”,

“aspiration”, “expectation”, “expectancy”, “value” and “expectancy-value” along with the plural versions of all constructs were used. Finally, reference sections for all articles found through these initial searches were checked to determine whether additional studies related to the variables of interest in the current study could be located (White & Schmidt, 2005). Due to the changes in access to post-secondary education following implementation of financial aid programs in the 1970s (Ehrenberg, 2004), the search was limited to studies published after 1970.

The current chapter is organized into four different sections. The first section introduces the theoretical frameworks that guide the current study. Both expectancy-value theory and social cognitive theory are discussed and the important connections between these two theories are highlighted. This section concludes with a proposed overall model with which to understand the motivational factors impacting pursuit of postsecondary education.

The second section reviews motivational components that have been previously examined in the empirical literature on postsecondary education and offers support for the conceptual model guiding the study. Interestingly, prior research on postsecondary aspirations and enrollment has included constructs of interest to motivation researchers, but these studies have often not been grounded in a theoretical conceptualization of achievement motivation. The motivation-related beliefs and behaviors defined in the first chapter are discussed within the context of the theories and conceptual model guiding the current study.

The third section reviews literature and statistics on the broader trends in college enrollment and the demographic, academic, and other contextual factors shown to

influence these enrollment trends. This section draws from research in the fields of economics, sociology, higher education, and educational psychology. It includes research on demographic trends in college enrollment, school-level and achievement variables shown to impact postsecondary aspirations and enrollment, and finally, research on the influence of parents' aspirations and expectations for their child's education.

The final section points out specific gaps in our current understanding of students' pursuit of postsecondary education. It concludes by outlining how the conceptual model proposed in the first section will address these gaps. Additionally, it details how the conceptual model will guide the current study.

Guiding Theoretical Frameworks

There are multiple theoretical frameworks that attempt to describe the ways in which students can be motivated to achieve academically. Many different theorists discuss the beliefs and behaviors that influence students' academic decisions and choices (e.g. Bandura, 1986; 1991; Eccles et al., 1983; Lent, Brown & Hackett, 1994; Pintrich, 2000; Schunk & Pajares, 2009; Wigfield & Eccles, 2000; Zimmerman, 2000). However, research on how these variables may specifically contribute to students' postsecondary enrollment outcomes is lacking. Aspirations or expectations for obtainment of a college education develop well before students actually apply to or enroll in a postsecondary institution (Bohon et al., 2006; Day et al., 1994; Mello, 2008, 2009; Yowell, 2002). It is therefore important to consider theories that take into account the longitudinal connections between students' beliefs, behaviors, and educational outcomes. Thus, the motivational constructs included in the overall conceptual model were selected due to

their demonstrated importance in predicting future academic outcomes, both theoretically and empirically.

Expectancy-Value Theory

The overall, guiding framework for the current study is the Eccles et al. (1983) expectancy-value model of achievement motivation (Wigfield & Eccles, 2000; Wigfield, Tonks & Klauda, 2009). Expectancy-value theory is a motivational theory that focuses on how individuals' beliefs and values develop and predict academic outcomes and choices. This framework was chosen because of its focus on future outcomes and the wealth of prior research that shows expectations, ability beliefs, and values—three constructs central to the theory—significantly influence students' academic choices (Durik et al., 2006; Eccles et al., 2004; Meece et al., 1990; Musu-Gillette et al., 2013; Nagy et al., 2006; Watt, 2006; Wigfield & Eccles, 2000). Within the expectancy-value framework as discussed by Eccles and colleagues, academic choices are assumed to be predicted by students' ability beliefs and values associated with the domain in which those choices are being made (Eccles & Wigfield, 2002). The larger theory proposes that social and contextual factors also impact an individual's beliefs, and academic choices and outcomes.

The expectancy-value framework considers self-concepts of ability to be important precursors to expectations for success and subjective task value. Self-concepts of ability are defined as students' beliefs that they have the necessary skills to accomplish a certain task within a domain (Wigfield & Eccles, 2000). In many studies, self-concept of ability is also measured by comparative performance, that is, how good at something a student perceives he or she is in comparison to others, or how skilled a student believes

he or she is in one subject as compared to another (Wigfield, 1994). Self-concept of ability is predictive of both task values and expectations for success.

Task values are defined as qualities that influence whether or not students want to complete a task (Wigfield & Eccles, 1992). Task value can be further broken down into the sub-components of attainment value, intrinsic value, utility value and cost (Eccles & Wigfield, 2002). Attainment value refers to the importance of performing well on a task and how central the task is to one's identity. Intrinsic value refers to how enjoyable or interesting a particular task or domain may be to an individual. Finally, utility value refers to the usefulness of a particular task or domain. Task values are generally examined in relation to academic outcomes such as achievement-related choices and performance (Durik et al., 2006; Eccles et al., 2004; Meece et al., 1990; Musu-Gillette et al., 2013; Nagy et al., 2006; Simpkins et al., 2006; Watt, 2006).

Figure 1 shows Eccles' (1983) full expectancy-value model of achievement motivation. The current study will focus on the latter half of the expectancy-value model of achievement motivation. Specifically, the boxes labeled child's goals and general self-schemata, subjective task value, and expectation of success, as these are considered to be the most direct predictors of the achievement-related choice of enrolling in a postsecondary institution. Research based in expectancy-value theory also shows that these variables are the strongest and most proximal predictors of students' achievement-related choices (Bleeker & Jacobs, 2004; Bouchey & Harter, 2005; Eccles et al., 2004; Wigfield & Eccles, 2000).

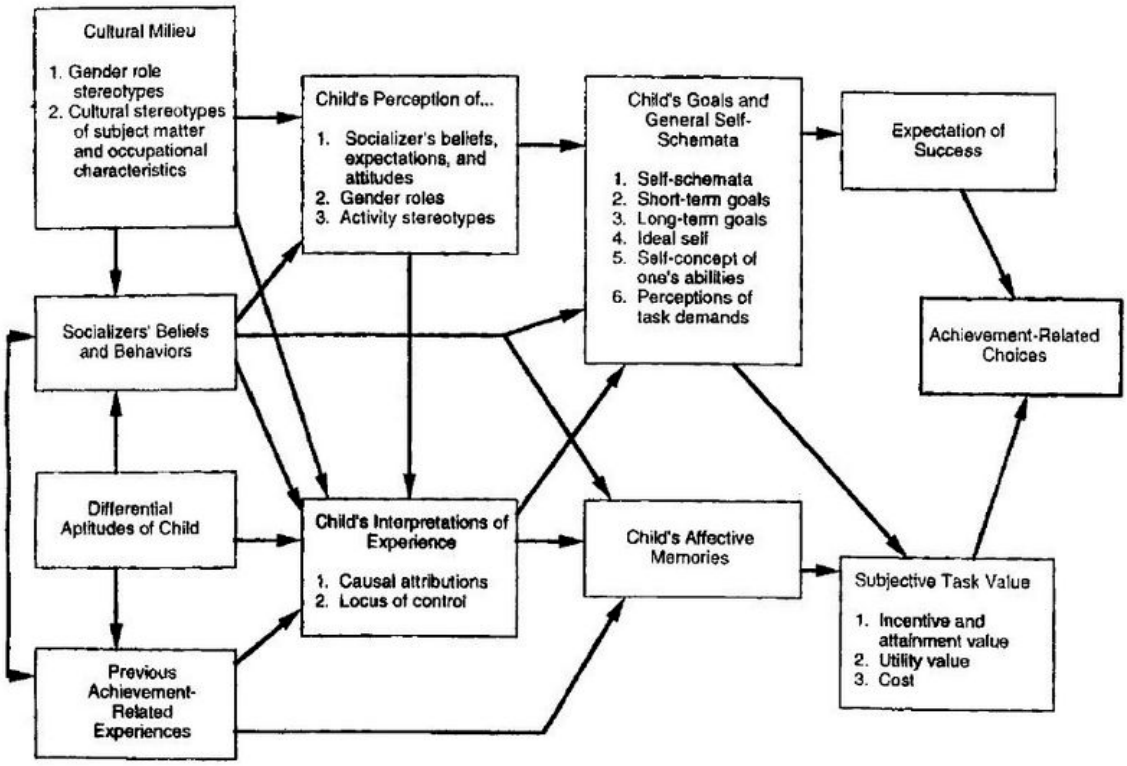


Figure 1. Eccles et al. (1983) Expectancy-Value Model of Achievement Motivation

Qualitative studies with students who have successfully enrolled in postsecondary institutions highlight the salience of students' valuing of and expectations for education in helping them make the decision to enroll (Cavazos et al., 2010; Hines, Merdinger, & Wyatt, 2005; Richardson & Skinner, 1992). For example, Cavazos et al. (2010) provides this quote from Veronica, a first generation Latina college student, "I know that education is a way that I can change the world, be it by helping other students learn, or through developing ideas and helping my community. So that's how I feel. I'm a lifelong student. I love it!" (p. 180). The value placed on education is apparent in this comment. Veronica reports intrinsic value in her love of school and utility and attainment value are evident in her acknowledgement that school is necessary to accomplish her goal to change the world for the better.

Similar quotes emerge in other qualitative studies. Yowell (2000) interviewed Latino 8th grade students about their orientations toward the future. Most students discussed their educational plans. She offers the following quote from a male student, "I know that whatever I'll want to do I have to get through college…[school] is important because it's your record" (p. 265). Again, utility and attainment value are evident in this students' acknowledgement that school is essential for obtaining his career goals. Thus, in students' own words, their value for school is an important component of their desire for postsecondary education.

Expectations for postsecondary education were also evident in the quote above. The young man quoted plans or expects to continue his education. A young female in the same study explained, "Yeah, I'll go to college and I think my life will be good" (p. 265). This quote similarly illustrates her expectation for a college education, as well as the influence she believes a college education will have for her future more broadly. Students' expectations for success are defined as beliefs about how well they will do on a given task or in a given domain (Wigfield et al., 2009). The quotes from these 8th grade students indicate that they expect to be successful in attending college and see the value that school has for them in achieving their future goals. Thus, in the current study, school self-concept of ability, value for school and expectations for postsecondary education attainment are expected to be key components of the motivational processes that predict postsecondary enrollment.

While the beliefs and values of students predict many academic outcomes and choices, the complexity of the college application and enrollment process requires that students also direct certain behaviors towards their expected college enrollment plans in

order to successfully enroll in a postsecondary setting after high school. One theory that can help explicate this important aspect of the college enrollment process is social cognitive theory. The next section offers a brief overview of social cognitive theory and a discussion of the particular components of the theory relevant to the current study.

Social Cognitive Theory

Bandura's (1986) social cognitive theory is built on the view that there is a triadic reciprocality between aspects of the individual person, their behavior, and the environment (see Figure 2). Individuals are driven by internal characteristics, external factors, and the reciprocal interactions that occur between the internal and external (Bandura, 1986). One of the central tenets of social cognitive theory is that behavior is primarily purposeful, and internal self-regulatory systems and processes mediate the relation between external influences and future outcomes (Bandura, 1991).

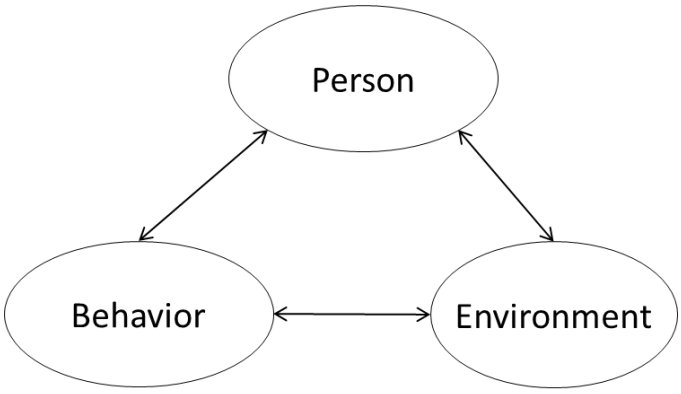


Figure 2. Bandura's 1986 model of reciprocal determinism

Goal-directed behaviors add an important contribution to the expectancy-value framework, especially in regard to postsecondary enrollment. Before applying to college, students must secure information to help guide their application process (Martinez & Cervera, 2012) and take the requisite standardized exams (e.g. SAT/ACT; Klasik, 2012; USDE, 2013). Within a social cognitive framework, educational outcomes are predicted

by both self-efficacy beliefs and self-regulatory behaviors (Bandura, 1991; Pintrich, 2000; Schunk & Pajares, 2009; Zimmerman, 2000). Behavior is a key component of social cognitive theory (Bandura, 1986; 1991) with goal-directed behaviors mediating the relation between expectations and goals for the future and actual obtainment of desired outcomes (Cabrera & La Nasa, 2001; Eccles et al., 2004; Schutz, 1997). Additional theoretical models that attempt to explain how beliefs translate to behavior, such as the theory of reasoned action (Fishbein & Ajzen, 2010), also offer evidence for the importance of behavioral intentions as a mediator between individuals' beliefs and their actual behavior.

Goals and goal-directed behavior. Bandura (1986) explains that goal setting is important to the overall process of motivating behavior towards a future outcome.

> People do things to gain anticipated benefits or to avert future trouble. The anticipation of distal outcomes provides the general direction for choosing activities, and it raises the level of involvement in them…People have to create for themselves proximal guides and self-motivators for courses of action that lead to distal attainments. (p. 336)

Thus, the expectation of a future outcome is integral in shaping an individual's plans for the future, and subsequently, the goal-directed behavior in which an individual engages. An expectation or plan for college attendance can serve as an initial motivator for pursuing necessary sub-goals or strategies that could impact college attendance; for example, going to the school counselor for information about college enrollment, or enrolling in college preparatory courses. These goal-directed activities serve as proximal guides in the pursuit of a more distal goal or expectation.

The qualitative study by Yowell (2000), which offered the quotes from the unnamed male and female students provided earlier in this section, provides evidence for the important role of goal-directed behaviors aimed at the pursuit of future expectations. Yowell found that eighth grade students frequently reported that they intended to pursue higher education; however, the students in her study had limited knowledge about pathways they needed to navigate in order to obtain postsecondary education. These pathways included things such as the college application process, academic requirements, and application requirements. These pathways are akin to goal-directed behaviors in that they are necessary activity-oriented precursors to students' desired outcome of postsecondary enrollment.

Pursuit of a college education will likely be difficult for students who are unable to appropriately direct their behaviors toward postsecondary enrollment. Yowell (2000) concluded that better understanding and "access to opportunities, resources, and experiences within institutional settings" (p. 276) could strengthen the connection between aspirations for postsecondary education and future enrollment. Thus, interviews with participants in the study highlighted the important connection between the desire or expectation to attend college and future postsecondary enrollment mediated by the knowledge of appropriate behaviors necessary to obtain this desired outcome.

Ability Beliefs, Values and Expectations Connections to Goal-Directed Behavior

Both theoretical and empirical connections between goals and ability beliefs, values, and expectations exist in the literature. Social cognitive theorists also acknowledge the important role of some of the constructs central to expectancy-value theory in explaining how individuals select and pursue goals. Bandura and Schunk

(1981) explain how task valuing is likely an important component of eliciting behaviors in that future outcomes that are personally valued will be the outcomes that individuals actively pursue. Bandura (1986) discusses goals as important motivators only insomuch as they provide individuals with particular standards or courses of action for behavior.

> The capacity to represent future consequences in thought provides a necessary condition for one cognitive source of motivation. Through cognitive representation of future outcomes individuals can generate current motivators for courses of action that are instrumental in attaining outcomes they value. (p. 467)

Thus, Bandura highlights that the value attached to the outcome as well as expectations regarding one's ability to attain that outcome are essential to a longitudinal model examining individuals' choices. Individuals' beliefs and behaviors at earlier points in time help them maintain a particular course of action.

Engagement in a particular course of action is also one possible academic choice or outcome of interest in expectancy-value theory. Expectancy-value theory lays out a model that posits that self-concept of ability predicts expectations for success and task values, which in turn relate to achievement outcomes such as academic choices and performance (Eccles & Wigfield, 2002). In a sense, goal-directed behaviors could be considered an intermediate outcome because students must choose to engage in these tasks. That is, engaging in these behaviors is a choice that students' must make, and students' ability beliefs, values, and expectations should then influence these academic choices.

Additionally, there is empirical evidence for the mediating role of high school students' behaviors in the relation between students' ability beliefs, task values,

expectations for success, and postsecondary enrollment. Eccles et al. (2004) found that plans to attend college measured in 6th grade and self-concept of academic ability in 6th grade predicted students' later postsecondary enrollment. However, the relations between educational expectations, self-concept of ability, and college enrollment were partially mediated by high school course selection such that those students who planned to attend college in 6th grade took college-prep courses in high school. High school course taking then also predicted students' choice to enroll in college, thus providing evidence that what students are doing in high school is a key component of an overall model for predicting students' postsecondary enrollment. Therefore, both theory and empirical research indicate that goal-directed behaviors follow from students' postsecondary expectations and school ability beliefs, and goal-directed behaviors directly predict postsecondary enrollment.

While valuing school and beliefs about one's abilities, as well as intending to go to college, are important predictors of postsecondary enrollment, these motivational constructs may not necessarily translate into an individual taking the necessary steps towards actual postsecondary enrollment. As such, goal-directed behaviors, such as seeking information about college and taking necessary standardized assessments, are likely important precursors to the decision to enroll in college. These are central constructs in Bandura's social cognitive theory (Bandura, 1986; 1991) and are empirically related to future achievement choices in social cognitive and related theories (Bandura & Schunk, 1981; Kember, Ho & Hong, 2010; Lent, Sheu, Singley, Schmidt, Schmidt, & Gloster, 2008; Lent, 2013; Schutz, 1997). Thus, the final conceptual model guiding this literature review, as well as the study as a whole, proposes goal-directed

behaviors should factor into a model guided by expectancy-value theory that considers ability beliefs, values, and expectations as predictors of students' academic choices.

Conceptual Model Guiding the Current Study

The full model depicting the constructs to be included in the current study, derived from the empirical and theoretical connections outlined in the previous section, is illustrated in Figure 3.

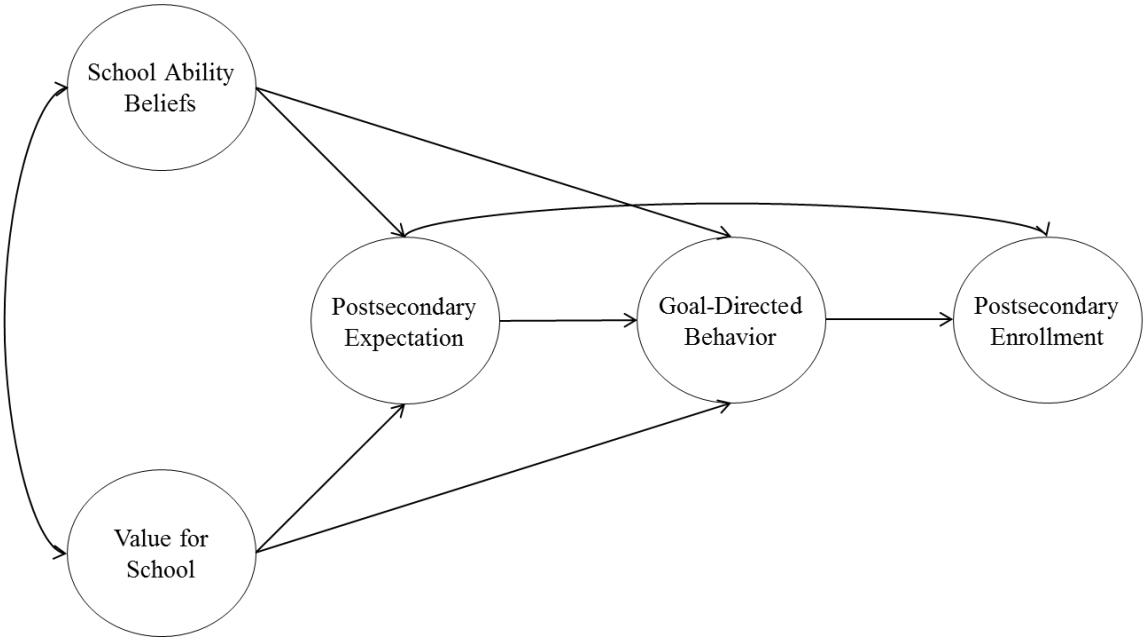


Figure 3. Conceptual model guiding the current study

In the original conceptualization of Eccles et al.'s expectancy-value theory, school ability beliefs are predictive of value for school and postsecondary expectations (Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). However, recent iterations of the model have suggested that self-concept of ability and task values are correlated, especially when measured at the same point in time (Eccles & Wang, 2012). Additionally, school ability beliefs are connected to individuals' goal-directed behaviors. The construct of ability beliefs preceding goal-directed behaviors is consistent with social

cognitive theory, which posits that individuals' judgments of their capabilities affect the effort they put into goal pursuit (Bandura, 1986). Consistent with prior research, school ability beliefs and value for school are expected to be correlated rather than ability beliefs independently predicting students' value for school (Durik et al., 2006; Eccles et al., 2004; Meece et al., 1990; Musu-Gillette et al., 2013; Nagy et al., 2006; Simpkins et al., 2006; Watt, 2006).

Consistent with expectancy-value theory (Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000), value for school is predictive of students' postsecondary expectations. Consistent with social cognitive theory, value is also predictive of students' goal-directed behaviors, as individuals are more likely to engage in tasks that are valued (Bandura, 1986). Expectations are shown to have a direct predictive relation with postsecondary enrollment, also consistent with theory and research outlined above, as well as a possible indirect relation through goal-directed behaviors.

The mediating role of goal-directed behaviors in the relation between postsecondary expectations and postsecondary enrollment is consistent with social cognitive theory; in particular, the emphasis of social cognitive theory on the necessity of directing behaviors toward a desired outcome (Bandura, 1986). Empirically, Cabrera and La Nasa (2001) used data from NELS:88[1] and found that high school students' predisposition or expectation to attend college leads to students' search for general information about college, and this in turn leads to the eventual choice to enroll in college. Thus, there is empirical support for the possible mediating role of goal-directed behaviors in the relations between postsecondary expectations and actual college

[1] NELS:88 is a large-scale longitudinal dataset collected by the National Center for Education Statistics. Data collection began in 1988 when students were in 8th grade, and respondents were resurveyed in 1990, 1992, 1994 and 2000

enrollment. All possible pathways illustrated in the proposed conceptual model will be discussed throughout the remainder of this literature review. Chapter 3 will revisit the conceptual models to discuss the strategies for empirical testing of the proposed pathways.

Theoretical alignment of the proposed model. It is important to note that although the current study limited the theoretical models to expectancy-value theory and social cognitive theory, the proposed model aligns well with several other theories interested in future-oriented motivation, and educational and occupations choices. Husman and Lens (1999) discussed the role of the future in students' academic motivation by integrating future time perspective into a number of motivational theories, including achievement goal theory and expectancy-value theory. Future time perspective has been empirically connected to college students academic performance (Malka & Covington, 2005), and college students' self-efficacy in regard to their ability to make decisions about their future career pursuits (Walker & Tracey, 2012). However, no work investigating future time perspective has examined postsecondary aspirations or attainment. Thus, future time perspective was not included in the current proposed model. However, the conceptual model guiding this study does align with the central tenets of future time perspective; specifically, it aligns with the assertion that individuals' anticipation of future outcomes allows them to engage in particular behaviors aimed at achieving their future goals, especially in domains that are personally valued (Husman & Lens, 1999).

Miller and Brickman (2004) also offer a model of future-oriented motivation that integrates components of self-regulation. Their model incorporates many of the

constructs included in the current review, including goal-directed behaviors, expectations, ability beliefs, and values. However, Miller and Brickman's model does not have a clear representation of how these constructs relate to future academic choices and does not include research examining students' postsecondary enrollment as an outcome. The conceptual model proposed in the current study does align with Miller and Brickman's ordering of constructs in which ability beliefs and values precede goal-directed behaviors.

As mentioned previously, the theory of reasoned action (Fishbein & Ajzen, 2010) also discusses several of the constructs central to the conceptual model for the current study. Although all of the constructs included the theory of reasoned action are not included in the model for the current study, most notably individuals' control beliefs and degree of actual control, the theory posits that behavioral intentions (i.e., expectation to attend postsecondary education) mediate the relation between beliefs and actual behaviors (i.e., enrollment). This theory has been applied occasionally in educational contexts (Ajzen, 2012), but has never been used to examine students' postsecondary enrollment beliefs, behaviors, and outcomes.

Social cognitive career theory (Lent, 2013; Lent, Brown & Hackett, 1994; 2000) is another important theory that includes constructs similar to those in the proposed conceptual model for the current study. The outcome of interest in studies applying social cognitive career theory is generally occupational choice, and it is therefore not the most appropriate overarching theory to use for the current study. However, several studies examining students' postsecondary choices have examined their occupational choices in the same study and have found that social cognitive career theory can be applied to understand some of the longitudinal connections between students'

postsecondary expectations and ultimate career goals (Gonzalez et al., 2012; Mau & Bikos, 2000; Mello, 2008; 2009). Longitudinal studies using social cognitive career theory offer additional evidence for the ordering of some of the constructs in the proposed model for the current study. Lent et al. (2010) found that ability beliefs, represented in their model with a self-efficacy scale, predicted both outcome expectations and persistence goals. Lent et al. (2008) reported that interest, an important component of task value, also predicted students' persistence goals.

Status attainment theory and human capital theory were commonly cited in studies examining postsecondary expectations and enrollment (e.g. Alon et al., 2010; Bryan et al., 2009; Engeberg & Wolniak, 2010; Farmer-Hilton & Adams, 2006; Hanson, 1994; Kao & Tienda, 1998; Mau & Bikos, 2000; Reddick et al., 2011; Trusty, 2002; Trusty & Harris, 1999; Wolniak & Engeberg, 2010). Human capital theory primarily focuses on the resources available to students in their environment that can help them to succeed (Coleman, 1988). Most commonly in the literature on postsecondary access, these resources include academic support from schools and families (Cabrera & La Nasa, 2001; Engenberg & Wolniak, 2010; Wolniak & Engeberg, 2010). Status attainment theory primarily focuses on social class mobility and whether or not financial and educational resources can help individuals be more upwardly mobile (Campbell, 1983). Thus, studies framed with status attainment theory are primarily interested in examining how demographic factors such as race/ethnicity and SES influence postsecondary expectations and outcomes (Hanson, 1994; Kao & Tienda, 1998; Trusty & Harris, 1999).

Both human capital theory and status attainment theory do not tend to consider variables such as students' own ability beliefs, values, goals, and behaviors. Instead, the

focus in studies applying these frameworks was on the availability of resources. While these theories are not appropriate for the approach used in the current study because they do not account for individuals' beliefs and behaviors, many of the covariates selected for inclusion come directly from studies applying these theoretical frameworks. More information will therefore be provided in the third section of this chapter when studies that examine the relations between demographic, academic, and social variables and postsecondary enrollment are discussed in greater depth.

A final model worth considering, although surprisingly not used to frame any of the empirical studies included in the current review, is Perna's nested process model of college choice (Perna, 2010). Perna's model considers the college choice process to be nested within several layers, the broadest of which is the social, economic, and policy context. The next layer is the higher education context, then the school and community context, and finally, the individual and family context is the most proximal context influencing students' college enrollment choices. The conceptual model framing the current study is especially concerned with students' individual beliefs and behaviors and thus primarily addresses the first layer of Perna's model. However, consistent with Perna's emphasis on context, other contextual factors are considered, such as parents' educational aspirations and the academic rigor of the courses in which students are enrolled in their school.

Motivational Beliefs and Behaviors Influencing Postsecondary Enrollment

The previous section presented a conceptual model based both in theory and empirical research. The next section presents research on the individual constructs included in the proposed model. Very few studies have attempted to connect multiple

constructs related to motivation or goal-directed behavior to postsecondary outcomes; therefore, this section explores these constructs one by one. Where appropriate, connections between the constructs are reviewed and highlighted.

Ability Beliefs

There is very little research on how students' general ability beliefs in regard to school and learning are predictive of their educational expectations, goal-directed behaviors, or enrollment in postsecondary education. The label of school ability beliefs is used in the current study as a way to encompass the different theoretical approaches to conceptualizing students' perceptions of their ability. School ability beliefs can be considered a more general label for many of the theory-specific constructs in the motivation literature (Wigfield & Eccles, 2000) such as self-concept of ability or self-efficacy.

Self-concept of ability is defined as an individuals' perception of his or her competence on a given task or in a given domain by expectancy-value theory (Wigfield & Eccles, 2000). In social cognitive theory, "self-efficacy is defined as people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (Bandura, 1986, p. 391). The common thread in both these definitions is students' own beliefs about how adept they are in a particular domain or at performing a particular task. Additionally, although somewhat conceptually distinct, measures of self-efficacy and ability beliefs are often not empirically distinct (Bong & Clark, 1999; Bong & Skaalvik, 2003; Skaalvik & Skaalvik, 2002), a topic which is further explored when discussing validity of the measures in Chapter 3. The studies

outlined in this section include several different labels for students' beliefs about their abilities.

Fuertes and Sedlacek (1994) found that students' ability beliefs were related to their college retention and GPA controlling for students' high school GPA in a sample of 431 students entering their first year of college. However, the researchers only examined incoming freshman and therefore limited their sample to those students already enrolled in college. Using samples of students from the many different countries present in the PISA survey[2], Nagengast and Marsh (2012) found that students' academic self-concept of ability in science predicted their aspirations for science-related careers. Additionally, they found that students' high ability self-concept in science was a protective factor in maintaining high aspirations for a science career when the average achievement of the school was low, thus indicating that self-concept of ability and aspirations may be especially important in schools that are less academically focused.

Watt et al. (2012) examined the influence of ability beliefs and values on educational and career aspirations cross-culturally in samples from the U.S., Canada and Australia. Participants in the study were in 9th grade with sample sizes of approximately 400 students per country. The researchers examined how students' ability beliefs in math and value for math differentially impacted educational aspirations and math-related career choices for male and female students and students in the different countries included in the sample. For the U.S. students, the researchers found that ability beliefs were the only significant predictor of educational aspirations. However, it is important to

[2] PISA is an international survey collected every three years. Assessments on a given subject (e.g. math, science) are administered to 15-year-old students, along with some questions addressing their academic beliefs and behaviors.

note that all of the included constructs from the expectancy-value framework were domain specific to mathematics, whereas the educational aspirations were general.

In one of the few studies that examined whether earlier ability beliefs predicted college enrollment, Eccles et al. (2004) examined the longitudinal connection between students' expectations to attend college, self-concept of academic ability, and their ultimate decision of whether or not to attend college. A sample of 528 participants provided information in 6th grade on their math and English academic self-concept of ability, math and English academic task value, their future educational plans, and their GPA. When in 10th grade, participants reported on their course enrollment. At the final wave, participants were asked about their college attendance. College enrollment was limited to those participants that were enrolled full time in college at the follow-up wave. Students' self-concept of academic ability as measured in 6th grade predicted students' actual enrollment in college, as did students' expectations for college attendance. This study offers evidence that both ability beliefs and educational expectations uniquely contribute to students' postsecondary enrollment, although these relations were partially mediated by students' course-taking choices and behaviors. Additionally, findings from this study point to the importance of considering students' beliefs and expectations at earlier points in time as well as considering how these constructs influence one another over time.

It is quite surprising that more studies that addressed the link between students' ability beliefs and post-secondary enrollment were not found given the large body of research that examines the relation between ability beliefs and other academic outcomes (Durik et al., 2006; Meece et al., 1990; Musu-Gillette et al., 2013; Nagy et al., 2006;

Simpkins et al., 2006; Watt, 2006). Additionally, the studies that were reviewed in this section used domain-specific measures of ability beliefs. While this is common in the literature, it seems plausible that an academic decision such as college enrollment would be predicted by beliefs about one's ability in school in a broader sense.

Academic Task Values

Evidence for the important influence of task values is provided in a study by Domina et al. (2011) that examined the connection between educational expectations, values and academic engagement. Using a large-scale dataset representative of 9th and 10th grade students in California the researchers found that students who expected to attend a four-year college reported higher utility values for math. That is, those students who indicated they planned to attend college also reported that their high school math coursework would be more useful in the future compared to their peers who did not plan to attend college. This different pattern of endorsements of the utility of math courses remained even after controlling for prior educational expectations and reports of math utility. This study provides evidence that students' utility value for school is closely tied to their postsecondary expectations.

Students' continued intrinsic value for careers that require higher education appears to be one of the strongest factors in students sustaining their postsecondary aspirations over time (Packard & Nguyen, 2003). Similarly, in a small sample of students followed from birth to age 26, Gottfried et al. (2013) found initial levels of intrinsic motivation predicted educational attainment. The relation between intrinsic motivation and educational attainment was mediated by course-taking behaviors, such as enrolling in advanced courses and taking a greater number math courses in high school.

Thus, students' behaviors in high school follow from earlier interest in school, and these behaviors are what then predict educational attainment. Although somewhat conceptually distinct, the authors' view of intrinsic motivation overlaps with the definitions of intrinsic value presented earlier in that both constructs focus on students' enjoyment of learning (Gottfried, Fleming & Gottfried, 2001).

In another that looked explicitly at students' utility value for education, Wood et al. (2001) surveyed a sample of 424 African American students when they were in 11th grade and again two years later. The researchers found that the students' reported utility value predicted on-time progress in postsecondary enrollment, measured by completion of a full year of college at the follow-up two years later, but only for boys. Additionally, students' educational expectations were predictive of completion of a year of college for both genders.

The connections between students' valuing of school and college enrollment is also apparent in more subtle ways in some qualitative studies with students. Richardson and Skinner (1992) interviewed 107 first generation college students and found that many students spoke about the connection between earning a college degree and attaining a good job, thus highlighting that for them, postsecondary education related to even other long-term possibilities. Students from the foster care system who enrolled in college after high school also spoke about the value school had for their future goals in retrospective interviews (Hines et al., 2005). The 14 participants in Hines' study reported they valued the role education could play in helping them realize their career goals. The connection of expectations and values has also emerged in more qualitative explorations of students' educational possible selves. Pizzolatto (2006) interviewed 28 currently

enrolled college students who were asked to reflect on their precollege experiences. Students highlighted the value they placed on a college education as a motivator for deciding to pursue postsecondary education.

The studies detailed in this section provide clear evidence that ability beliefs and task valuing impact individuals' aspirations or expectations for postsecondary education (Domina et al., 2011) as well as their actual enrollment (Eccles et al., 2004; Wood et al., 2011). Overall, these studies provide justification for the proposed motivational process model presented earlier in this chapter. Additionally, they offer evidence that students' value for school differentially influences postsecondary enrollment expectations and outcomes for male and female students (Wood et al., 2011). However, with the exception of the Wood's study, most of the research cited in this section did not examine differences by gender, race/ethnicity, or SES.

Additionally, the specific task value subscales included in these studies differed, with some focused more on intrinsic value (Gottfried et al., 2013; Packard & Nguyen, 2003) and others focused more on utility value (Domina et al., 2011; Wood et al., 2011). Interestingly, what emerged in the qualitative research is that students' may be bringing together these different components of task value when considering the value of postsecondary education. That is, when students' discuss the value that a college education has for their future they often mention their interest in school in general as well as the usefulness and importance of a college education for achieving a variety of life and career goals. Thus, a broader construct of value for school that encompasses both students' enjoyment and perceived utility of school may be an especially important predictor of postsecondary expectations and enrollment.

Aspirations, Expectations, and Future Possibilities

The most research on motivation-related constructs has been conducted on students postsecondary plans for the future, whether they be students' expected levels of educational attainment, or their aspired to levels of educational attainment. Because the conceptual and empirical distinction between these two constructs has sometimes been blurred (Bohon et al., 2006), research on possibilities for the future more generally are discussed here whether they are referred to as expectations, expectancies, aspirations, or even possible selves. Academic or educational possibilities for the future tend to be the most common goals or desires elicited in open-ended or qualitative studies with middle and high school students about desired future outcomes (Kerpelman et al., 2002; Oyserman et al., 2002; Oyserman, Bybee, Terry, & Hart-Johnson, 2004; Yowell, 2000; 2002). It is therefore perhaps not surprising that postsecondary aspirations and expectations are the most commonly explored motivational constructs in the literature examining students' postsecondary enrollment (Reynolds & Burge, 2008; Wells et al., 2011).

Aspirations and expectations for postsecondary education were measured in a number of the studies examining pursuit of postsecondary education, and they can be linked to the theoretical models undergirding this study. Aspirations are defined as desired achievements, whereas expectations are defined as the actual perceived likelihood of an achievement (Bohon et al., 2006); expectations of success are of course a critical variable in expectancy-value theory. Surprisingly, many of the studies that have included both educational aspirations and expectations do not report the correlation between the

two, but Wood et al. (2011) found they were highly correlated (r = .73). Additionally, when included in the same model, only youths' educational expectations predicted enrollment, perhaps because expectations were somewhat more realistic than students' aspirations, even though expectations and aspirations were correlated.

When asked in open-ended interviews about what is important to them in the future many middle school students report that they hope to do well in school (Day et al., 1994; Oyserman, Bybee & Terry, 2006) and additionally focus on the importance of obtaining a college education (Yowell, 2000). Yowell interviewed 38 Latino students' in the eighth grade about their future educational goals and aspirations and coded whether responses applied to goals or aspirations for middle school, high school, or college. Postsecondary goals and aspirations were reported at a much higher frequency than educational goals for middle or high school indicating that postsecondary expectations appear to be most salient for many students.

Aspirations. As noted above, aspirations are students' most desired levels of education. In a study cited earlier, Cabrera and La Nasa (2001) used NELS:88 data and found that those students who aspired to earn a four-year degree were 28% more likely to apply to a postsecondary institution than those students' who did not aspire to attend postsecondary education. These researchers further found that if students aspired to earn a post baccalaureate degree they were 34% more likely to apply to college than those that did not aspire to postsecondary education.

In a study that specifically focused on the domain of science, Nagengast and Marsh (2012) found that high school students' academic self-concept of ability in science mediated the relation between science achievement and aspirations for science-related

careers cross-culturally for students in the PISA study. In the Watt et al. (2012) study cited earlier, an additional finding of interest that emerged is that female adolescents reported higher educational aspirations than males; this aspect of the study is discussed more in depth in the third section of this chapter. While these studies cited above only examined aspirations broadly, Mickelson (1990) looked at different types of student aspirations in a sample of 1,193 high school seniors in the U.S. She concluded that the level of specificity of aspirations can impact academic achievement. That is, more specific aspirations, such as obtaining a certain degree, are better predictors of high school GPA than more general aspirations, such as just desiring to go to college.

It is important to note that none of these studies examine actual postsecondary enrollment. Cabrera and La Nasa did not report whether application to postsecondary education resulted in enrollment for these students and the other studies only explained either predictors of aspirations or differences in students' aspirations. Additionally, Watt et al.'s (2012) study was the only one that examined gender differences and Mickelson (1990) was the only one that explicitly examined racial differences, and it limited the minority sample to only African American students. Cabrera and LaNasa's (2001) study limited its scope to low income students and therefore did not consider differences in aspirations by SES.

Expectations. Using the nationally representative NELS:88 longitudinal dataset, Mello (2008; 2009) found that educational expectations at age 14 positively predicted educational attainment at age 26, and educational expectations had a similar contribution to educational attainment as achievement did. Additionally, this finding emerged for both genders (Mello, 2008) and across racial and ethnic groups (Mello, 2009).

Educational expectations also predicted on-time progress in postsecondary enrollment in a study examining African American youth who enrolled in college after high school (Wood et al., 2001). While Wood et al.'s study also included utility value as a predictor of postsecondary enrollment, Mello's studies did not consider additional variables measuring students' beliefs.

Early expectations to attend college are important predictors of enrollment. In addition to the relation between students' ability beliefs and college attendance discussed earlier in this chapter, Eccles et al. (2004) found that students' expected college attendance as measured in 6th grade predicted actual enrollment in college. However, this relation between expectations and enrollment was partially mediated by high school course selection such that those students who planned to attend college in 6th grade took college-prep courses in high school and high school course taking then predicted students' choice to enroll in college. This study adds additional evidence of the importance of goal-directed behavior. Goal-directed behavior, such as choosing to take and performing well in college-prep courses, mediated the relation between expectations for postsecondary education and actual college attendance.

Changes in aspirations and expectations. There are a small number of studies that have examined changes in students' aspirations and expectations, but these studies have been influential in the understanding of how motivation for postsecondary education develops over time. Mello (2008) looked at overall trends in students' educational expectations from the ages of 12-26 using NELS:88. She found a cubic trend in change of educational expectations such that expectations decreased from 12-18, increased from 18-20, and decreased again from 20-26. However, Mello did not do much exploration

into whether these patterns differentially predicted postsecondary enrollment, although she did find that the patterns differed slightly by gender in that females had initially higher expectations than males, but females expectations showed a sharper decline compared to male expectations after age 20.

Also using NELS:88 data, Kao and Tienda (1998) found a drop in students' aspirations between 8th and 10th grade but reported there was a slight rise between 10th and 12th grade. Although aspirations declined in the sample as a whole, the decline in aspirations was the most dramatic for African American males. Aside from these racial differences, SES was the strongest predictor of students maintaining their aspirations with higher SES students more likely to maintain high aspirations over time. Additionally, the researchers found that maintenance of high aspirations was a benefit in that aspiring to higher amounts of education earlier related to maintenance of relatively high aspirations later.

While Mello (2008; 2009) only considered students' expectations and Kao and Tienda (1998) only considered students aspirations, Hanson (1994) examined the ties between aspirations and expectations, particularly as they related to lost talent. That is, Hanson specifically selected high achieving students and examined whether students with initially high aspirations had matching expectations. Youth who had educational expectations that were not aligned with their aspirations were more likely to reduce their educational expectations over time.

Packard and Nguyen (2003) completed longitudinal interviews with 41 high school girls who had expressed initial interest in pursuing math and science related postsecondary pathways. The girls were interviewed within two years of their graduation

from high school to determine what factors contributed to the stability or change in their desired level and domain of education. The participants that maintained their postsecondary goals from high school into college reported involvement in other programs and internships related to their college plans and their future career interest. Thus, goal-directed behaviors may be an important predictor of students' maintenance of high postsecondary expectations over time. The next section explores research on behaviors shown to be important for students' pursuit of postsecondary education.

Overall, there is evidence that ability beliefs, values, and educational expectations in regard to postsecondary education are both related to one another (Domina et al., 2011; Watt et al., 2012) and predictive of postsecondary enrollment (Eccles et al., 2004; Mello, 2008; 2009; Wood et al., 2011). While there is some evidence of differences across gender (Mello, 2008; Watt et al., 2012; Wood et al., 2011), race/ethnicity (Kao & Tienda, 1998; Mello, 2009; Mickelson, 1990), and SES (Kao & Tienda, 1998), there are very few studies that consider how underlying processes may differ for individuals in these different groups. In the broader motivation literature, several studies have found that the trajectory of motivational changes differs across students (Archambault, Eccles, & Vida, 2010; Gottfried, Marcoulides, Gottfried, Oliver, & Guerin, 2007; Marcoulides, Gottfried, Gottfried, & Oliver, 2008). It is therefore important to look at whether motivational processes and changes in educational expectations differ across individuals of different genders, racial and ethnic groups, and SES. Additionally, several studies have pointed to the important role that students' behaviors play in their successful enrollment in postsecondary education. The next section reviews this literature more in depth.

Goal-Directed Behaviors towards Postsecondary Education

Surprisingly little research has focused on how students' goal-directed behaviors, such as seeking out college information or preparing to take and taking standardized assessments, may relate to their pursuit of postsecondary education (Klasik, 2012). Very few empirical studies have connected students' strategy use to their postsecondary outcomes and no empirical research could be located that specifically examined whether goal-directed behaviors or strategies mediated the relation between postsecondary expectations and enrollment. However, several more qualitative studies have examined the important role that goal-directed behaviors may play in helping students translate their educational expectations into actual enrollment. Therefore, both the qualitative and quantitative research is presented in this section.

A number of qualitative studies have examined how strategies impact the attainment of future desired outcomes. Kerpelman et al. (2002) interviewed female African American adolescents aged 14-17 about their desired future outcomes as well as their expected future outcomes. Specifically, the researchers first asked participants to respond to the question: "Who do you expect to become during the next 5 years?" (p. 292) and afterwards participants were asked to indicate 3 future outcomes from the ones generated that participants most expected to obtain in the next 5 years. The majority of the desired future possibilities the participants generated focused broadly on college education and employment. Participants were then asked what they were doing or planning to do to pursue these desired possible future outcomes. The strategies listed by participants primarily focused on getting good grades, being motivated and focused, figuring out the logistics of applying to college and financial aid, and maintaining

connections with peers and family (Kerpelman et al., 2002). However, participants were not followed longitudinally to see if these strategies predicted actual outcomes.

In a mixed methods study that built on findings from her 2000 qualitative study, Yowell (2002) examined the hoped for future selves in a primarily Mexican American sample of 415 students in 9th grade and also examined how these hoped for and feared selves predicted risk of high school drop-out. Risk of high school drop-out was calculated using students' school absences, grade point average, number of suspensions and the students' age as an indicator of whether they had previously been held back. Yowell found that students' aspired to earn higher levels of education than they actually expected to earn. Somewhat surprisingly, neither aspired to nor expected education was a significant predictor of the calculated drop-out risk score.

In follow-up qualitative interviews with a subsample of participants, Yowell found that the specificity of students' future educational plans, as well as beliefs about one's ability to pursue those plans, were integral to the process through which future expectations influenced academic outcomes. Those students who hoped to attend college discussed specific strategies for achieving this hoped-for self, including working hard in school. However, it was also clear that while students were able to list strategies like working hard in school, they still lacked a clear understanding of how to find information about college as well as what the requirements of applying to college might be.

Abi-Nader (1990) interviewed Hispanic high school students involved in a school-based program designed to increase college enrollment. The program encouraged students to focus on the future, specifically, getting good jobs and going to college. In the interviews, students routinely identified the future-oriented direction of the program

as most helpful in allowing them to think through their future educational and occupational options. Additionally, students explained that through their involvement in the program they were able to see the future as something that they could shape and control. While not explicitly designed to do so, this program gave students strategies for working towards their future selves by showing them pathways into college and giving them the logistical information necessary to pursue this future self. However, other motivation-related variables, such as ability beliefs and values, were not measured or reported.

In one qualitative study examining this connection Kember et al. (2010) interviewed current college students from three different universities in Hong Kong and asked about their initial motivations for pursuing education. One of the components that emerged in their grounded theory approach to understanding motivation to pursue a university education was students' use of goal-directed behaviors such as finding out the requirements for college entry and working to ensure they completed those requirements. The researchers found that in terms of initial motivation, expectations for university attendance led to students' directing behavior toward success in college in order to meet their expectations. Thus, future possibilities guided more proximal behaviors that related to eventual attainment of students' desired outcome.

Unfortunately, not all students are able to translate their aspirations, expectations, and possible selves into actual behaviors aimed at obtaining their desired outcomes. Pizzolatto (2006) interviewed twenty-eight students already in college who were at risk of not completing their education due to poor performance. She found that these students did not have enough information about what they needed to do to be successful in

college. That is, they were unable to translate their desire for obtaining postsecondary education into viable strategies for obtaining that goal. In particular, they lacked access to individuals that could help them understand what was necessary for successful completion of their degree. Access to information was an important theme that emerged in a study by Richardson and Sinner (1992) as well. They interviewed 107 ethnically diverse undergraduates, and found that preparation was the most often cited reason for achievement in college; this included preparation in terms of content as well as information about college.

Further, Day et al. (1994) showed that increasing students' awareness of the links between schooling and hoped for jobs may be beneficial for actual completion of steps necessary to obtain their desired future outcomes. Participants in an intervention group in which researchers worked with students to create lists of strategies to acquire their desired educational and occupational goals reported that they thought more about how to achieve these outcomes than students in the control group. This study suggests that increasing students' awareness of the links between schooling and hoped for jobs may be beneficial. However, just having a future possibility in mind may not be enough to motivate pursuit of that possibility if students do not have sufficient knowledge of the necessary steps for obtainment. It is important to note that neither the Pizzolatto (2006) nor Day et al. (1994) studies examined students' actual behaviors in regard to pursuing desired future possibilities. Further, most of these studies reviewed in this section did not follow individuals over time to see whether the relation between beliefs, expectations and actual behaviors do in fact predict postsecondary enrollment.

Schutz (1997) surveyed 480 high school students to examine whether distal and proximal education goals predicted their grade point average. Participants were asked to rate the importance of obtaining different degrees ranging from a high school degree to a Doctorate in order to asses long-term, or distal, educational goals. Proximal goal-directed behaviors were evaluated using questions that assessed student's attempt at day-to-day school success such as coming to class prepared and doing assigned readings. Schutz (1997) also measured confidence related to college work and attendance, which assessed whether students felt they had the ability to do college work and is therefore similar to both school ability beliefs and postsecondary expectations in the current study. Results showed that educational goals, as well as confidence related to college work, positively predicted GPA for the current academic year. This study indicates that a distal goal of college attendance, akin to a postsecondary expectation, influences more proximal goal-directed behaviors.

Information-seeking behaviors. Access to information about college is a key component of students' eventual college enrollment (Cabrera & La Nasa, 2001). Leslie, Johnson, and Carson (1977) found that the variety of sources of college information that students have access to in high school influences their college enrollment. That is, students' who are able to access multiple sources of information, such as school counselors, family members, and college publications, are more likely to enroll in college. Cabrera and La Nasa (2001) similarly found that high school students approach a variety of different sources of information when seeking information about college applications and enrollment, although the researchers did not examine how these patterns of information seeking actually predicted enrollment. They did, however, find that

students' who received help with application material were 11% more likely to apply to a four-year college.

Students from schools in low income areas report that they often feel alone or unaided in their pursuit of postsecondary education (Bloom, 2007). Bloom's ethnographic study found that students' reported they often lacked the necessary information and role models from which to seek this information. This is important because students' who talk with counselors, parents, peers, or teachers about college are more likely to apply and enroll (Bryan, 2005; Cheng & Starks, 2002; Farmer-Hinton & Adams, 2006; Merdinger et al., 2005; Plank & Jordan, 2001; Reddick et al., 2011). Bloom also brings up the necessity of students' motivation in the college-going process. A quote from Laura illustrates this point, "The hardest thing about the application process wasn't the essays or the applications, but the motivation" (Bloom, 2007, p. 360). Thus, both motivation and the ability to seek information from appropriate resources are important in an overall process of gathering information, applying to, and enrolling in postsecondary education.

Test-taking behaviors. Despite the fact that almost every college in the U.S. requires students to take the SAT or ACT there is surprisingly little research on how planning to take or taking these exams influences postsecondary enrollment. Horn (1997) found that although 65.8% of 10th graders in NELS:88 aspired to earn a postsecondary degree, only 52.4% of those had taken the SAT or ACT by their senior year of high school. Klasik (2012) examined responses in the ELS:2002 study and found that 90% of students who expected to earn a bachelor's degree reported they had taken or were planning to take the SAT or ACT by their senior year. Additionally, students'

reports of having taken or planning to take the SAT or ACT by their senior year was a significant predictor of college enrollment.

In examining how state- and school-level policies can influence postsecondary enrollment patterns, Klasik (2013) found that states that changed their policies to require students to take the SAT their junior year of high school saw increased rates of college application and enrollment the following year. No study could be located that examined the role of both the PSAT/PACT as well as the SAT/ACT on college enrollment. In most states, students must decide to take these tests by signing up for exam dates and times. Additionally, it seems important to consider the level of preparation that students have in regard to these exams by looking at both the PSAT/PACT and the SAT/ACT.

Overall, students' must engage in certain behaviors in order to enroll in a postsecondary institution. These behaviors include finding information about the application and enrollment process and taking the necessary standardized assessments. Studies have shown these behaviors are necessary steps to college enrollment (Cabrera & La Nasa, 2001; Klasik, 2012; Leslie et al., 1997). However, research on how these behaviors connect to students' beliefs about school and expectations for postsecondary education is lacking.

Additional Predictors of College Aspirations and Enrollment

Although the constructs representative of students' motivation for postsecondary education are important predictors of postsecondary enrollment on their own, pursuit of postsecondary education is also strongly influenced by economic (Bloom, 2007; Long, 2007; Merdinger et al., 2005), academic (Cabrera & La Nasa, 2001; Deil-Amen & Turley, 2007; Wolniak & Engeberg, 2010), and social (Chang et al., 2010; Cheng &

Starks, 2002; Pizzolatto, 2006; Wells et al., 2011) factors. Therefore, it is necessary to establish the broader context in which students' motivational processes related to college choice may be operating. This section reviews literature on the demographic differences in both the motivational and behavioral variables reviewed in the previous section as well as differences in actual enrollment in a postsecondary institution.

Socioeconomic Status

Disparities exist in the demographic profiles of students who manage to successfully enroll in postsecondary education. Students who enroll in college directly after high school graduation are more likely to be female, White or Asian, and from a middle or upper class income bracket (NCES, 2012a). Socioeconomic factors are perhaps the most cited factor impacting whether or not students enroll in postsecondary education. However, despite possible economic roadblocks, many students classified as having a low socioeconomic status do manage to enroll in college, and even manage to do so immediately following high school graduation. The immediate college enrollment rate of high school graduates from low SES families was 55% in 2009. This is certainly less than the immediate enrollment rate of students from high SES families (84%), but there are a lot of students who enroll in postsecondary education institutions despite financial difficulties (NCES, 2012b).

While economic factors are indeed important, they cannot completely account for a student's decision to attend college. As discussed in Chapter 1, Baker and Vèlez (1996) found that academic performance appeared to be a stronger predictor of students' postsecondary enrollment as compared to demographics. Additionally, considering 55% of low income students choose to go to college it is clear that socioeconomic status and

financial aid cannot be the only factors influencing college enrollment. As reviewed earlier in this chapter, motivational processes are one important factor to consider and these motivation-related variables that have been examined less often in literature considering enrollment differences by socioeconomic status (Long, 2007). However, because there are still differences in enrollment by different levels of a students' socioeconomic status, it is important to examine whether motivational processes differ for students' of differing SES.

Studies have shown that, especially for minority students and students of low socioeconomic status, there is often a mismatch between aspirations for a college education and actual attainment (Bloom, 2007; Hanson, 1994; Mickelson, 1990). Students may want to attend college, and may even be academically prepared to do so, but they may not have the financial resources to make this a reality. Hanson (1994) focused specifically on academically talented youth, defined as individuals who scored in the top 50% on standardized math and reading assessments given as part of the NELS:88 longitudinal study. She found over twice as many low SES youth had educational expectations that were not aligned with their aspirations; that is, they aspired to earn more education than they expected to earn. Additionally, over the course of the longitudinal study, youth from low SES families were more likely to have reduced or unrealized expectations indicating that the relation between educational expectations and actual enrollment may differ based on socioeconomic circumstances. Hanson suggests this may be primarily due to students' initial educational expectations as students from low SES families were less likely to report they expected to earn a college degree than students

from high SES families when students were first surveyed in their senior year of high school.

Bloom (2007) offers support for the important role economic factors play in college enrollment in her ethnographic study of college bound, low-income, inner city students. In follow-up interviews with students after they initially applied to and were accepted to college, Bloom found that many students did not ultimately enroll due to their concerns with being able to pay off loans. Thus, economic factors may be of particular importance to students from families with limited financial resources. However, Long (2007) points out that many studies that explicitly examine the role of socioeconomic status differences of students who enroll or do not enroll in college do not provide a clear picture of how students' motivations factor into postsecondary enrollment. The primary focus of much of the literature on college choice from an economic perspective is one of access to college, not one of process. That is, researchers often analyze retrospective data on overall trends of those enrolled or not enrolled in college and ignores the earlier development of students' beliefs and behaviors aimed at postsecondary enrollment.

Other studies in the field of economics have focused on the effects of financial aid on college enrollment decisions as well as an overall analysis of the cost of higher education (see Ehrenberg, 2004; Heller, 1997). In this line of research, the costs of higher education and opportunities for financial aid are of primary concern. Overall, access to higher education has been increasing since the 1970s when federal financial aid programs were first established. Federal loan programs, grants and scholarships have contributed especially to increased enrollment in postsecondary education for under-represented minority students and students from low-income households (Ehrenberg,

2004). However, research by Oyserman, Johnson and James (2011) showed that individuals from low SES households are less likely to have a clear idea of the specific behaviors necessary for pursuit of postsecondary education, even if their aspirations are high. This study selected a total of 284 8th grade students from multiple locations across the U.S. The findings indicate that motivational factors may differentially relate to college enrollment for students from low SES families as higher levels of motivation and goal-directedness may be necessary to secure enrollment given students' financial situation. Alternatively, these students may have the motivation, but not the goal-directed behaviors necessary to secure postsecondary enrollment. Thus it is important to not only take into account motivation-related variables, but also important to look at differences across students' who come from households with varying levels of socioeconomic status.

In a survey of 171 7th to 10th grade students from immigrant families, economic barriers negatively predicted college-going self-efficacy (Gonzalez et al., 2012). However, the researchers also found that resilience to these barriers positively predicted college-going self-efficacy indicating that resilience in the face of difficulties may mitigate some of the negative impact of barriers such as economic concerns. Lending additional support to this possibility that personal motivation and resilience may temper difficult economic circumstances comes from a study on individuals formerly in the foster care system. Those individuals who managed to enroll in postsecondary education cited being goal-oriented and having high expectations for their future careers and family lives as important factors in their ability to succeed in college. This was despite the fact

that they often had no financial support outside of what they managed to secure on their own through loans and employment (Hines et al., 2005).

Boatwright, Ching and Parr (1992) found that the influence of students' reported importance of financial aid ability on the decision to attend college did not differ for African American or White students, or by students' gender in a sample of 691 high school seniors. Further, students in the study indicated financial aid availability was a less important factor in their decision to attend college when compared with internal factors such as their desire to achieve a hoped for occupation or external factors such as living up to the expectations of parents and counselors. However, socioeconomic status of the students included in the sample was not reported in this study, making it difficult to evaluate the financial means of the students included in the study. Additionally, this study selected only students that already planned to attend college and therefore had likely already weighed the costs of college attendance.

Race and Ethnicity

Students who come from low SES families are also more likely to be from a racial minority group (Alon et al., 2010; Bloom, 2007; Gonzalez et al., 2012; Long, 2007). Thus, students from racial and ethnic minorities may face a combination of barriers to postsecondary enrollment. However, while there are racial and ethnic differences in postsecondary enrollment trends tracked by the Department of Education, the gap is not as pronounced as it once was. In 2011, approximately 65% of African American, 63% of Hispanic, and 68% of White high school graduates enrolled in college in the fall immediately following high school graduation. Asian high school graduates enrolled in postsecondary education at the highest rate, estimated to be between 80% and 90% in

2011 (NCES, 2012a). However, the Department of Education tracks enrollment into any type of postsecondary institution and empirical studies have found that students from racial and ethnic minority groups are more likely to attend two-year colleges as compared to White and Asian students (Alon et al., 2010; Engeberg & Wolniak, 2010).

Ethnic differences in enrollment are more apparent when examining enrollment in four-year institutions. Alon, Thurston and Tienda (2010) pooled data from five large-scale datasets and found that enrollment in two-year institutions is similar across both White and Hispanic students, but Hispanic students are less likely to enroll in 4-year institutions. The researchers also found that Hispanics with college educated parents lag behind in enrollment compared to whites with college educated parents, but these differences in parents' education account for about a quarter of the variance in the enrollment gap. No student-level beliefs or behaviors were included in the study so addition of these variables could help account for the other 75% of the variance in enrollment left unexplained.

In her study cited earlier, Mickelson (1990) found that abstract beliefs such as education being important for the future were not predictive of achievement for African American students, but more specific beliefs such as the importance of reading and writing were predictive of their cumulative high school GPA. However, other studies have shown that beliefs about postsecondary attainment more generally are strong predictors of postsecondary enrollment. Kao and Tienda (1998) examined the first three waves of NELS:88 data and found that for minority students, aspirations for postsecondary education were a strong predictor of enrollment. This was especially true

for students who maintained high aspirations across the different time points in which data was collected.

Similarly, Mello (2009) found that despite slightly lower enrollments, African American students reported higher educational expectations than White students, although Hispanic students have reported lower educational expectations than White students. This finding is consistent with other studies that have used NELS:88 to examine postsecondary expectations across racial and ethnic groups (Glick & White; Kao & Tienda; Mau & Bikos, 2000), but few studies have explored these differences in the more up to date ELS:2002 dataset. Additionally, these studies have overall failed to include additional measures of students' beliefs and behaviors outside of educational expectations or aspirations.

Many of the studies on racial and ethnic differences in the pathways to postsecondary education have focused on specific groups. For example, Trusty (2002) examined only African American students in the NELS:88 dataset and found high school students' SES and parents' educational expectations for their children had direct positive effects on students' own educational expectations. Gonzalez and colleagues (2012) examined a sample of 171 Latino middle and high school students and found that students who scored high on a resilience scale reported higher college going self-efficacy as well as higher aspirations, indicating that students' level of motivation may be particularly important for Latino students. While the focus and findings of these studies are different, what they do indicate is that race and ethnicity may affect the ways in which students' beliefs and behaviors predict postsecondary enrollment.

While several studies have looked at racial and ethnic differences in educational expectations (Glick & White; Kao & Tienda; Mau & Bikos, 2000; Mello, 2009) and enrollment (Alon et al., 2010), it is rare that studies have examined how several variables, considered together, may differ across racial and ethnic groups. Those studies that have examined several beliefs or behaviors together have tended to focus on only one group (e.g., Gonzalez et al., 2012). While it is important to know how enrollment trends differ across racial and ethnic groups, it is perhaps more informative to examine whether differences in the underlying processes that impact college enrollment can account for these enrollment differences.

Gender

Female enrollment in postsecondary education surpassed male enrollment starting in 1991 and has remained higher to this day (NCES, 2012a). Recent projections show this trend is expected to continue (Hussar & Bailey, 2013). The enrollment discrepancy between males and females has also been reflected in research on students' college aspirations. Using the nationally representative ELS:2002 dataset, Wells and colleagues (2011) found that males are 7% less likely than females to expect a bachelor's degree or higher. As cited earlier in the chapter, Wood et al. (2011) found that African American females reported higher educational expectations and aspirations than males. Similarly, Chang et al. (2006) found that women have higher educational expectations than their male peers across all races, and Watt et al. (2012) found that female adolescents reported higher educational aspirations in the U.S., Canada, and Australia. Thus, gender differences emerge in both expectations and aspirations for postsecondary education as well as in actual enrollment rates.

There is also evidence for gender differences in the changes in students' educational expectations over time. Hanson (1994) found that males were more likely to have unrealized educational aspirations. Males initially reported similar aspirations for postsecondary education as females, but males were less likely to enroll in postsecondary education, thus leaving their aspirations unfulfilled. Mello (2008) tracked educational expectations over time and found that while females' expectations are initially higher than males, there was a steeper decline for females in their educational expectations after the age of 20. Further, she found that differences in expectations were mostly attributable to achievement differences. Specifically, females had higher academic achievement than males as measured by GPA and standardized test performance, and once achievement was controlled the gender differences in expectations were no longer observable.

In addition to the possibility that achievement differences can account for these findings, there is also evidence that females may seek information about college more readily than males. Bryan et al. (2009) examined ELS:2002 data and found that female students were more likely to go talk to the counselors at their school about college applications, and those students that saw the counselor were more likely to report higher postsecondary aspirations. Additionally, female students report more positive perceptions of their learning environments (Majoribanks, 2003) which could indicate more positive perceptions of school in general thus leading to the desire to pursue more education in the future.

While it is clear that expectations and aspirations differ for males and females, it is less clear how the influence these expectations and aspirations have on actual postsecondary enrollment may differ by gender. Only Wood et al. and Mello examined

how postsecondary expectations influenced actual enrollment. Both studies concluded that both higher expectations and higher achievement among females likely accounted for their increased enrollment in postsecondary institutions (Mello, 2008; Wood et al., 2011). More research is necessary to determine how other motivational beliefs and behaviors may differ in their prediction of college enrollment for males and females.

Prior Educational Preparation

Preparation at the high school level has been studied extensively in an attempt to understand which students manage to successfully enroll in college. One often cited factor influencing postsecondary enrollment is the quality of education at the high school level. Schools that offer more academically oriented courses as compared to vocational courses are more likely to have greater numbers of students that enroll in higher education (St. John, 1991). Further, tracking within schools influences likelihood of college enrollment. Students who take higher track classes in high school are more likely to enroll in college after graduation, whereas students in the lower tracks are more likely to either delay postsecondary enrollment or not enroll at all in a postsecondary institution by the age of 24 (Deil-Amen & Turley, 2007).

Using data from the National Longitudinal Study of Freshman, Wolniak and Engeberg (2010) found that students' from higher SES backgrounds had higher quality infrastructure at their schools. Quality of infrastructure at the school was measured by the number of resources at a school (e.g. having a library, computer lab, etc.) as well as school administrators' ratings of the quality of those resources from poor to excellent. This measure of school quality positively predicted college GPA. However, high school GPA and standardized test scores were much stronger predictors of college GPA than

school quality. A similar study by these same authors using ELS:2002 data found no effect of the high school learning environment on students' actual enrollment in a four-year degree program; but students' academic performance, measured by GPA and standardized test scores, was a significant predictor of their postsecondary enrollment (Engeberg & Wolniak, 2010). Taken together, these studies indicate that enrollment in postsecondary education and academic performance in college may be influenced by an individuals' achievement more than school-level variables such as school quality. Although high school quality does appear to be an important predictor of students' achievement once students are enrolled in college.

It is important to note that, even after controlling for financial factors, academic performance as measured by SAT scores also accounts for some of the differences in enrollment for individuals from ethnic minorities; ethnic minority students with stronger academic preparation are more likely to enroll (Heller, 1997). That is, level of academic preparation is important to consider in addition to socioeconomic status and race/ethnicity. However, this level of preparation is not always reflected in students' aspirations, as many underprepared students indicate they expect to attend college (Carter, 1999). Aspirations to earn a college degree remain high despite some students' lack of knowledge of financial aid and a lack of academic preparation (Carter, 1999; Rosenbaum, 2001), and the misalignment of ambitions and pathways may complicate students' ability to access and enroll in postsecondary institutions.

In summary, work on prior educational preparation and academic performance shows that it is important to consider both individual achievement, such as GPA (Goldrick-Rab, 2006; Wolniak & Engeberg, 2010) and standardized test scores

(Goldrick-Rab, 2006; Heller, 1997; Fuertes & Sedlacek, 1994; Wolniak & Engeberg, 2010), as well as school level factors such as the rigor of the curriculum at the school (Engeberg & Wolniak, 2010; Deil-Amen & Turley, 2007; Goldrick-Rab, 2006; Wolniak & Engeberg, 2010). However, individual-level academic achievement variables seem to be a stronger predictor than factors measured at the school level (Engeberg & Wolniak, 2010).

Parental Influences on College Aspirations and Enrollment

The social context is an important component of expectancy-value theory (Eccles et al., 1983). Socializers' beliefs and behaviors are an antecedent to individuals' own expectations for success and task values in regard to a particular task or domain. Social cognitive theory similarly emphasizes the importance of considering the social and cultural context (Bandura, 2002). Individuals often must interact with others to obtain desired outcomes. This includes locating and interacting with knowledgeable others to gain necessary information. The influence that significant others, such as parents and peers, have on the underlying motivational processes and the ultimate decision to pursue postsecondary education has been explored in many of the studies examining postsecondary aspirations and enrollment.

Postsecondary expectations and attainment are impacted by significant others and the social context. Cabrera and La Nasa (2001) similarly found that high parental expectations for degree attainment had a positive effect on students' likelihood of applying to postsecondary institutions. Cheng and Starks (2002) analyzed data from the NELS:88 and found that parents, teachers and peers aspirations influenced students' own aspirations in terms of how far they planned to go in school. They also found racial and

ethnic differences in how parental aspirations influenced students' own aspirations. Hispanic and African American parents had higher aspirations for their children than did white parents, but the impact of parents' aspirations on students' own aspirations was not as strong for the minority students as it was for the white students. The authors' posit that this could be indicative of the minority parents having fewer conversations with their children about postsecondary attendance. Students' own aspirations are likely not effected by their parents' aspirations if they remain unaware of these aspirations. Thus, students' information-seeking from family members may be a key piece of the college-going process.

Wells et al. (2011) found that students whose parents expect them to go to college are 38% more likely to expect four-year degree than those whose parents do not. This study further showed that the effects of parents' educational expectations on their children's own expectations were consistent across race/ethnicity; the higher the parents' expectations, the higher the students' own postsecondary expectations across the sample. However, the researchers only considered the influence of socializers and did not include any measures of personal motivation other than expectations. Additionally, they did not examine actual college enrollment as an outcome, only students' postsecondary expectations. Similarly, Wintre and Bowers (2007) found perceived parental support predicted persistence to graduation for already enrolled college students. Again, this study did not consider the longitudinal connections between students' aspirations and their enrollment.

Pizzolatto (2006) interviewed 28 college students from low income families about their college and precollege experiences asking questions that elicited information about

participants' conceptions of self and how students' desire to attend college developed. The most common themes that emerged included parental messages about the importance of a college education as well as the overall value of a college education. Students without family support reported that their expectancy level for being able to attend college and be a successful college student was lower than those students who reported more family support for their college attendance.

Chang and colleagues (2010) followed 754 high school seniors over a one-year period to assess whether important non-parental adults and close friends influenced academic performance, educational expectations and depressive symptoms one year after graduation from high school. They found that the actual educational attainment of important non-parental adults as well as the desired educational attainment of close friends was a significant predictor of individuals' desired educational attainment. Further, the educational attainment of important non-parental adults also positively predicted individuals' college grades (Chang et al., 2010). Similarly, Packard and Nguyen (2003) found that individuals interested in math and science in high school who had opportunities to interact with a mentor were more likely to maintain a math or science career-related possible self in their second year of postsecondary education. Role models facilitated participants' engagement in career-related activities and allowed opportunities for exploration and success within the fields of math and science.

Dennis, Phinney and Chauteco (2005) surveyed 100 Latino and Asian first-generation sophomore college students regarding their motivation, perceived parental and peer support, and their level of college adjustment and commitment to continuing higher education. The construct they labeled "Career/Personal Motivation" was the strongest,

positive predictor of both college adjustment and college commitment indicating that while family and peer influences are certainly important contributors to college outcomes, individual motivational factors are perhaps more influential overall. Further, the general student population at this school came from households with a low socioeconomic status, thus giving evidence the motivation variables may be important predictors of postsecondary enrollment above and beyond demographic factors.

Gaps in the Literature

Although the research reviewed above shows that there is some evidence of the important contribution motivational factors make in understanding students' pursuit of postsecondary education, there are still a number of gaps in the literature. Overall, postsecondary enrollment has rarely been the explicit outcome of interest in studies applying expectancy-value theory or social cognitive theory to studying distal educational outcomes. Generally, the outcomes of interest when applying these theories have instead been domain specific, such as examining math- and science-related choices (Nagengast & Marsh, 2012; Packard & Nguyen, 2003; Watt et al., 2012). However, choosing to enroll or not enroll in postsecondary education is a key decision shaping the future of youth in the U.S. and deserves more attention as an outcome in and of itself.

Additionally, while many of the studies reviewed in this chapter incorporate one or two of the constructs of interest to the current study, no study could be located in the literature that considered all of the proposed variables of interest. Further, very little research explicitly examines the connection between constructs drawn from both expectancy-value theory and social cognitive theory despite the fact that there is evidence for the inclusion of goal-directed behaviors in understanding how students' beliefs

translate to tangible outcomes (Eccles et al., 2004; Gottfried et al., 2013; Schutz, 1997). There is no research examining school ability beliefs, value for school, postsecondary expectations, and goal-directed behaviors all together as they relate to postsecondary enrollment.

Research from the fields of sociology, economics, and higher education has a longer history of examining differences in postsecondary enrollment. There are documented differential rates of postsecondary attendance across individual-level variables such as race/ethnicity, gender, and household income (Long, 2007). Further, factors such as opportunities to enroll in college preparatory coursework, and high school tracking illustrate the importance of additional sociological and educational influences on college choice (Deil-Amen & Turley, 2007; St. John, 1991). However, researchers taking an economic perspective on college entrance have not integrated motivational constructs into their examination of postsecondary enrollment. Although several of the studies reviewed allude to the importance of students' expectations and their level of motivation (Long, 2007), these constructs have not often been included in studies examining postsecondary pursuit from these other perspectives. The current study specifically examines how these academic and social factors may relate to students' motivation, behaviors, and outcomes in regard to postsecondary education.

Surprisingly, pathways to postsecondary education are also not often discussed in the higher education literature. A review of this literature by Goldrick-Rab and colleagues (2007) posits that this transition is perhaps neglected because it falls between the focus of K-12 researchers and higher education researchers. Of those studies that do examine the connection between students' high school experiences and college

enrollment, many focused on outcomes once students were already enrolled in a postsecondary institution, such as college GPA, college retention, and graduation rates (Deil-Amen & Turley, 2007). Further, researchers studying higher education tend to focus primarily on the contextual factors of the school environments that students come from or demographic differences in enrollment (Goldrick-Rab et al., 2007), rather than the motivational characteristics of students, in explaining college enrollment.

Much of the literature on college enrollment reviewed in this chapter looks at expectations and/or aspirations for college attendance, but does not adequately address how these aspirations and expectations actually translate to outcomes. That is, what are the processes by which having an expectation or aspiration to go to college allows for actual enrollment at a postsecondary institution? Is it enough to merely expect to attain a postsecondary degree? Mickelson (1990) and others have shown that this is not necessarily the case (Alon et al., 2010; Hanson, 1994). However, other studies show that these educational expectations are predictive of postsecondary enrollment even after controlling for demographic and achievement differences (Reynolds & Burge, 2008; Wood et al., 2011). There is ample evidence that the predictors of college enrollment are complex and thus the motivation-related predictors of postsecondary enrollment are also likely to include more than just educational expectations. It is therefore important to consider how ability beliefs, values, expectations and goal-directed behaviors relate to one another to predictor college entrance over and above the influence of demographic and achievement variables.

Revisiting the Model

Important to note is that research question one takes place somewhat outside of the model proposed for the current study because it initially aims to address how expectations change, or do not change, over time. This is an important precursor to developing a more complete model of the motivational components of postsecondary enrollment because educational expectations have been the most often explored motivation-related predictor of postsecondary enrollment (Bohon et al., 2006; Wells et al., 2011). Previous studies examining changes in educational expectations have not adequately considered possible patterns of change (Hanson, 1994; Kao & Tienda, 1998; Mello 2008; 2009; Mickelson, 1990). Therefore, we need to understand not only previous expectations, but also how expectations change differentially over time in order to gain a more complete understanding of the longitudinal processes underlying students' postsecondary enrollment decisions.

The proposed conceptual model additionally provides a way to understand how students' school ability beliefs, value for school, educational expectations, and goal-directed behaviors relate to one another over time. Students' begin to think about the possibility of postsecondary enrollment long before they actually enroll in college (Day et al., 1994; Yowell, 2000). The model therefore offers a way to examine the role that motivational processes play in predicting students' postsecondary enrollment. Additionally, the current model will explore how academic and social variables influence both postsecondary enrollment and the beliefs and behaviors related to school and postsecondary enrollment. Finally, use of a process model can allow for a better exploration of how underlying motivational processes may function in different ways for

individuals with different demographic characteristics by comparing the model across groups.

Conclusion

There are clear differences in college enrollment rate that tie to demographic differences. However these differences only tell a small portion of the story of who enrolls in postsecondary education. Over 60% of high school graduates from all racial and ethnic groups enroll in a postsecondary institution in the fall following high school graduation (U.S. Department of Commerce, 2012). Further, 55% of individuals classified as low-SES made the immediate transition from high school to college in 2012 (NCES, 2012b). Thus, there are clearly a number of students who successfully enroll in postsecondary education settings despite many of the barriers to enrollment. Motivational processes may be able to account for the reasons why students' enroll in college despite financial difficulties or racial barriers.

Much of the motivation literature reviewed does not take into account the demographic, academic, and social factors shown to be important influences on postsecondary enrollment, and certainly not all within one study. Given that the educational requirements for many job openings is expected to rise in the coming years (Carnevale et al., 2010) it is necessary that we continue to examine the underlying reasons why students enroll or do not enroll in college. It is therefore essential to understand the motivational factors that contribute to an individual's decision to pursue postsecondary education as well as the demographic differences in how these motivational factors both relate to one another and predict postsecondary enrollment.

Chapter 3: Methods

The overarching goals of this study were twofold. First, change over time in motivation constructs related to the pursuit of postsecondary education was investigated. Second, the study examined how these constructs both related to one another and were predictive of postsecondary enrollment. In order to explore how these motivation constructs changed over time and predicted actual college enrollment, a longitudinal dataset was necessary. Therefore, the current study used the Education Longitudinal Study of 2002 (ELS:2002) which follows a nationally representative cohort of students from their sophomore year of high school into postsecondary education and beyond. One of the explicitly stated purposes of the ELS:2002 was "[to gather] information about the ways that [individuals'] earlier achievements, aspirations, and experiences predict what happens to the respondents later" (Ingels et al., 2007, p. 9). Further, the focus of the ELS:2002 study as a whole was to collect data that could answer the question, "What are students' trajectories from the beginning of high school into postsecondary education, the workforce, and beyond?" (NCES, 2013a). Thus the dataset was ideally suited to address the questions of interest in this study both in its longitudinal structure and its focus on the factors predictive of educational outcomes.

In this chapter the Education Longitudinal Study sample and data collection procedures more generally are described. Characteristics of participants and relevant measures collected for ELS:2002 as they relate to the purpose of the current study are then discussed. Finally, the research questions of interest in the current study are revisited and the specific analytic plan for each of the proposed research questions is discussed.

The Education Longitudinal Study Dataset

The ELS:2002 was designed to follow a nationally representative sample of U.S. adolescents from their 10th grade year of high school through the transition to postsecondary education or the labor market (Ingels et al., 2007). The ELS:2002 is ongoing, with a fourth follow-up wave collected and scheduled to be released some time in 2014. The current study included the first three waves of publicly released data, collected in 2002, 2004 and 2006.

Baseline Year (2002)

Participants. A national probability sampling procedure was used to select the sample using a two-stage process. First, schools were selected. Of the approximately 27,000 U.S. schools containing sophomore students, 1,221 were randomly selected with a proportional probability based on school enrollment by race/ethnicity. Of those schools initially selected, 752 public and private schools agreed to participate. At the student level, 26 students per school were selected from the sophomore enrollment lists provided by the school. Asian and Hispanic students were oversampled. Of the 17,591 eligible participants, 15,362 sophomores completed the baseline measurements. The baseline sample was collected by surveying sophomores in the spring of 2002. The weighted sample is considered to be nationally representative. Parents, teachers, and school administrators were also surveyed at this time, but these responses were not included in the current study as they do not directly relate to the research questions of interest.

Instruments. Surveys administered to students during the baseline year included questions that broadly targeted seven different areas: location and contact information for follow-up purposes, school experiences and activities, plans for the future, non-English

language usage, money and work, family, and respondents' beliefs and opinions about themselves. At this time, achievement tests were administered in both reading and math. These tests were adapted from other large-scale assessments such as NELS:88, NAEP and PISA. Both the surveys and achievement tests were administered in the schools to all students during a "survey day".

First Follow-Up (2004)

Participants. Two populations were targeted in the first follow-up survey administration. All base-year students were considered to be eligible for the first follow-up and were therefore included regardless of current enrollment status. Therefore, while the majority of these students were seniors in high school, some of the students were currently enrolled in another grade in school, had finished high school early or had dropped out of school. Data collection occurred in schools in the spring of 2004 for those students who could be located in their school. Students who were no longer in school for the reasons listed above participated in data collection over the telephone with parent permission obtained prior to commencement of the interview. Approximately 14,100 (91.8%) of the base-year participants completed the first follow-up. Further, 1,000 of the 2,200 non-respondents at the base year were subsampled and included in the first follow-up, although only 650 of these actually completed the survey.

In order to supplement the sample to ensure it was a nationally representative sampling of seniors in high school, the sample was "freshened" at the first follow-up. Approximately 240 new students were added to the sample for this purpose. Thus, the weighted first year follow-up is considered a nationally representative sample of seniors in high school in the U.S. in 2004.

Instruments. Many of the questions included in the survey during the base year measurement were also administered during the first follow-up with slight wording changes as necessary to reflect changes in the participants' age and status. Further, the questionnaire differed depending on whether the respondents were in the 12th grade at the same school they were at during the base year, had transferred to a different school, were homeschooled, had completed high school early, or had dropped out of high school.

Eight broad areas were included on the student questionnaire for those students still enrolled in high school. These included: contact information, school experiences and activities, devotion of time to particular activities, plans and expectations for the future, postsecondary planning steps and choice criteria, plans for work after high school, current work outside of school, and finally, items about community, family and friends. At this time, transcript data was also obtained from schools so that course enrollment and grade point averages could be included, as well as ACT and SAT test scores.

Second Follow-Up (2006)

Participants. Respondents from the baseline year as well as those added during the first follow-up were also included in the second follow-up. The sampling frame was therefore all initial students selected at the baseline as well as those students added at the "freshening" of the sample during the first follow-up. A total of 17,900 students were initially eligible for the second follow-up wave due to the fact that the survey attempted to follow up with all participants initially selected for wave 1 or wave 2 of the study, whether or not they actually completed that wave or were regarded as eligible participants. However, non-respondents from both the first and second wave as well as those individuals who requested to be removed from the study were not included in the

final fielded sample bringing the total participants surveyed at the second follow-up to 16,400. The sampling procedure, complete with approximate numbers sampled at each wave from the baseline year to the second follow-up, is shown in Appendix A.

Instruments. The second follow-up survey was primarily web-based, although respondents could choose to complete it via a telephone or field interviewer if they did not have web access or did not want to self-administer the survey via the internet. The primary focus of this follow-up year was the transition from high school to postsecondary education, particularly college access and choice. The second follow-up also asked about high school completion, employment and community. The postsecondary portion of the survey acquired month-by-month enrollment information in order to classify respondents into one of six postsecondary enrollment categories: standard enrollees, delayers, leavers, delayer-leavers, non-enrollees, and high school students.

Analytic Sample

The section above detailed an overall description of the dataset as a whole. A more detailed description of the participants who were included in the current study is provided below.

Participants

Table 1 shows the number of respondents at each wave, as well as those that are linked across multiple waves.

Table 1

Number of Responses at each wave and across multiple waves

Response pattern	N
Responded at wave 1, wave 2 and wave 3	12,591
Responded at wave 1 and wave 2	1,415
Responded at wave 1 and wave 3	791
Responded at wave 2 and wave 3	649
Responded at wave 1 only	439
Responded at wave 2 only	186
Responded at wave 3 only	100
Other	26
Total respondents	16,197

Thus, the total sample of eligible participants that were eligible for inclusion in the current study is 16,197. However, due to the longitudinal nature of the proposed study, not all eligible participants were included in the final sample. A large selection of weights are available in the ELS:2002 dataset. Different weights were created to examine samples of participants cross-sectionally, longitudinally, and even to look at students' across different datasets (e.g. compare ELS:2002 participants with PISA or NELS:88). Almost all of the proposed research questions address all three waves of data collection and are therefore longitudinal in nature requiring use of a weight that corresponds to respondents who were included at all three time points.

Limitations of the use of weights in SPSS and M*plus* require that only one weight be specified, and those individuals that are missing a value for the weight or have a weight of zero are eliminated using listwise deletion. Additionally, NCES recommends the use of panel weights when multiple waves of data are used. "The general purpose of the ELS:2002 weighting scheme was to compensate for unequal probabilities of selection and to adjust for the fact that not all individuals selected into the sample actually

participated" (Ingels et al., 2007, p. 159). Thus, only the 12,591 individuals who were present at all three waves of data collection were included in the current study. This allowed for the use of one weight for all analyses intended for use with students who responded to all three initial waves of data collection.

Non-responders. Although the use of the panel weight described above results in a sample that is supposed to be equivalent to the initial sample this assumption was tested by examining weighted means and standard deviations for both the full baseline sample and the sample selected for the current study. Weighted means for most variables in the current study are presented in Appendix B. Some of the categorical variables are not presented in this table because it would not make sense to examine means and standard deviations for these variables (e.g. race, school program). The frequencies were examined for these variables and show a similar pattern to the means presented in the table. That is, the weighted frequencies of both samples are mostly equivalent.

Final Sample. The final sample consisted of 12,591 respondents. Of these 12,591 respondents, there were 6,066 male respondents (48.2%) and 6,525 female respondents (51.8%). The total numbers of individuals and percentage of the sample that was classified in each racial/ethnic group are shown in Table 2.

Table 2

Race/Ethnicity Information

Response pattern	N	%
American Indian/Alaska Native	100	.8
Asian, Hawaii/Pacific Islander	1189	9.4
Black or African American, non-Hispanic	1633	13.0
Hispanic, no race specified	780	6.2
Hispanic, race specified	963	7.6
More than one race, non-Hispanic	578	4.6
White, non-Hispanic	7348	58.4
Total respondents	12,591	100

For the purposes of the current study, Hispanic, no race specified and Hispanic, race specified were collapsed into one category labeled Hispanic/Latino. Although there is evidence of some heterogeneity within the Hispanic/Latino group (Bohon et al., 2006; Wojkiewicz & Donato, 1995), collapsing this category into one group is consistent with other studies that also used the full ELS:2002 dataset and were not specifically focused on heterogeneity within one particular ethnic group (e.g., Barber & Torney-Purta, 2008; Bryan et al., 2009; Fan & Williams, 2010; Wells et al., 2011). Examining heterogeneity within ethnic groups, while interesting, is beyond the scope of the current study. Additionally, consistent with prior studies (Barber & Torney-Purta, 2008; Wells et al., 2011), American Indian/Alaska Native and More than one race, non-Hispanic were combined into a category labeled “other” due to the small amount of respondents in these two categories.

It is important to note that while the weighted sample of participants can be considered nationally representative in regard to ethnicity and gender, the sample may not be representative of all students who could potentially move from high school to college. First, anyone who had already dropped out of high school by spring of the 10th

grade would not have been included in the sample. Additionally, although every effort was made to keep high school drop outs in the full sample, it is still possible that because these individuals are sometimes more difficult to track down that they would be underrepresented in the more limited sample being used in the current study. However, the use of the weighted sample should account for this. Additionally, because the interest of the current study was in examining college enrollment and completion of high school or obtainment of a GED is a prerequisite of college enrollment, this sample can still be considered representative of the population of interest for the research questions that were posed in the current study.

Nesting. Due to the sampling structure of the ELS:2002, students were nested within their schools as well as within certain regions of the country. In order to account for the nested nature of the dataset both the sample stratification variable as well as the primary sampling unit were specified in M*plus*. When these sampling variables are specified, the standard errors are adjusted to account for the unequal probability of selection as well as the non-independence of observations that is inevitable with cluster sampling procedures (Asparouhov, 2005).

Measures

The measures used in the current study are pulled from the students' responses to items throughout the survey with two exceptions; high school GPA and socioeconomic status were calculated by researchers at the Institute of Education Sciences using restricted-use data, but these variables are available as composites in the publicly accessible dataset. These calculated composites available in the public use dataset were used in the current study. To the extent possible, item and scale labels, as well as scale

construction, were based in prior research studies that have also made use of the ELS:2002 or NELS:88 dataset. Additionally, scales were created by aligning items in the ELS:2002 dataset with pre-existing motivation-related scales and measures frequently used by researchers studying students' motivation. More information about this alignment is discussed later in this chapter when the scales are introduced.

Missing data. In the ELS:2002 dataset missing values were assigned several different codes to give additional information as to why a particular question was not answered. The most common missing data code was "non-respondent" which indicated a respondent left the question blank, but non-responses could also be coded as a "legitimate skip" or a "partial interview break off". While these codes are somewhat useful in determining why a respondent may not have answered a particular question, ultimately they all simply indicate that there was no response that could be used in the analyses and therefore were all recoded as missing.

Statisticians at IES used multiple imputation procedures to replace missing values for 14 key variables in the ELS:2002 dataset (Ingels et al., 2007). Some of the imputed variables of interest to the current study included students' sex, race and ethnicity, parental SES indicators, and type of school program (i.e. vocational, general or college preparatory). Very few of these variables needed to be imputed as they were generally obtained either from other survey measures (e.g. parent surveys, students' transcripts) or from subsequent waves of data collection. Students' postsecondary expectations and parental aspirations for students' postsecondary achievement were also imputed and are discussed later in the chapter when describing these measures. Table 3 presents the initial amount of missing data for each imputed variable included in the current study.

Note that 5 variables (mother's educational attainment, mother's occupation, father's educational attainment, father's occupation, and family income) were all used to create the SES composite used in the current study. The imputation procedure used sampling weights in order to take into account the unequal selection probabilities in the original sample.

Table 3

Percent of data initially missing for variables in which imputed values will be used

Variable	%
Gender	0.05
Race/Ethnicity	0.02
School program type	6.64
Student postsecondary educational expectations	2.36
Parental postsecondary educational aspirations	14.53
Mother's educational attainment	3.88
Mother's occupation	5.58
Father's educational attainment	10.28
Father's occupation	15.03
Family income	22.40
Math standardized test score	6.26
Reading standardized test score	5.33

The multiple imputation procedures employed by NCES diverge somewhat from typical procedures in which multiple datasets are created and analyses are run with the results then averaged across the multiple datasets. This is because only one imputed value is available in the publicly accessible dataset. Although multiple datasets were created during the imputation process, ultimately only one value was provided in the dataset itself. The main concern with only one imputed value available is a reduction in power; however, the amount of missing data is important to consider when determining the amount of imputed datasets that would be necessary (Graham, 2009). Most of the variables listed in Table 3 are missing for around 5% or less of the cases. While more

data is missing for some of the variables, most notably family income, it is important to note that because these variables were used to create a composite the other variables missing less data could be used to inform the value for the composite.

Due to the large number of cases in the dataset power issues are not a large concern in the current study, but it is important to keep in mind. Although valid and appropriate procedures were followed in the initial imputations the results will be discussed in light of the procedures that were used, thus noting possible limitations in power. Another option available in dealing with missing data would be to use of a full information maximum likelihood (FIML) procedure. However, a FIML approach does not work when there is missing data on the covariates unless a variance and covariance are specified as many programs, including M*plus*, models missingness by conditioning on the covariates (Graham, 2009). Therefore, given the options available, it seemed best to proceed with the use of the imputed variables provided by NCES. However, FIML procedures were used for all other model variables with missing data, as described below.

Table 4 gives a summary of the total percentage of missing data for each variable included in any of the analyses. For the model variables with missing data, analyses were conducted under the assumption that data were missing at random (Fitzmaurice, Laird, & Ware, 2011). This assumption allows for missing data to depend on observed data, but not missing data (Schafer & Graham, 2002). Due to the use of the imputed values for the covariates, all other missing data could be estimated using Full Information Maximum Likelihood estimation (FIML) in M*plus*. FIML appropriately handles the existence of missing data by fitting the estimates to non-missing variables for each case

instead of deleting or replacing missing values, which can result in biased estimates (McCartney, Burchinal & Bub, 2006).

Table 4

Percent of data missing on each variable

Variable	Baseline N (%)	First Follow-up N (%)
Covariates		
Gender	0 (0%)	NA
Race/Ethnicity	0 (0%)	NA
ELL	0 (0%)	NA
SES	0 (0%)	NA
Parents' Aspirations	0 (0%)	NA
School Program	0 (0%)	NA
Math Standardized Test Score	0 (0%)	NA
Reading Standardized Test Score	0 (0%)	NA
GPA	895 (7.1%)	NA
Model Variables		
Value 1	570 (4.5%)	NA
Value 2	608 (4.8%)	NA
Value 3	428 (3.4%)	NA
Value 4	521 (4.1%)	NA
SCA 1	3268 (26.0%)	NA
SCA 2	3399 (27.0%)	NA
SCA 3	3623 (28.8%)	NA
Postsecondary Expectations	1130 (9.0%)	1060 (8.4%)
Counselor	2021 (16.1%)	3755 (29.8%)
Teacher	2021 (16.1%)	3755 (29.8%)
Coach	2021 (16.1%)	3755 (29.8%)
Parent	2021 (16.1%)	3755 (29.8%)
Sibling	2021 (16.1%)	3755 (29.8%)
Other Relative	2021 (16.1%)	3755 (29.8%)
Friend	2021 (16.1%)	3755 (29.8%)
College Representative	2021 (16.1%)	3755 (29.8%)
College Publication or Website	2021 (16.1%)	3755 (29.8%)
College Search Guide	2021 (16.1%)	3755 (29.8%)
Test-taking Behaviors 10th grade	1139 (9.0%)	1176 (9.3%)
Test-taking Behaviors 12th grade	1139 (9.0%)	1109 (8.8%)

Predictor Variables

The predictor variables for the current study consist of the items measuring the motivation-related constructs outlined in chapter two.

School Ability beliefs. There were several scales included in the base-year ELS:2002 dataset that assessed students' beliefs about their ability. Two of the three scales were domain-specific, one asked about reading and the other asked about math. The current study will use a domain-general school ability belief latent factor that assesses students' beliefs about their ability to learn in general. No prior studies in the literature that used this domain-general ability belief scale could be located, although several have used the math- and reading-specific items (Barber & Torney-Purta, 2008; Fan & Williams, 2010). As mentioned in the definition of terms in Chapter 1, this factor is labeled school ability beliefs as this term can be considered a more general label for many of the theory-specific constructs in the motivation literature (Wigfield & Eccles, 2000) such as self-concept or self-efficacy. Further, although conceptually distinct, measures of self-efficacy and ability beliefs are often not empirically distinct (Bong & Clark, 1999; Bong & Skaalvik, 2003; Skaalvik & Skaalvik, 2002). Additionally, while not directly drawn from any existing self-concept or self-efficacy scales, these items do align with items included in these types of scales.

The following three items are included in this factor:

1. When I sit down myself to learn something really hard, I can learn it
2. If I decide to not get any bad grades, I can really do it
3. If I want to learn something well, I can

The response options were coded from 1-4 with *1* = Almost never, *2* = Sometimes, *3* = Often, and *4* = Almost always. Appendix C presents the means, standard deviations, skewness, and kurtosis for all variables included in this factor.

Value for school. A factor called value for school was created to represent students' interest in and perceived importance of school. While no prior studies using a value scale or latent factor with the ELS:2002 dataset, this latent factor is consistent with a broader concept of task value consisting of students' perceived usefulness, importance and interest in a task or domain (Wigfield & Eccles, 2000). Although many studies have chosen to examine these aspects of task value separately, the limited number of items in the dataset does not allow for use of the subscales. The combination of task value sub-scales is consistent with other validated measures such as the MSLQ (Pintrich & DeGroot, 1990) in which task value is considered as an overall scale, rather than as separate components. Further, an overall task value scale using similar items has been shown to be both valid and reliable (Pintrich, Smith, Garcia & McKeachie, 1993).

The following items and response scales are included on this factor:

1. I go to school because I think the subjects I'm taking are interesting and challenging (*1* = Strongly disagree, *2* = Disagree, *3* = Agree, *4* = Strongly agree)
2. I go to school because education is important for getting a job later on (*1* = Strongly disagree, *2* = Disagree, *3* = Agree, *4* = Strongly agree)
3. How much do you like school? (*1* = Not at all, *2* = Somewhat, *3* = A great deal)
4. How important in your life is getting a good education? (1 = Not important, 2 = Somewhat important, 3 = Very important)

Appendix C presents the means, standard deviations, skewness, and kurtosis for all variables included in this factor.

Ability beliefs and value for school confirmatory factor analysis (CFA). Because these scales are based on items similar to those that already exist in the literature, a CFA was executed to confirm the factor structure. Additionally, the two scales were run together because there was some missing data on the individual scales, but when combined there were only 40 cases that were missing data on all variables. Thus, full information maximum likelihood estimator could be used to ensure that all cases, with the exception of the 40 missing all data, would be included.

Due to the categorical response options offering only 3 or 4 indicators, categorical indicators were specified and a maximum likelihood estimator was used. The estimator selected uses a sandwich estimator to produce parameter estimates with standard errors and a chi-square test that are robust to non-normality (Muthèn & Muthèn, 2011). Traditionally, a normality assumption is necessary for many methods of confirmatory factor analysis, but sandwich estimates of the variances of the parameters are rescaled to account for deviations from the normality assumption (Yuan & Bentler, 2002). This is important because two of the items on the value scale showed evidence of skewness and kurtosis.

Overall data model-fit was good (χ^2 = 566.75, *df* = 13; CFI = 0.98, RMSEA CI = (.055, .062)) according to joint criteria derived by Hu and Bentler (1999) and Schreiber et al. (2006). SRMR is not available with categorical indicators; therefore, the Weighted Root Mean Square Residual (WRMR) was reported. The WRMR of 3.08 is somewhat higher than the specified cut-off value of less than .90 (Schreiber et al., 2006; Yu, 2002).

However, WRMR is not a well-studied fit statistic and there is evidence that it does not perform particularly well with real world data as it has primarily only been studied using simulations (Muthèn, 2010). Therefore, RMSEA and CFI were used to assess model fit as they address both descriptive overall fit and descriptive model comparison, respectively (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

Modification indices were requested and suggested that a significant reduction in the value would result from correlating the errors of items 1 and 3 on the value scale. Because items 1 and 3 both address students' interest in school and the value scale overall captures elements of interest, importance, and utility, it is logical that these items may share some of their remaining variance due to the item content and wording. Therefore, the residual variances of these items were allowed to covary resulting in very good model fit (χ^2 = 40.40, *df* = 12; CFI = 0.99, RMSEA CI = (.009, .019)).

The full confirmatory factor analysis model with standardized loading is shown in Figure 4. Standardized factor loadings were high and ranged from 0.54 to 0.88. Ability beliefs and value were correlated at r = .55. It is important to note that these scales are only available during the base year of data collection when students were in 10th grade.

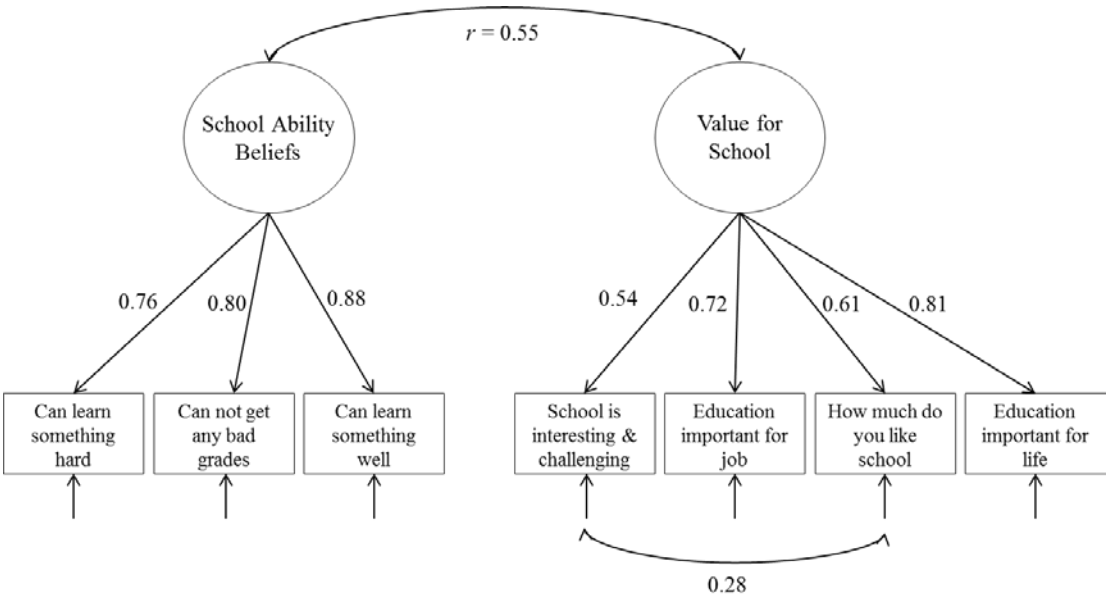


Figure 4. Confirmatory factor analysis for ability beliefs and value for school

Validity. Supportive evidence for the construct validity of factors is often obtained from exploratory or confirmatory factor analysis procedures (Knapp & Mueller, 2010). The factor structure depicted in Figure 4 is consistent with the factor structure expected based on expectancy-value theory. Additionally, the moderately high correlation between ability beliefs and task values is consistent with prior confirmatory factor analysis findings from other data sets (Eccles & Wigfield, 1995).

In order to investigate content validity, a review of the literature was conducted in order to obtain items from similar scales. Appendix D presents the alignment between the individual items included in the scales for the current study and widely used scales in the literature on students' motivation. While the wording of all scale items was not identical, the items in the current study were judged to align well with the scales published in the literature. It is also interesting to note that despite similar, sometimes identical, names for scales, the items included in commonly used instruments in the

literature were not identical; however, further probing of this issue is outside the scope of the current study.

Reliability. To assess reliability of the factors coefficient H was calculated. Coefficient H is preferred to Cronbach's α when calculating the reliability of factors because Cronbach's α indicates the reliability of a composite, rather than a factor. Coefficient H was hand-calculated from the standardized loadings given in Figure 4 to be 0.88 for School Ability Beliefs and 0.81 for Value for School, indicating sufficient reliability of the factors as values above 0.70 are considered desirable (Mueller & Hancock, 2010).

Postsecondary expectations. Individuals' expected level of postsecondary attainment was a single-item indicator asked in both the baseline and first follow-up years of data collection. It stated, "As things stand now, how far in school do you think you will get?" As detailed in the section above, Bohon et al. (2006) note that there is some inconsistency in whether this item measures individuals' aspirations or expectations. In this study it will be labeled expectations because it is more consistently labeled as an educational expectation (Mello, 2008; Mello, 2009; Trusty, 2002) and how far students actually think they will get is different from how far they aspire or want to go in school (Hanson, 1994; Mickelson, 1990). The item had eight response options. The number and percentage of respondents who selected each response option is shown in Table 5. "Don't know" was recoded as a missing response in order to maintain a continuous scale. This allowed for easier interpretation of this factor as higher response scores indicate higher desired level of postsecondary education.

Table 5

Response options and response selections for postsecondary expectations

Response	Baseline N (%)	First Follow-up N (%)
Less than high school graduation	89 (.7)	32 (.2)
High school graduation or GED only	681 (5.4)	634 (5.0)
Attend or complete a 2-year school course in a community or vocational school	683 (5.4)	1651 (13.1)
Attend college, but not complete a 4-year degree	414 (3.3)	406 (3.2)
Graduate from college	4534 (36.0)	4099 (32.6)
Obtain a master's degree or equivalent	2743 (21.8)	2867 (22.8)
Obtain a Ph.D., M.D., or other advanced degree	2317 (18.4)	1843 (14.6)
Don't know	1130 (9)	1060 (8.4)
Total respondents	12,591	12,591

Goal-directed behavior. Goal-directed behavior included two sub-scales both important in postsecondary enrollment. The first subscale examined information-seeking behaviors.

Information-seeking behaviors. In a series of items respondents indicated where or to whom they had gone for information about the entrance requirements of various colleges. The items were dichotomously scored (0 = No, 1 = Yes) for each of the possible sources of information. The following response options were provided to respondents at both the baseline and follow-up waves: Guidance counselor; Teacher; Coach; Parent; Friend; Brother or sister; Other relative; College publications or websites; College representatives; and College search guides, publications, or websites. An additional option, None of the above, was left out of the current analyses because it was redundant (i.e. those that indicated they had not gone to any of the listed sources for information would be captured by their "no" responses to all questions).

No scales using these variables could be located in the literature. Although one study by Martinez and Cervera (2012) chose to break the options into five subscales, four that are parallel to the items used in this study: School agents, Family members, College resources, and friend. The final scale used in their study, Library resources, was eliminated because these questions were only included in the first year follow-up and less than 10% of students indicated they had gone to their high school, public, or a college library for information. Scales containing more than one source in Martinez and Cervera's (2012) study were summed so that higher scores indicated students' approached more of the sources in the category (e.g. the highest possible score for Family members would be 3 if students' reported going to parents, siblings, and other relatives for college information). However, the creation of subscales, while intuitive, may not accurately reflect the underlying structure of the ways in which students' seek college information. Therefore, in order to explore the underlying structure of the information-seeking variables, exploratory factor analysis with categorical indicators was used in M*plus* version 6.

The EFA was run at both 10th grade and 12th grade specifying the program should run one to five factors with a promax rotation. An oblique rotation was selected because it was expected that there would be some relation between the sources of information. A promax rotation was selected because it has been shown to reach a solution more quickly than oblimin rotation, especially with large sample sizes like those in the current study. Additionally, promax rotations are designed to provide the best structure while maintaining the lowest correlation among factors thus reducing the possibility for very highly correlated factors (Pett, Lackey, & Sullivan, 2003).

Models were compared to one another based on their RMSEA, their interpretability, and using a χ^2 difference test as the models were nested. Table 6 displays the fit statistics for the models.

Table 6

Fit-statistics for EFA models with 1 to 5 factors

Number of Factors	RMSEA	χ^2	df
1	0.065	1584.171	35
2	0.033	331.425	26
3	0.020	92.743	18
4	0.016	42.170	11
5	0.008	8.077	5

All the χ^2 difference tests were significant indicating that the models with increasing numbers of factors fit better. However, the 4 and 5 factor model both had factors where many items cross-loaded and there was no clearly interpretable structure to either the rotated or unrotated loadings. Additionally, the EFA was rerun in SPSS so that a parallel analysis could be performed. Interestingly, the EFA in SPSS initially offered a 3 factor solution as each of these three factors had eigenvalues above 1, a common choice criterion for determining the number of factors to be maintained in an EFA (Pett, Lackey, & Sullivan, 2003). Finally, a parallel analysis was run in SPSS that also indicated that three factors should be maintained for the best representation of the factor structure underlying the data. Therefore, the 3-factor solution was ultimately selected due to its relatively good fit and the interpretability of the factors.

Both the initial factor loadings and the rotated loadings were examined to determine on which factor the item best loaded. General rules of thumb note that values above 0.40 can be considered to “load” on that factor (Pett, Lackey, & Sullivan, 2003)

and this criterion was therefore used while also examining values of the cross-loadings on other factors.

The three factors were labeled Information-seeking from School Personnel, Information-seeking from Significant Others, and Information seeking from College Sources. Table 7 presents loadings and cross-loadings for the rotated structure at both time points on each of the factors. Not presented in the table are the correlations between the factors. For the base year, information-seeking from school sources and significant others ($r = .54$, $p < .001$) and college sources ($r = .46$, $p < .001$) were correlated, as was information seeking from significant others and college sources ($r = .28$, $p < .001$). For the first follow up wave the correlations between factors were similar. Information-seeking from school sources and significant others ($r = .53$, $p < .001$) and college sources ($r = .35$, $p < .001$) were correlated, as was information seeking from significant others and college sources ($r = .21$, $p < .001$).

Confirmatory factor analysis will be used in any subsequent analyses with these variables and coefficient H will be calculated for these factors at that time. Most items loaded clearly on one factor, however, college representative showed evidence of cross-loading on both the School Personnel and the College Sources factor. Therefore, the possibility that this item may cross-load on both factors will be examined in the CFA. The possibility of this item cross-loading also makes sense conceptually as college representatives often travel to high schools to present college information, but also are representative of the college and therefore associated with college sources.

Table 7

Final EFA Loadings for 3 Factor Solution using Robust Weighted Least Squares Estimator

	School Personnel		Significant Others		College Sources	
	10th	12th	10th	12th	10th	12th
Counselor	**0.546**	**0.577**	0.016	0.040	0.053	0.055
Teacher	**0.744**	**0.435**	0.166	0.395	-0.136	-0.062
Coach	**0.467**	**0.518**	0.138	0.073	-0.077	-0.115
College Representatives	**0.395**	**0.512**	-0.108	-0.147	0.320	0.391
Parent	0.161	0.271	**0.690**	**0.464**	0.062	0.025
Friend	0.117	-0.008	**0.738**	**0.537**	0.019	0.085
Brother or Sister	-0.064	-0.001	**0.562**	**0.660**	-0.026	-0.057
Relative	0.135	0.045	**0.586**	**0.762**	0.054	0.033
Publications or Websites	-0.018	0.088	0.023	0.046	**0.853**	**0.807**
College Search Guides	-0.090	-0.082	0.029	0.097	**0.917**	**0.677**

Note: Bolded loadings indicate on which factor the item will be included

College preparatory test-taking behavior. The second subscale indicative of goal-directed behaviors assessed test-taking plans and behaviors. Most 4-year colleges and many 2-year colleges require students to submit ACT or SAT scores with their application (USDE, Federal Student Aid, 2013). Thus, planning to take, or taking, these tests is an important step in planning and preparing for college attendance.

Test-taking plans and behaviors were worded slightly different during the baseline and first follow-up waves due to the timing of administration. The baseline wave survey in 10th grade asked students to indicate whether they had taken or were planning to take any of the following tests in the next two years: Pre-SAT (PSAT) or Pre-ACT (PACT); SAT or ACT. The question also asked about intentions to take an AP test and the Armed Services Vocational Aptitude Battery (ASVAB), but these two tests will not be used in the current study because they are not necessary precursors of college enrollment. Response options were: I haven't thought about it; No, I don't plan to; Yes, this school

year; Yes, next school year; and Yes, in 12th grade. I haven't thought about it and No, I don't plan to will be coded as a No response and the other three options will be coded as a Yes response consistent with Klasik (2012).

During the first follow-up wave the parallel question asked "Have you taken or are you planning to take any of the following tests?" with the same test options. Response options were: You haven't thought about it; No, you don't plan to take it; Yes, you've already taken it; and Yes, you plan to take it. The first two options, You haven't thought about it and No, you don't plan to will be coded as a No response and the other two options will be coded as a Yes response, also consistent with Klasik (2012). The responses will be summed such that individuals can receive a score of 0 (don't plan to take either test), 1 (plan to take/have taken either the PSAT/PACT or ACT/SAT) or 2 (plan to take/have taken both the PSAT/PACT and the ACT/SAT). Thus, test-taking behavior is a single-item indicator available at both the base year, when students are in 10th grade, and the first follow up, when students are in 12th grade. Table 8 shows the number and percentage of respondents with their scores.

Table 8

Response options for test-taking behaviors

Response	Baseline N (%)	First Follow-up N (%)
0 = Do not plan to take PSAT/PACT or SAT/ACT	2237 (17.8)	1295 (10.3)
1 = Plan to/Have taken PSAT/PACT or SAT/ACT	1747 (13.9)	3115 (24.7)
2 = Plan to/Have taken PSAT/PACT & SAT/ACT	7393 (58.7)	6919 (55.0)
Total respondents	11,377 (90.4)	11,329 (90.0)

Outcome Variable

The outcome of interest was postsecondary enrollment. Postsecondary enrollment was assessed during the second follow-up wave of data collection. Although the majority of studies have treated postsecondary enrollment as a dichotomous variable (Wells et al., 2011; Wojtkiewicz & Donato, 1995), there is evidence that enrollment patterns differ for males and females (Mello, 2008; Wood et al., 2011), different ethnic groups (Mau & Bikos, 2000; Mello, 2009) and for individuals of differing socioeconomic status (Hanson, 1994; Mello, 2009). Therefore, a more nuanced consideration of postsecondary enrollment was used.

Five different types of college enrollees were classified based on the enrollment patterns in the two years between the first and second follow-up waves. These classifications were determined based on students' self-reported enrollment in college as well as school records collected from any postsecondary institution they attended. The first category is Standard Enrollee (n = 7184, 57.1%) and these are students who enrolled in a postsecondary institution in the fall of 2005 and were still enrolled during data collection in 2006. The second largest category was Non-enrollees (n = 2846, 22.6%). These were students who never enrolled in a postsecondary institution of any kind. The third largest group of enrollees were classified as Leavers (n =1373, 10.9%) and these were students who initially enrolled in a postsecondary institution following high school graduation, but were no longer enrolled during data collection in 2006.

Finally, there were two types of delayers for postsecondary enrollment. The first group were labeled Delayers and these students did not enroll immediately in the fall following high school graduation, but they were enrolled in a postsecondary institution

by the 2006 data collection (*n* = 725, 5.8%). Delayer-leavers were students who did not enroll in the fall following high school graduation and were not enrolled in the fall follow-up, but reported some enrollment in a postsecondary institution in between those two time points (*n* = 381, 3.0%). At the second follow-up 82 students (.7%) were still in high school.

Covariates

Covariates were chosen for their demonstrated effects on postsecondary enrollment in previous research outlined in Chapter 2. These variables primarily capture individual-level demographic, economic, and academic differences as previous literature has established that college access and enrollment differs based on these factors. It is important to note that while these variables were not a part of the theoretical model their influence on all of the variables included in the model was examined. Thus, they are an important part of the overall investigation of how students' motivation for postsecondary education impacts their enrollment.

Ethnicity. The racial/ethnic categories described in the analytic sample section of this chapter will be used in order to examine whether the model differs across racial/ethnic groups. For the analyses in which race/ethnicity is used as a predictor these categories will be dummy coded with White used as the referent group category (i.e., coded 0).

Gender. The gender distribution was described in the analytic sample section of this chapter. Gender will be dummy coded for the analyses in which gender is used as a predictor with females as the referent group (i.e., coded 0).

Socioeconomic status. Socioeconomic status (SES) is a weighted composite variable constructed to be parallel to the SES measures used in previous large-scale studies such as the National Longitudinal Study: 1972, High School and Beyond, and the National Education Longitudinal Study: 1988. It was constructed primarily from parent questionnaires, but was supplemented with student questionnaire responses if there was missing data. The five variables used were: father's/guardian's education, mother's/guardian's education, family income, father's/guardian's occupation and mother's/guardian's occupation. If both parents' and students' responses for each of these variables was missing, data was imputed for each variable individually before the composite was created (NCES, 2004). No respondents are missing data on this item. Because SES is being used as a grouping variable, SES quartile membership will be used. Thus, this will be a categorical indicator with four categories.

High school grade point average. High school GPA was obtained from students' school records. Although complete GPA records are available in the restricted dataset, the current study will use a categorical indicator for GPA from 9th to 12th grade because no finer measure of students' grade point average in available. For this measure GPA is available a 7-point scale (0 = 0.00-1.00, 1 = 1.01-1.50, 2 = 1.51-2.00, 3 = 2.01-2.50, 4 = 2.51-3.00, 5 = 3.01-3.50, 6 = 3.51-4.00). High school GPA was entered as a covariate in the models.

Standardized test scores. A standardized math and reading measure was given to participants during the base-year wave of data collection. The standardized scores will be used, with math and reading scores entered as separate covariates. Math standardized scores range from 19.38 to 86.68 (M = 51.47, SD = 9.92). Reading standardized scores

range from 22.57 to 78.76 (*M* = 51.32, *SD* = 9.91). Both the reading and math scores are norm-referenced, standardized T scores. That is, they provide an estimate of achievement relative to the entire population of 10th graders in spring 2002. The scores are transformations of the IRT ability estimates that were rescaled to a mean of 50 and a standard deviation of 10.

Type of school program. This variable attempted to classify the academic rigor of the coursework and school in which students were enrolled. There were three options: General (*n* = 4240, 33.7%); College preparatory – academic (*n* = 7172, 57.0%); and Vocational – including technical or business (*n* = 1179, 9.4%). This variable will be dummy coded with College Preparatory as the referent group.

Parental postsecondary aspirations. A single-item indicator will be used to assess parents' postsecondary aspirations. This item asked, "How far in school do you think your mother and father want you to go?" This particular item has been labeled as both parental expectations (Byun, Meece, & Irvin, 2012; Glick & White, 2004) and parental aspirations (Cheng & Starks, 2002; Fan & Williams, 2010) in prior research. To be consistent with the definitions of expectations and aspirations given in Bohon et al. (2006) described in chapter 2, this items will be labeled parental aspirations because the word "want" denotes a desire (i.e., aspiration) rather than an expectation.

This question was qualified with the statement, "When we say parent(s), mother, or father, answer for the parent, guardian, or stepparent with whom you live most of the time." Respondents were asked to indicate aspirations for both their mother (or mother figure) and father (or father figure). The options provided were: Less than high school graduation; High school graduation or GED only; Attend or complete a 2-year school

course in a community or vocational school; Attend college but not complete a 4-year degree; Graduate from college; Obtain a master's degree or equivalent; and Obtain a Ph.D., M.D., or other advanced degree. A composite variable was created and imputed by ELS:2002 to obtain a single indicator of parents' aspirations using a weighted sequential hot deck procedure (Ingels et al., 2007).

Statistical Analysis

The relations between expectations for postsecondary attendance, goal-directed behaviors, ability beliefs and value for school, and postsecondary enrollment were investigated in the current study. Three primary research questions were examined that addressed both how these constructs changed over time as well as how they related to one another to predict postsecondary enrollment.

Analysis of Research Questions

Mixture latent Markov modeling and structural equation modeling were proposed as the analysis procedures to be used. However, multinomial logistic regression models were ultimately substituted for the mixture latent Markov procedure for reasons described in this section. The research questions and analysis procedures for each question and sub-question are detailed in this section. SPSS version 20 was used for all preliminary data cleaning and analysis. All other analyses were conducted using M*plus* version 6.11 (Muthén & Muthén, 2011).

Research Question 1: How do the postsecondary expectations of students change over a two year period prior to high school graduation? This research question was broken into three sub-questions:

RQ1.1: What are common patterns of change in students' postsecondary expectations from 10th grade to 12th grade?

RQ1.2: How do individual-level characteristics such as gender, ethnicity, and SES predict whether individuals maintain or change their postsecondary expectations between 10th and 12th grade?

RQ1.3: How does postsecondary enrollment differ based on the patterns of change?

Proposed procedure. The proposed analysis procedure to answer this research question was Mixture latent Markov modeling. This modeling procedure looks at "movers" and "stayers" in regards to different subpopulations characterized by chains that are qualitatively different from one another (Kaplan, 2008; Wang & Chan, 2011). That is, this modeling procedure allows for there to be a finite mixture of discrete latent classes that capture students' postsecondary expectations, and individuals can change class membership from time 1 to time 2. Thus, some students may maintain a particular postsecondary expectation from one time point to another (e.g. report they expect to obtain a 4-year degree at both 10th grade and 12th grade). Other students may change their expectations (e.g. report they expect to obtain a 4-year degree in 10th grade, but expect to obtain less than a 4-year degree in 12th grade).

Figure 5 provides a visual depiction of mixture latent Markov modeling. Bold lines represent "stayer" classes and dotted lines represent "mover" classes. Thus, this type of modeling imposes a latent class structure on the data in order to look at the change in students' expectations from 10th to 12th grade. Latent class patterns of change

are of primary interest and the output from the analysis provides class probability estimates.

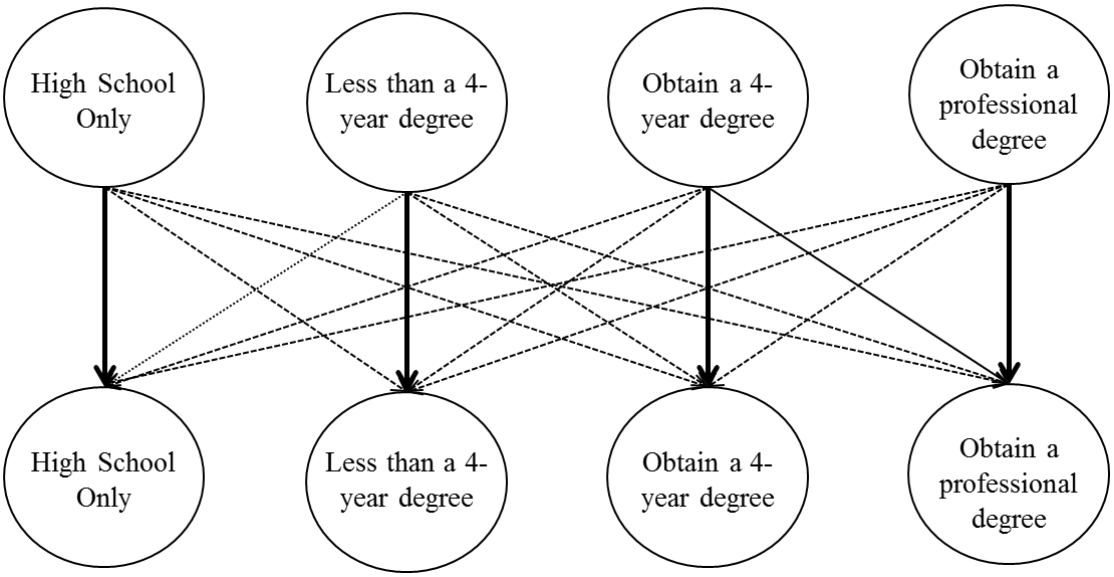


Figure 5. Visual depiction of mixture latent Markov modeling

Due to the complexity of this model, expectations were recoded into four categories: High school only, Less than a 4-year degree, Obtainment of a 4-year degree, and Obtainment of an advanced degree. Even with this simplification there were 16 possible transition patterns to be examined. However, it was possible that not all 16 possible classes would be selected because there may be only a very small amount of individuals who transition between two particular classes from time 1 to time 2.

The addition of predictors to the model is akin to multinomial logistic regression (Magidson, Vermunt, & Tran, 2009; Wang & Chan, 2011). For example, with gender added as a predictor of change the odds being in a particular latent class can be ascertained for males compared to females. Again, because of the complexity of the model the number of covariates was limited. Therefore, gender, ethnicity, and SES quartiles were proposed to be used as predictors of latent class memberships. The final

step would also be similar to multinomial logistic regression in that the odds of being classified into a particular postsecondary enrollment pattern would be examined for each latent class.

While the originally proposed mixture latent Markov modeling was a good fit to the research question, the available data ultimately required a different type of analysis. The number of parameters to be estimated exceeded the number of pieces of information supplied by the variables entered into the model. This resulted in the model being under-identified and therefore unable to converge appropriately. Unfortunately, no constraints could be imposed on the parameters such that the model would be estimable. Personal communication with the software creators also confirmed this (L. Muthén, personal communication, March 11, 2014). As such, different approaches to answering the research sub-questions were explored and ultimately a combination of descriptive procedures and multinomial logistic regression were used. These procedures are described below for each of the specific sub-questions.

RQ1.1: What are common patterns of change in students' postsecondary expectations from 10th grade to 12th grade?

The number of students in each possible change pattern was examined qualitatively to get a sense of the percentage of the sample that maintained or changed their expectations as well as the most common patterns of change. Consistent with the proposed procedures, expectations were recoded into four categories: High school only, Less than a 4-year degree, Obtainment of a 4-year degree, and Obtainment of an advanced degree. Next, cross-tabs were run in SPSS across the sample as a whole to get

a sense of how students' postsecondary expectations changed from 10th grade to 12th grade. These patterns are described in Chapter 4.

RQ1.2: How do individual-level characteristics such as gender, ethnicity, and SES predict whether individuals maintain or change their postsecondary expectations between 10th and 12th grade?

The goal in this analysis was to determine whether patterns of change differed for different groups of students based on demographic characteristics. The analysis for this question consisted of two steps. First, cross-tabs were run on files that were split by gender, ethnicity, and SES quartile, respectively. These patterns as well as descriptive differences between individual groups within each demographic factor are described in Chapter 4.

As a second step, multinomial logistic regressions were run in order to examine whether the demographic variables were predictive of students' patterns of change. In order to have an outcome that was appropriate for multinomial logistic regression, change in expectations was recoded into a three category outcome with 1 = reduced postsecondary expectations, 2 = increased postsecondary expectations, and 3 = maintained postsecondary expectations. Due to the complex sampling structure and use of weights, this analysis was run in M*plus*. Although SPSS can analyze weighted data, it cannot account for the nested nature of the data. M*plus* automatically uses the highest category as the referent group; therefore maintenance of expectations was the referent group in these analyses. Gender, race, and SES quartile were entered as dummy-coded variables with female as the referent group for gender, white as the referent group for

ethnicity, and the highest quartile as the referent group for SES. Thus, the multinomial logistic regression equation of interest in this set of analyses was:

$$ln\left(\frac{\pi(Exp)_{ik}}{\pi(Exp)_{iK}}\right) = \beta_0 + \beta_1(Male)_{1i} + \beta_2(Black)_{2i} + \beta_3(Asian)_{3i} + \beta_4(Hisp)_{4i}$$

$$+\beta_5(Other)_{5i} + \beta_6(SES1)_{6i} + \beta_7(SES2)_{7i} + \beta_8(SES3)_{8i}, \text{ where k = 1, 2}$$

Where "Exp" refers to the pattern of change in expectation groups described above, K is the referent category of maintenance of expectations and k is the comparison group of either increased or reduced expectations. The log odds coefficients will be reported for each predictor as well as the odds ratio, although results will only be interpreted in terms of the odds ratio as the interpretation of this coefficient is more straightforward than the interpretation for the log odds. The general interpretation of the odds ratio is that for every one unit increase in the predictor, there is an associated increase or decrease in the odds of the outcome occurring. However, because the predictors in this case are all dummy-coded, the odds ratio indicates the odds of being classified into the referent outcome (maintain expectations) for the referent group (e.g., female, white, highest SES quartile) as compared to the gender, ethnic or SES group specified and for each additional outcome (i.e., reduce or increase expectations). Therefore, results will be discussed in terms of whether a particular group is more likely to be classified into a particular outcome relative to the referent groups.

Finally, to determine whether the models with demographic predictors fit better than a model with no predictors, models were compared based on their sample size adjusted BIC (SBIC) values. SBIC was selected for comparison because this statistic tends to select the correct model above other criteria when sample sizes are large (Haughton, 1988). Additionally, a likelihood ratio test was performed to determine

whether a model with the demographic factors added as predictors provided a better fit to the data then a model with no predictors.

RQ1.3: How does postsecondary enrollment differ based on the patterns of change?

The final set of analyses for this research question explored whether patterns of change in expectations predicted students' actual postsecondary enrollment pattern. Again, this analysis was run in two steps. First, cross-tabs were examined in order to get a sense of the patterns of change and differences across groups. Next, a multinomial logistic regression was run with enrollment category as the outcome. Standard enrollees were specified as the referent group. The three category expectation variable (i.e., reduce, maintain, increase) was dummy-coded with maintained expectations as the referent group and then this variable was used as the predictor for students' postsecondary enrollment category. As in the model above, SBIC and a likelihood ratio test were used to assess model fit.

Research Question 2: How do students' school ability beliefs, value for school, postsecondary expectations and goal-directed behaviors in 10th grade relate to one another and predict students' postsecondary enrollment? Figure 6 presents the full conceptual model of interest in this question.

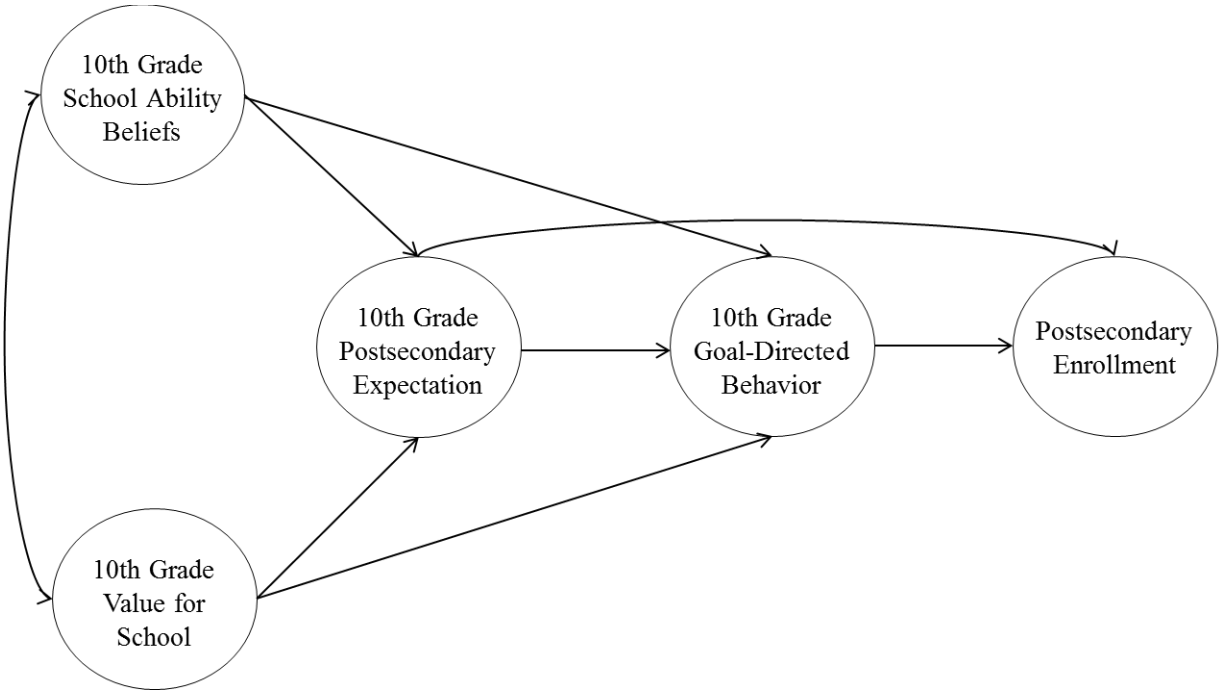


Figure 6. Full conceptual model for research question 2.

This research question was broken into four sub-questions:

RQ2.1: When students are in 10th grade, how do their ability beliefs and values for school in general influence their 10th grade postsecondary expectations?

RQ2.2: When students are in 10th grade, how do their ability beliefs and values for school in general influence their goal-directed behaviors in 10th grade?

RQ2.3: When students are in 10th grade, how do their postsecondary expectations predict postsecondary enrollment, and do their goal-directed behaviors mediate the relation between their postsecondary expectations and their actual enrollment?

RQ2.4: How does the final proposed model fit for students in 10th grade? How does the final model depicting motivational processes in 10th grade differ by:

- Gender
- Ethnicity
- SES quartiles

All the analyses entered students' standardized test scores, GPA, type of school program, and parents' postsecondary aspirations as covariates. Thus, the influence of all these variables on the constructs included in the model was investigated. Gender, ethnicity and SES were not included at this point as these were used for between group comparison purposes in the analyses examining RQ2.4. In a sense, gender, ethnicity and SES were treated as moderators in that the model compared the different groups to see if the constructs were related in similar ways or whether the model fit differently across groups.

An important point should be raised here about what the models were tested versus what the models can tell us about the relations between the included constructs. Mueller and Hancock (2010) state, "Following satisfactory data-model fit, the interpretation of individual parameter estimates is permitted to involve explicit causal language, as long as this is done from within the context of the particular causal theory proposed and the possibility/probability of alternative explanations is raised unequivocally" (p. 382). In no way do the models being examined in the current study *prove* a causal relation between any of the variables included. Thus, the language used when describing the models refers to what the model was testing rather than what conclusions may be drawn from the results. This point will be revisited in the discussion section.

Detailed modeling process. A step-by-step process was followed to examine each sub-question:

RQ2.1: According to steps outlined by Hancock and Mueller (2011), first, a measurement model should be examined in which all constructs are allowed to covary

and second, a structural model with proposed structural relations should be fit to compare the two models. However, for this sub-question the measurement model and structural model will fit the same for RQ2.1 because the structural model includes all possible relations between the factors so only one model was examined. Modification indices were requested and considered if they significantly improves model fit and made theoretical sense. Covariates were also entered into the model. The covariates were specified to relate to each of the factors included in the structural equation model. Thus, the influence of each covariate on each factor in the model could be investigated.

The overall fit of the structural model was assessed using accepted fit criteria. Traditionally, many researchers using SEM in the social sciences have cited criteria mentioned in Hu and Bentler (1999) as the basis for assessing model fit (e.g., RMSEA < .06, CFI > .95, SRMR < .08). However, while Hu and Bentler provide evidence for the use of these benchmarks, other researchers have criticized a blanket application of these model-fit criteria (Fan & Sivo, 2005). Due to the use of categorical indicators in the structural equation models for the current study, SRMR is unavailable as a fit statistic and WRMR is provided instead. As described earlier, WRMR is not a well understood fit statistic and there is evidence that it may not perform particularly well (Muthèn, 2010). Therefore, descriptive overall fit and descriptive model comparison were assessed by RMSEA and CFI, respectively (Schermelleh-Engel et al., 2003).

RQ2.2: This sub-question again examined a model where all possible paths were included. Thus, the same process outlined for RQ2.1 was followed.

RQ2.3: For this model, there were two competing models to be tested, one in which goal-directed behaviors partially mediated the relation between postsecondary

expectations and enrollment and one in which these behaviors fully mediated this relation. Thus, a measurement model was first fit to be used for comparison purposes. All constructs were allowed to covary and model-fit was assessed as described for RQ2.1. Fit statistics examined included χ^2, degrees of freedom, RMSEA, and CFI.

The next step was to fit two competing structural models specifying either full or partial mediation. Fit indices specified above (χ^2, degrees of freedom, RMSEA, and CFI) were recorded in order to compare the three models. Because these structural models were nested in the measurement model fit in the first step, a hierarchical χ^2 difference test was used for model comparison.

RQ2.4: First, following the procedures outlined for RQ2.3, a measurement model was fit in order to examine the model in its entirety. Next, a structural model was fit. Model comparisons were made using the same procedures outlined above. Finally, models were constrained to be equivalent across groups and then pathways were released one by one to test the relations for evidence of non-invariance. A χ^2 difference test was used at each step to evaluate whether release of constraints across groups resulted in better data-model fit.

Research Question 3: How do students' school ability beliefs, value for school, postsecondary expectations, and goal-directed behaviors over 10th to 12th grade relate to one another over time and predict students' postsecondary enrollment? Figure 7 presents the conceptual model.

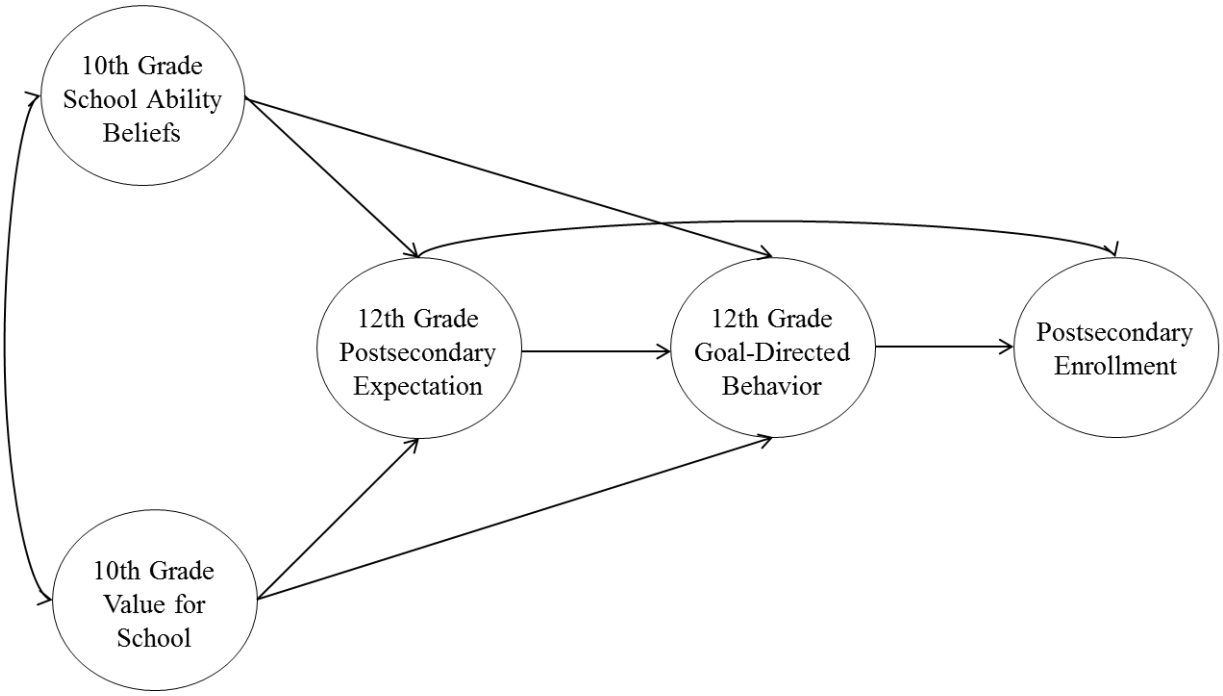


Figure 7. Full conceptual model for research question 3.

This research question was broken into four sub-questions:

RQ3.1: How do students' ability beliefs and values for school when students' are in 10th grade influence their postsecondary expectations in 12th grade?

RQ3.2: How do students' ability beliefs and values for school when students' are in 10th grade influence their goal-directed behaviors in 12th grade?

RQ3.3: How do students' postsecondary expectations when they are in 12th grade predict postsecondary enrollment, and do their goal-directed behaviors mediate the relation between their postsecondary expectations and their actual enrollment?

RQ3.4: How does the final proposed model fit for students longitudinally? How does the final model depicting motivational processes longitudinally differ by:

- Gender
- Ethnicity
- SES quartiles

Similar to research question two, SEM was used to examine the overall research question as well as the sub-questions. All the analyses included students' standardized test scores, GPA, type of school program, and parents' postsecondary aspirations as covariates. Gender, ethnicity and SES were not entered at this point as these were used for multi-group comparison purposes in the final step of the research question. Multi-group comparisons were also run with the M*plus* software using the procedure detailed for RQ2.4. Due to the similarity between the procedure used to answer research questions two and three, a step-by-step detail of the analyses is not provided here. This is not to say that the analyses are the same because conceptually they answer different questions, but the statistical approaches used were parallel.

Conclusion

The goal of this study was to examine the longitudinal connections among motivation-related constructs as they relate to one another and predict postsecondary enrollment. Additionally, due to the demonstrated group differences in college enrollment observed across gender, ethnicity and SES (NCES, 2012a), group differences were examined. Using the methods described in this chapter, the next chapter describes the statistical analyses and results.

Chapter 4: Results

Several different sets of analyses are described in this chapter in order to examine the relations between postsecondary expectations, school ability beliefs, value for school, goal-directed behaviors and postsecondary enrollment. Results are reported individually for each research sub-question.

Analysis Results

Research Question 1

RQ1.1: What are common patterns of change in students' postsecondary expectations from 10th grade to 12th grade?

Crosstabs were run on these four categories of postsecondary expectations for students across the two waves of data collection and converted to percentages. These are presented in Table 9. A total of 5,933 students maintained their postsecondary expectations from one time point to the next whereas 4,709 changed their expectations from 10th grade to 12th grade.

Table 9

Maintenance and Change in Postsecondary Expectations from 10th grade to 12th grade

	12th grade expectations (%):				
	high school only	< 4-year degree	4-year degree	Advanced degree	N
10th grade expectations:					
10th high school only	1.9	2.3	1.0	0.5	607
10th < 4-year degree	1.1	4.5	2.4	1.1	967
10th 4-year degree	1.3	7.1	19.9	11.3	4206
10th Advanced degree	0.8	2.8	12.6	29.5	4862

Note: Underlined percentages indicate students who maintained their aspirations

Due to the issues with the proposed analysis procedure described in Chapter 3, no other analyses were run at this point, and the common patterns of change are

descriptively expanded upon here. 55.6% of students maintained their postsecondary expectations from 10th to 12th grade. Out of these students, 3.4% maintained their expectation to only attend or graduate from high school, 8.1% maintained their expectation to attend or complete some college, 35.6% maintained their expectation to graduate from college, and 52.9% maintained their expectation that they would pursue an advanced degree.

Fewer students changed their postsecondary expectations, with 44.2% of students reporting a change in their postsecondary expectations from 10th grade to 12th grade. Of these, the most common change was students who reduced their expectations from pursuing an advanced degree to only graduating from college. These students represented 28.4% of the changed expectations group. The next largest group consisted of those students who raised their expectations from graduating college to pursuing an advanced degree (25.5%). For all those students who reported a change in their degree expectations, 41.9% raised their expectations while 58.2% lowered their expectations.

RQ1.2: How do individual-level characteristics such as gender, ethnicity, and SES predict whether individuals maintain or change their postsecondary expectations between 10th and 12th grade?

First, crosstabs were run on each set of demographic characteristics. Table 10 shows the percentage in each category for males and females. Table 11 compares across ethnicities and Table 12 compares across SES quartiles. Following this more descriptive examination of patterns of change across groups, multinomial logistic regression was performed and these results are presented.

Table 10

Maintenance and Change in Postsecondary Expectations from 10th grade to 12th grade by Gender

	12th grade expectations (%):				
	high school only	< 4-year degree	4-year degree	Advanced degree	N
10th grade expectations:					
Females:					
10th high school only	1.1	1.4	0.7	0.4	200
10th < 4-year degree	0.7	3.6	2.3	0.9	422
10th 4-year degree	0.9	6.8	18.2	12.1	2127
10th Advanced degree	0.7	3.1	13.4	33.7	2855
Males:					
10th high school only	2.8	3.3	1.3	0.6	407
10th < 4-year degree	1.6	5.5	2.5	1.3	545
10th 4-year degree	1.8	7.4	21.7	10.4	2079
10th Advanced degree	1.0	2.5	11.6	24.7	2007

Note: Underlined percentages indicate students who maintained their aspirations

56.6% of females maintained their postsecondary expectations from one time point to the next and 54.7% of males maintained theirs. A higher percentage of females reported maintenance of expectations for an advanced degree as compared to males. A higher percentage of males reported increased expectations from 10th grade to 12th grade (19.4% and 17.8% for males and females, respectively). A very similar percentage of males and females reported reduced expectations (25.9% and 25.6% for males and females, respectively). Next, crosstabs were run for each ethnic group and the percentages were calculated.

Table 11

Maintenance and Change in Postsecondary Expectations from 10th grade to 12th grade by Ethnicity

	12th grade expectations (%):				
	high school only	< 4-year degree	4-year degree	Advanced degree	N
10th grade expectations:					
White:					
10th high school only	1.9	2.0	0.7	0.4	323
10th < 4-year degree	1.0	4.8	2.0	0.8	546
10th 4-year degree	1.1	6.8	21.1	11.0	2546
10th Advanced degree	0.5	2.6	13.2	30.2	2962
Asian:					
10th high school only	0.9	1.1	0.8	0.3	31
10th < 4-year degree	0.4	1.8	2.3	1.2	57
10th 4-year degree	1.1	4.1	19.5	12.0	369
10th Advanced degree	0.2	2.0	12.0	40.4	549
Black/African American:					
10th high school only	1.8	2.5	1.6	0.8	91
10th < 4-year degree	1.6	4.9	3.5	1.3	152
10th 4-year degree	1.4	7.8	17.5	12.6	525
10th Advanced degree	1.8	3.3	10.4	27.1	570
Hispanic/Latino:					
10th high school only	2.3	3.8	2.1	1.1	127
10th < 4-year degree	1.5	5.3	3.3	1.7	159
10th 4-year degree	2.3	9.7	17.3	11.2	547
10th Advanced degree	1.6	4.1	10.0	22.6	518
Other:					
10th high school only	2.6	2.6	0.5	0.4	35
10th < 4-year degree	1.6	4.0	2.3	1.4	53
10th 4-year degree	1.9	7.9	18.2	10.4	219
10th Advanced degree	1.4	2.8	17.5	24.4	263

Note: Underlined percentages indicate students who maintained their aspirations

A higher percentage of White (58%) and Asian (62.6%) students maintained their postsecondary expectations as compared to Black/African-American (51.3%), Hispanic/Latino (47.5%), and students of other ethnicities (49.2%). Also quite notable

was the higher percent of Asian students who maintained postsecondary expectations to obtain a graduate degree. For all races a higher percentage of students reduced their expectations as compared to those that increased their expectations.

Table 12

Maintenance and Change in Postsecondary Expectations from 10th grade to 12th grade by SES Quartile

	12th grade expectations (%):				
	high school only	< 4-year degree	4-year degree	Advanced degree	N
10th grade expectations:					
First:					
10th high school only	4.5	5.0	1.6	0.9	260
10th < 4-year degree	2.8	7.3	3.6	1.7	334
10th 4-year degree	2.9	11.9	16.9	8.5	873
10th Advanced degree	1.4	4.5	10.3	16.5	708
Second:					
10th high school only	2.3	2.8	1.9	0.6	181
10th < 4-year degree	1.4	7.4	3.7	1.5	329
10th 4-year degree	1.4	9.5	21.1	9.8	984
10th Advanced degree	1.1	3.7	12.2	19.4	858
Third:					
10th high school only	1.4	1.9	0.7	0.6	121
10th < 4-year degree	0.6	3.8	2.2	0.9	198
10th 4-year degree	1.3	6.6	22.3	12.0	1130
10th Advanced degree	0.9	2.6	14.2	28.0	1225
Fourth:					
10th high school only	0.3	0.5	0.3	0.3	45
10th < 4-year degree	0.2	1.4	1.0	0.5	106
10th 4-year degree	0.3	2.7	19.0	13.5	1219
10th Advanced degree	0.3	1.3	12.9	45.7	2071

Note: Underlined percentages indicate students who maintained their aspirations

Next, crosstabs were run for SES quartiles and the percentages were calculated. The highest percentage of students to maintain their expectations were those in the highest quartile (66.4%) and this percentage dropped across the other quartiles (55.5%,

50.2% and 45.2% across the third, second, and first SES quartiles, respectively). The first SES quartile had the highest percentage of students that reduced their expectations (33.8%) and the fourth SES quartile has the lowest (17.7%). Similar to the overall patterns and patterns observed across gender and ethnicity, a higher percentage of students in all SES quartiles reported reduced, as compared to increased, expectations.

For the multinomial logistic regression, gender, Ethnicity and SES were entered one at a time with all associated groups. The model with all three of these predictors had the lowest SBIC (SBIC = 21185.79 as compared to SBIC = 21480.165 with only gender and SBIC = 21390.85 with only gender and ethnicity) and therefore showed the best data-model fit. Additionally, the likelihood ratio test indicated the model with the predictors was a better fit than the null model (χ^2 = 388.51, df = 16, p < 0.01).

Holding ethnicity and SES constant, the gender difference with respect to reducing expectations as compared to maintaining expectations was not significant. However, the gender difference for increasing expectations as compared to maintaining expectations was significant ($\widehat{\beta}$ = 0.166, $e^{\widehat{\beta}} = 1.18$, χ^2 = 2.42, p = 0.016) indicating that the odds of being classified in the increased expectations compared to the maintained expectations category were about 1.2 times greater for males compared to females.

Holding gender, SES, and other ethnicity categories constant, the odds of being classified in the reduced expectations group rather than the maintained expectations group were about 1.5 times greater for students of other ethnicities as compared to white students ($\hat{\beta}$ = 0.386, $e^{\widehat{\beta}} = 1.47$, χ^2= 3.17, p = 0.002). The odds of being classified in the reduced expectations group rather than the maintained expectations group were lower for Asian students as compared to white students ($\widehat{\beta}$ = -0.469, $e^{\widehat{\beta}} = 0.63$, χ^2 = -4.91, p <

0.001). Black/African-American students ($\widehat{\beta}$ = 0.387, $e^{\widehat{\beta}} = 1.47$, χ^2 = 4.13, $p < 0.001$) and Hispanic/Latino students ($\widehat{\beta}$ = 0.404, $e^{\widehat{\beta}} = 1.50$, χ^2 = 4.17, $p < 0.001$) odds of being classified in the increased expectations group rather than the maintained expectations group were about 1.5 times greater than those for white students.

Holding gender, ethnicity, and the other SES quartiles constant, the odds of being in the reduced expectations group rather than the maintained expectations group was 2.65 times higher as compared to students in the highest SES quartile ($\widehat{\beta}$ = 0.977, $e^{\widehat{\beta}} = 2.65$, χ^2 = 11.33, $p < 0.001$). This same pattern was observed for students in the second SES quartile ($\widehat{\beta}$ = 0.732, $e^{\widehat{\beta}} = 2.08$, χ^2 = 9.08, $p < 0.001$) as well as the third SES quartile ($\widehat{\beta}$ = 0.503, $e^{\widehat{\beta}} = 1.65$, χ^2 = 7.52, $p < 0.001$). Similarly, the odds of being classified in the increased expectations rather than the maintained expectations increased 1.8 times for students in the lowest SES quartile as compared to students in the highest SES quartile ($\widehat{\beta}$ = 0.605, $e^{\widehat{\beta}} = 1.83$, χ^2 = 6.12, $p < 0.001$). Again, this same pattern was observed for students in the second SES quartile ($\widehat{\beta}$ = 0.499, $e^{\widehat{\beta}} = 1.65$, χ^2 = 5.82, $p < 0.001$) as well as the third SES quartile ($\widehat{\beta}$ = 0.297, $e^{\widehat{\beta}} = 1.35$, χ^2 = 3.46, $p = 0.001$).

RQ1.3: How does postsecondary enrollment differ based on the patterns of change?

As a first step in examining this question the percentage of students who maintained or changed their postsecondary expectations from 10th to 12th grade was examined and is presented in Table 13.

Table 13

Maintenance and Change in Postsecondary Expectations from 10th grade to 12th grade by Postsecondary Enrollment Pattern

	12th grade expectations (%):				
	high school only	< 4-year degree	4-year degree	Advanced degree	N
10th grade expectations:					
Standard Enrollee:					
10th high school only	0.1	0.4	0.4	0.3	76
10th < 4-year degree	0.1	1.6	1.8	0.7	273
10th 4-year degree	0.2	3.3	21.5	13.8	2543
10th Advanced degree	0.2	1.2	14.3	40.3	3675
Delayer:					
10th high school only	0.4	1.8	1.6	0.5	24
10th < 4-year degree	1.2	8.0	4.1	1.4	83
10th 4-year degree	1.4	11.9	23.5	9.2	260
10th Advanced degree	1.6	4.6	12.9	15.9	198
Leaver:					
10th high school only	0.9	2.2	1.5	0.3	57
10th < 4-year degree	0.8	6.7	3.7	1.3	145
10th 4-year degree	1.3	11.6	21.8	9.8	517
10th Advanced degree	0.8	5.9	13.8	17.7	443
Delayer-Leaver:					
10th high school only	2.9	3.9	2.9	1.6	35
10th < 4-year degree	1.9	7.5	3.2	2.9	48
10th 4-year degree	3.2	13.0	15.6	7.1	120
10th Advanced degree	1.9	6.5	12.7	13.0	105
Nonenrollee:					
10th high school only	8.7	8.3	2.0	1.4	405
10th < 4-year degree	4.5	11.2	3.1	1.7	408
10th 4-year degree	4.7	14.5	13.3	5.3	753
10th Advanced degree	2.6	4.9	6.2	7.5	420

Note: Underlined percentages indicate students who maintained their aspirations

In each of the enrollment categories the highest percentage of students maintained, rather than reduced or increased, their expectations. Standard enrollees had the highest percentage of students who maintained expectations (63.5%) and delayer-

leavers (39.0%) and non-enrollees (40.7%) had the lowest. Other patterns appeared similar to those reported above with a higher percentage of students reducing their expectations rather than increasing their expectations across all enrollment categories.

In order to examine how patterns of change predicted postsecondary enrollment patterns, another multinomial logistic regression was run with standard enrollees as the referent group. The three category expectation variable (i.e., reduce, maintain, increase) was dummy-coded with maintained expectations as the referent group. The model with expectations change as a predictor had a lower SBIC (SBIC = 31105.11 as compared to SBIC = 31230.64 for the null model) and therefore showed the best data-model fit. Additionally, the likelihood ratio test indicated the model with the predictors was a better fit than the null model (χ^2 = 175.58, df = 8, p < 0.01).

Students who decreased their expectations rather than maintained them had greater odds of being classified as non-enrollees as compared to standard enrollees ($\widehat{\beta}$ = 0.453, $e^{\widehat{\beta}} = 1.57$, χ^2 = 7.32, p < 0.001). A similar pattern was observed for all other categories of enrollment (Delayer-leavers: $\widehat{\beta}$ = 0.887, $e^{\widehat{\beta}} = 2.43$, χ^2= 6.33, p < 0.001; Leavers: $\widehat{\beta}$ = 0.657, $e^{\widehat{\beta}} = 1.93$, χ^2 = 7.76, p < 0.001; Delayers: $\widehat{\beta}$ = 0.432, $e^{\widehat{\beta}} = 1.54$, χ^2 = 4.29, p < 0.001) as compared to standard enrollees. The only group that was significantly different from standard enrollees in terms of the odds of increasing their expectations as compared to maintaining their expectations was delayer-leavers who had higher odds of being classified as such ($\widehat{\beta}$ = 0.447, $e^{\widehat{\beta}} = 1.56$, χ^2 = 2.73, p = 0.006).

Research Question 2

RQ2.1: When students are in 10th grade, how do their ability beliefs and values for school in general influence their 10th grade postsecondary expectations?

In order to answer this first part of RQ2, structural equation modeling was used. The model was built from the CFA for ability beliefs and values presented in Chapter 3. From that model, pathways from Ability Beliefs to 10th Grade Expectations and Value to 10th Grade Expectations were specified. Finally, the covariates (GPA, math standardized test score, reading standardized test score, school program, and parents' aspirations) were examined as predictors of all variables in the model.

An issue emerged with the inclusion of the GPA variable in the model due to missing data on this variable. As mentioned previously, this is due to the fact that M*plus* conditions on the covariates and therefore will not include those individuals who are missing data if no other treatment for the variable is specified (Graham, 2009). There were two possible remedies for this issue. The first was to proceed with the analyses and allow listwise deletion to occur for the 895 students missing GPA. However, a series of t-tests showed that those students who were missing GPA were different in some ways from the students who were not missing this variable. Notably, those missing GPA tended to score lower on the standardized tests on average; there were also more males and more minority students missing GPA. Thus, another option was explored. This option involved imposing a distribution on the GPA variable by specifying a mean and a variance. Using this approach all cases could be included in the analyses.

There were strengths and weaknesses to both of these approaches. For the approach using listwise deletion, the model was more parsimonious because additional

parameters were not being added. However, the loss of the individuals missing GPA data changes the overall sample and therefore the generalizability of the results. Therefore, in order to determine the best model moving forward, models were run both ways and compared based on their overall data-model fit as well as the magnitude and significance of the pathways included in the model. Model comparisons were made to determine differences between overall model fit and the model parameter estimates and level of significance. Appendix E shows the side-by-by-side comparison of the models for both the analysis using listwise deletion and the one where a distribution was specified. The effect of the covariates on the model variables for both iterations of the model are also presented in Appendix E.

Although there were many similarities between the two models, there were some differences that were considered. Most notably, the model that eliminated the cases missing GPA data using listwise deletion showed better data-model fit than the model for which all cases were included likely due to the greater parsimony of the model. Also important to note is that although the magnitude of the estimates for the unstandardized paths in the model changed somewhat, the differences were not very large and their significance level did not change. Unstandardized coefficients were used for comparison purposes to ensure that the pathways being compared were in the same metric as the original variables (Kline, 2003).

A very similar pattern emerged in the observed relations between the covariates and the model variables. With the exception of the pathway from Reading Standardized Achievement Score to Value only being significant in the full sample, all other pathways were significant for both iterations of the model and were overall similar in direction and

magnitude. Based on the combination of these results the model that only included the more limited sample of participants who had full GPA data was selected moving forward. This is because the more parsimonious model was a much better fit to the data as models increased in complexity, for example, when the between group comparisons were performed. The final model is presented in Figure 8.

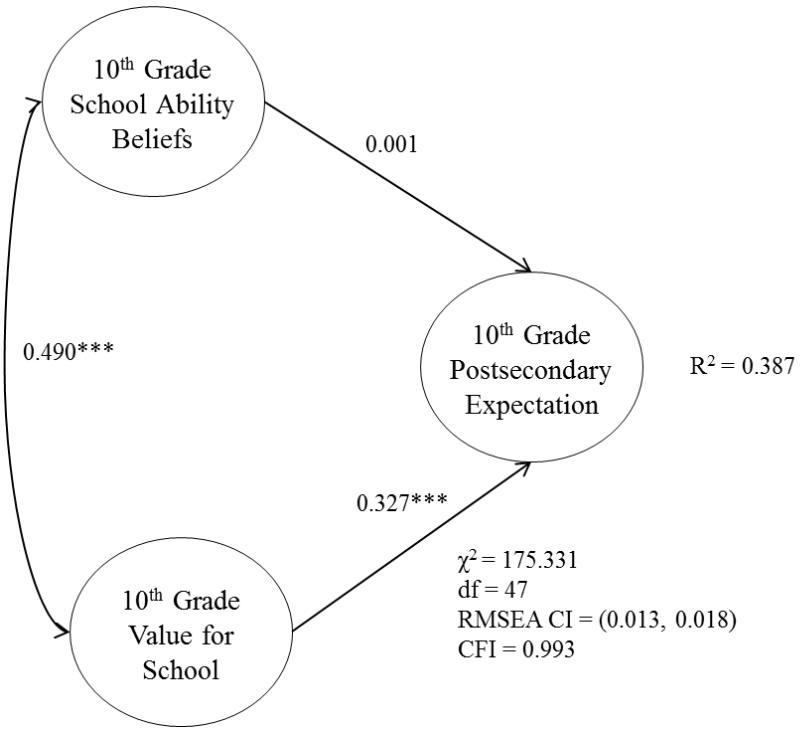


Figure 8. Standardized estimates for RQ2.1
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates and error terms not shown.

Note that while standardized coefficients are presented, the significance tests are associated with the unstandardized estimates. This is because standard errors and significance tests are not available for the weighted least squares estimator when covariates are included in the model and the model would not converge with a maximum likelihood estimator due to the complexity and number of integration points required

(Muthén & Muthén, 2011). Additionally, standardized and unstandardized significance are almost always equivalent (Muthén, 2011).

Students' beliefs about their ability were positively correlated with the value they reported for school. Students' value for school as measured in 10th grade positively predicted their postsecondary expectations at that point in time whereas their general school ability beliefs did not significantly predict these expectations. The relations between covariates and the variables in the model are presented in Table 14.

Table 14

Standardized and unstandardized estimates for relations between covariates and model variables for RQ2.1

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.174	0.093	0.009	< 0.001
Math → Ability beliefs	0.118	0.010	0.002	< 0.001
Reading → Ability beliefs	0.123	0.010	0.002	< 0.001
General Program → Ability beliefs	-0.345	-0.236	0.026	< 0.001
Vocational Program → Ability beliefs	-0.126	-0.163	0.038	< 0.001
Parents' Aspirations → Ability beliefs	0.140	0.090	0.010	< 0.001
GPA → Value	0.306	0.114	0.007	< 0.001
Math → Value	-0.175	-0.010	0.001	< 0.001
Reading → Value	0.008	0.000	0.001	0.701
General Program → Value	-0.489	-0.280	0.021	< 0.001
Vocational Program → Value	-0.226	-0.130	0.028	< 0.001
Parents' Aspirations → Value	0.189	0.085	0.007	< 0.001
GPA → Expectations	0.085	0.079	0.012	< 0.001
Math → Expectations	0.149	0.021	0.002	< 0.001
Reading → Expectations	0.108	0.015	0.002	< 0.001
General Program → Expectations	-0.051	-0.151	0.033	< 0.001
Vocational Program → Expectations	-0.059	-0.280	0.046	< 0.001
Parents' Aspirations → Expectations	0.218	0.245	0.011	< 0.001

Overall the relations between the covariates and the model variables were in the expected directions. Students with high GPAs reported higher levels of ability beliefs

and value for school as well as expected to complete more school. Higher standardized test scores were positively associated with students' ability beliefs and postsecondary expectations. However, this same relation was not observed between standardized test scores and value for school, which were negative and non-significant for math and reading, respectively. Students in general high school programs and vocational programs reported lower ability beliefs, value for school, and expectations for postsecondary education than those in college preparatory program tracks. Students' who perceived their parents had higher aspirations for their postsecondary enrollment also reported higher ability beliefs, value for school, and expectations to pursue postsecondary education.

RQ2.2: When students are in 10th grade, how do their ability beliefs and values for school in general influence their goal-directed behaviors?

Structural equation modeling was also used to answer this sub-question. However, before proceeding with the model it was necessary to fit a CFA for the Information-Seeking Behaviors. Thus, this CFA is presented first and then the structural equation model was built from these results.

Information-Seeking Behaviors CFA. As presented in Chapter 3, the EFA suggested that a three factor solution fit well and was the most theoretically justified and interpretable. The three factors were labeled Information-seeking from School Personnel, Information-seeking from Significant Others, and Information seeking from College Sources. Most items loaded clearly on one factor; however, college representative showed evidence of cross-loading on both the School Personnel and the College Sources factor. Therefore, three models were compared to determine which fit the data best. One

model specified college representative should load on the School Personnel factor, one specified it should load on the College Sources factor and the final model specified it should load on both factors. Table 15 presents fit indices for the three models specified.

Table 15

Model comparisons for10th grade information-seeking behavior CFAs

Model	χ^2	*df*	RMSEA	CFI
School Personnel Factor Only	522.77	32	0.038	0.968
College Sources Factor Only	404.54	32	0.033	0.976
Cross-loaded on Both Factors	236.85	31	0.025	0.987

While the two models where college representative loads on only one factor are nested within the model where it is specified to cross-load, the estimation procedure used in M*plus* provides a χ^2 value that cannot be used for traditional difference testing. Therefore, an alternative χ^2 difference test procedure was used to evaluate whether there were significant differences in model fit. These tests indicated that the model where the college representatives cross-loaded on both factors fit significantly better than one in which it only loaded on the School Personnel factor ($\chi^2 = 179.45$, $p < .001$) or the College Sources factor ($\chi^2 = 94.361$, $p < .001$). Therefore, based on multiple criteria, the model in which seeking information from college personnel loads on both factors was the best fitting model and was used moving forward. The full model with loadings is shown in Figure 9.

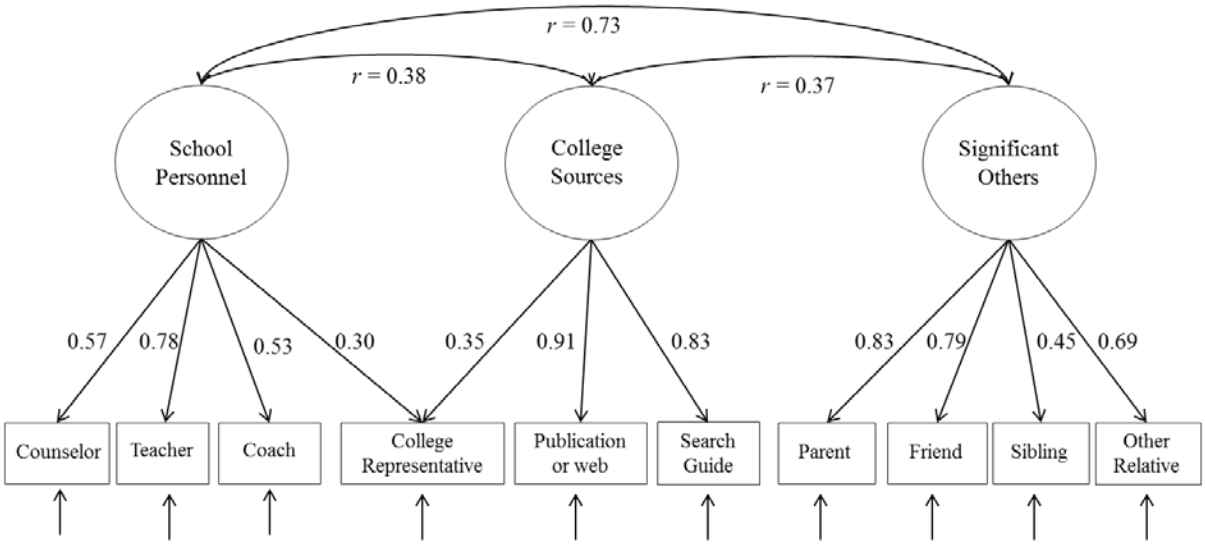


Figure 9. CFA for 10th Grade Information-Seeking Behaviors

To assess reliability of the factors, coefficient H was hand-calculated. H was 0.72 for Information-Seeking from School Personnel, 0.88 for Information-Seeking from College Sources and 0.84 for Information-Seeking from Significant Others. These values indicated sufficient reliability of the factors as values above 0.70 are considered desirable (Mueller & Hancock, 2010).

Full SEM for RQ2.2. The structural equation model for this sub-question was built from this factor structure. Using the CFA for information-seeking behaviors and the CFA for ability beliefs and value, pathways from ability beliefs to all three information-seeking factors and test-taking behaviors and value to all three information-seeking factors and test-taking behaviors were specified. Finally, the covariates (GPA, math standardized test score, reading standardized test score, school program, and parents' aspirations) were examined as predictors of all variables in the model. This model was again run two separate ways, once in which a distribution for GPA was specified and once in which those individuals missing GPA were eliminated using listwise deletion.

Appendix E presents these figures and the associated table showing how the covariates were related to each of the model variables.

Results from these two models showed a similar pattern to the parallel models specified for Research Question 2.1. Again, the model that eliminated the cases missing GPA data using listwise deletion showed better data-model fit than the model for which all cases were included. Also similar was the fact that although the magnitude of the unstandardized estimates for the paths in the model changed somewhat, the differences were not very large and overall the level of significance did not change. Therefore, only the model with the cases that have complete GPA information is presented here. Figure 10 shows the full structural equation model and Table 16 shows the relations between covariates and the variables in the model.

Ability beliefs were only significantly related to information seeking from school personnel whereas value for school was positively predictive of all goal-directed behaviors. The most amount of variance was explained in students' test-taking behaviors, whereas very little variance in information-seeking from significant others was explained. The effects of the covariates on ability beliefs and value for school were almost identical to those described above. Students' with higher GPAs and standardized test scores reported engaging in more test-taking behaviors, but sought less information from school personnel. Students' in general and vocational education programs were less likely than those in college preparatory programs to engage in goal-directed behaviors overall.

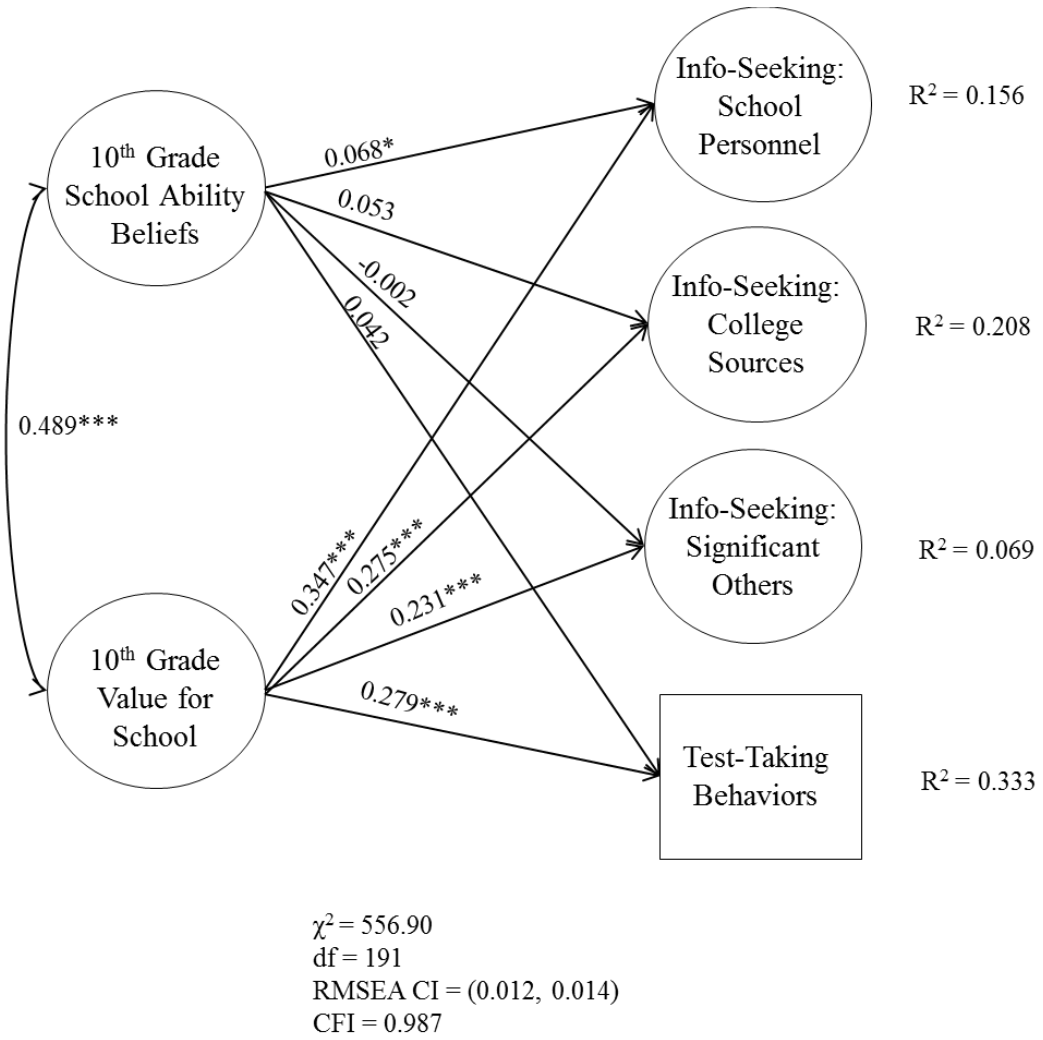


Figure 10. Standardized estimates for RQ2.2
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates, individual items for factors, error terms, and correlations between information-seeking and test-taking behaviors not shown.

Table 16

Estimates for relations between covariates and model variables for RQ2.2

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.174	0.093	0.009	< 0.001
Math → Ability beliefs	0.118	0.010	0.002	< 0.001
Reading → Ability beliefs	0.123	0.010	0.002	< 0.001
General Program → Ability beliefs	-0.288	-0.236	0.026	< 0.001
Vocational Program → Ability beliefs	-0.199	-0.164	0.038	< 0.001
Parents' Aspirations → Ability beliefs	0.140	0.090	0.010	< 0.001
GPA → Value	0.306	0.084	0.007	< 0.001
Math → Value	-0.175	-0.014	0.001	< 0.001
Reading → Value	0.007	-0.003	0.001	0.008
General Program → Value	-0.488	-0.287	0.021	< 0.001
Vocational Program → Value	-0.266	-0.203	0.020	< 0.001
Parents' Aspirations → Value	0.188	0.074	0.028	0.009
GPA → School Personnel	-0.092	-0.035	0.010	< 0.001
Math → School Personnel	0.039	0.002	0.002	0.184
Reading → School Personnel	-0.085	-0.005	0.002	0.005
General Program → School Personnel	-0.134	-0.078	0.026	0.003
Vocational Program → School Personnel	-0.066	-0.038	0.034	0.256
Parents' Aspirations → School Personnel	0.032	0.014	0.009	0.122
GPA → College Sources	-0.033	-0.021	0.014	0.144
Math → College Sources	0.060	0.006	0.002	0.011
Reading → College Sources	0.191	0.019	0.002	< 0.001
General Program → College Sources	-0.146	-0.141	0.036	< 0.001
Vocational Program → College Sources	-0.048	-0.046	0.054	0.398
Parents' Aspirations → College Sources	0.058	0.044	0.012	< 0.001
GPA → Significant Others	-0.012	-0.006	0.013	0.608
Math → Significant Others	0.045	0.004	0.002	0.054
Reading → Significant Others	-0.021	-0.002	0.002	0.375
General Program → Significant Others	-0.103	-0.088	0.031	0.004
Vocational Program → Significant Others	-0.085	-0.072	0.046	0.117
Parents' Aspirations → Significant Others	0.036	0.024	0.012	0.049
GPA → Test-taking Behaviors	0.068	0.051	0.014	< 0.001
Math → Test-taking Behaviors	0.155	0.018	0.003	< 0.001
Reading → Test-taking Behaviors	0.117	0.014	0.003	< 0.001
General Program → Test-taking Behaviors	-0.330	-0.330	0.034	< 0.001
Vocational Program → Test-taking Behaviors	-0.182	-0.182	0.052	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.100	0.092	0.012	< 0.001

Not shown on the figure to present a clearer picture of the model are the correlations between the information-seeking factors and the test-tasking behavior variable. All of the factors were significantly, positively correlated with one another. Information-seeking from school personnel was significantly correlated with information-seeking from college sources ($r = 0.309$, $z = 11.77$, $p < .001$), information-seeking from significant others ($r = 0.712$, $z = 24.19$, $p < .001$), and test-taking behaviors ($r = 0.162$, $z = 6.53$, $p < .001$). Information-seeking from college sources was significantly correlated with information-seeking from significant others ($r = 0.313$, $z = 14.49$, $p < .001$) and test-taking behavior ($r = 0.255$, $z = 10.99$, $p < .001$), and information-seeking from significant others was also significantly correlated with test-taking behavior ($r = 0.156$, $z = 6.62$, $p < .001$). Overall the relations between the covariates and the model variables were in the expected directions.

RQ2.3: When students are in 10th grade, how do their postsecondary expectations predict postsecondary enrollment, and do their goal-directed behaviors mediate the relation between their postsecondary expectations and their actual enrollment?

Initially, the models at this step were specified with actual enrollment included as the five category nominal outcome variable described in Chapter 3. However, due to the complexity of the models, the model would not converge because too many points of integration were required. Each non-continuous factor indicator requires one point of integration and the models used in the current study contain almost all non-continuous factors indicators. Thus, the number of integration points far exceeded the recommended

maximum of four (Muthén, 2011). Therefore, the outcome variable was recoded into a three category, ordered categorical outcome.

Three original categories – delayers, leavers, and delayer-leavers – were collapsed into a middle category that encompassed "some postsecondary enrollment". Thus, the three categories for the outcome variable were: Never enrolled in postsecondary education following high school graduation (n = 2846, 22.8%), Enrolled for some period of time following high school graduation (n = 2479, 19.8%), or Enrolled continuously from high school graduation to the time of data collection (n = 7184, 57.4%). This recoding was necessary to move forward with the research questions. The implications of this decision are elaborated in the discussion of the results in Chapter 5.

Different models were run at this step to determine the best fitting model for the data. Following the procedure used to answer the first two sub-questions, all models were run both with the full sample and a distribution assigned to GPA as well as only including those cases with GPA information. Similar to the prior analyses the models which only included those students with GPA showed better data-model fit, relatively small differences in parameter estimates, and no difference in significance levels. Therefore, only the models that included respondents with full GPA data are reported.

In order to examine whether goal-directed behaviors mediated the relation between postsecondary expectations and postsecondary enrollment, two specific models were examined at this step. The first model was one in which students' expectations for postsecondary education in 10th grade were allowed to have both a direct effect on postsecondary enrollment patterns and an indirect effect through information-seeking and test-taking behaviors (χ^2 = 392.57, df = 94, CFI = 0.981, RMSEA CI = (0.015, 0.018)).

The second model was one in which these expectations were specified to have only an indirect effect on enrollment through information-seeking and test-taking behaviors (χ^2 = 462.18, *df* = 95, CFI = 0.977, RMSEA CI = (0.017, 0.020)). Although both models fit the data well, the model which specified both direct and indirect effects of expectations on enrollment showed significantly better data-model fit based on the χ^2 difference test (χ^2 = 88.50, *df* = 1, $p < .001$). Additionally, the direct effect of 10th grade postsecondary expectations on postsecondary enrollment was significant and therefore this model was selected. The final model is presented in Figure 11. Table 17 shows the relations between covariates and the variables in the model.

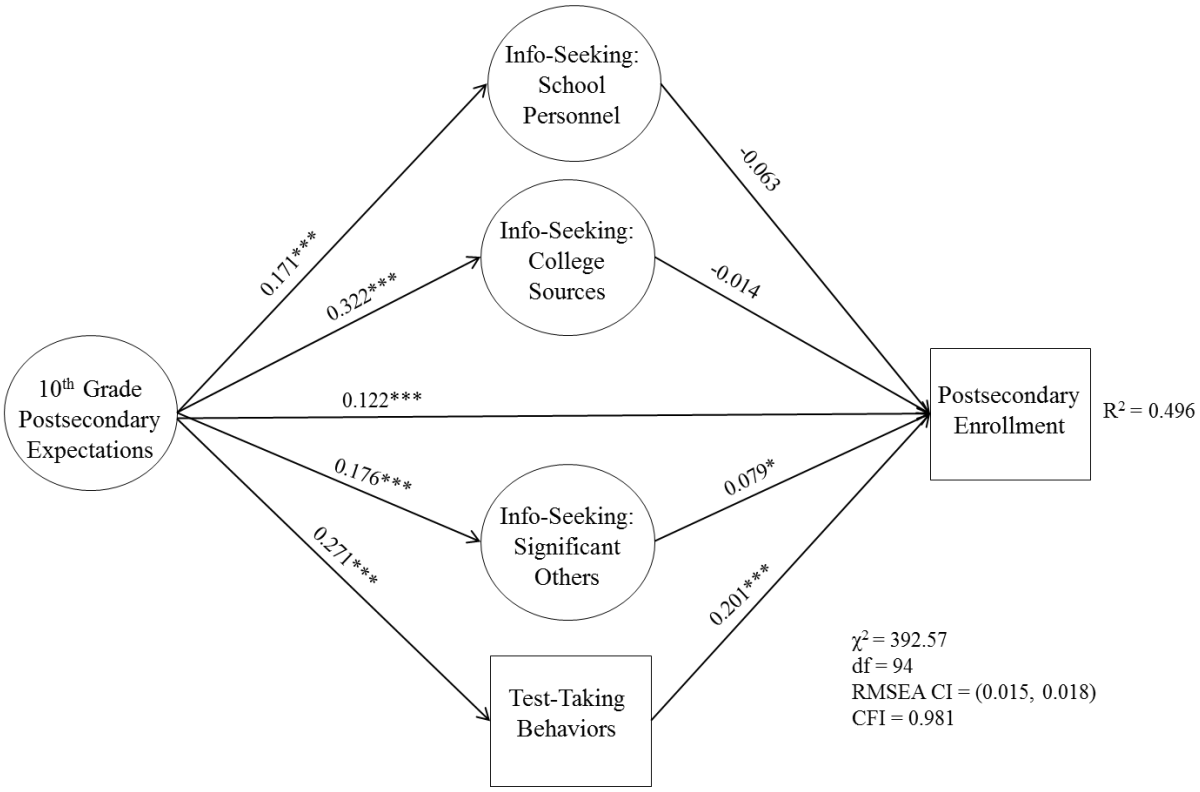


Figure 11. Standardized estimates for RQ2.3
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates, individual items for factors, error terms, and correlations between information-seeking and test-taking behaviors not shown.

Indirect effects of expectations on enrollment were also estimated in this version of the model. In addition to the direct effect of 10th grade postsecondary expectations on college enrollment, these expectations also had an indirect effect on enrollment through test-taking behavior ($\beta = 0.055$, $z = 9.52$, $p < .001$), and information seeking from significant others ($\beta = 0.014$, $z = 2.40$, $p = .016$). Indirect effects through information seeking from school personnel and college sources were not significant.

Postsecondary expectations at 10th grade were significantly and positively related to all of the goal-directed behaviors as well as actual postsecondary enrollment. Only information-seeking from significant others and test-taking behaviors significantly predicted students' postsecondary enrollment. The relations between postsecondary expectations and goal-directed behaviors were almost identical to those relations described above. Relations between the covariates and postsecondary enrollment were as expected with those students who had higher GPAs and standardized test scores more likely to enroll in postsecondary education. Additionally, students' with higher perceived parental postsecondary aspirations were more likely to enroll in postsecondary education. Those students in general and vocational education programs in high school were less likely than those in college preparatory programs to enroll in postsecondary education.

Table 17

Estimates for relations between covariates and model variables

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Expectations	0.185	0.172	0.011	< 0.001
Math → Expectations	0.092	0.013	0.002	< 0.001
Reading → Expectations	0.110	0.016	0.002	< 0.001
General Program → Expectations	-0.379	-0.379	0.033	< 0.001
Vocational Program → Expectations	-0.386	-0.386	0.048	< 0.001
Parents' Aspirations → Expectations	0.280	0.315	0.012	< 0.001
GPA → School Personnel	-0.006	-0.003	0.010	0.777
Math → School Personnel	-0.029	-0.002	0.002	0.315
Reading → School Personnel	-0.094	-0.007	0.002	0.002
General Program → School Personnel	-0.278	-0.194	0.031	< 0.001
Vocational Program → School Personnel	-0.115	-0.080	0.042	0.055
Parents' Aspirations → School Personnel	0.059	0.032	0.012	0.006
GPA → College Sources	0.001	0.001	0.029	0.962
Math → College Sources	-0.012	-0.003	0.005	0.585
Reading → College Sources	0.164	0.036	0.006	< 0.001
General Program → College Sources	-0.210	-0.461	0.087	< 0.001
Vocational Program → College Sources	-0.033	-0.072	0.121	0.555
Parents' Aspirations → College Sources	0.027	0.047	0.030	0.119
GPA → Significant Others	0.027	0.027	0.022	0.213
Math → Significant Others	-0.012	-0.002	0.003	0.603
Reading → Significant Others	-0.039	-0.006	0.004	0.088
General Program → Significant Others	-0.169	-0.263	0.056	< 0.001
Vocational Program → Significant Others	-0.089	-0.139	0.056	0.090
Parents' Aspirations → Significant Others	0.030	0.036	0.022	0.105
GPA → Test-taking Behaviors	0.110	0.086	0.014	< 0.001
Math → Test-taking Behaviors	0.087	0.011	0.003	< 0.001
Reading → Test-taking Behaviors	0.094	0.011	0.003	< 0.001
General Program → Test-taking Behaviors	-0.434	-0.434	0.032	< 0.001
Vocational Program → Test-taking Behaviors	-0.185	-0.185	0.053	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.083	0.078	0.013	< 0.001
GPA → Enrollment	0.381	0.350	0.013	< 0.001
Math → Enrollment	0.090	0.013	0.002	< 0.001
Reading → Enrollment	0.054	0.008	0.002	0.002
General Program → Enrollment	-0.100	-0.100	0.037	0.007
Vocational Program → Enrollment	-0.209	-0.209	0.050	< 0.001
Parents' Aspirations → Enrollment	0.075	0.083	0.014	< 0.001

RQ2.4: How does the final proposed model fit for students in 10th grade? How does the final model depicting motivational processes in 10th grade differ by gender, Ethnicity and SES quartiles?

As a first step in exploring this research sub-question the full structural equation model examining the relations between school ability beliefs, value for school, postsecondary expectations, goal-directed behaviors, and postsecondary enrollment was specified and fit for the entire sample. Initially, the models at this step included actual enrollment included as the five category nominal outcome. However, similar to the results for research sub-question 2.3, these models would not converge. Therefore, the model was re-specified using the 3 category outcome described above.

For this research question a measurement model was initially fit to the data in which no structural paths were specified and all variables were allowed to correlate. The measurement model showed good data-model fit (χ^2 = 616.36, *df* = 215, CFI = 0.987, RMSEA CI = (0.011, 0.014)). Next, the structural model was specified and run and a χ^2 difference test was performed. The results of this test indicated that the structural model was not a worse fit to the data than the measurement model (χ^2 = 4.48, *df* = 2. $p < .11$). This indicates that the proposed theoretical relations between the model variables is tenable. The final model for the full sample is shown in Figure 12 and the relations between the covariates and the model variables are presented in Table 18.

Although not displayed in the figure for the sake of parsimony, goal-directed behaviors were significantly correlated with one another. Information-seeking from school personnel was significantly correlated with college sources (r = 0.356, z = 8.26, $p < .001$), significant others (r = 0.776, z = 13.66, $p < .001$), and test-taking behaviors (r =

0.136, $z = 6.47$, $p < .001$). Information-seeking from college sources was significantly correlated with significant others ($r = 0.339$, $z = 8.04$, $p < .001$) and test-taking behavior ($r = 0.320$, $z = 7.30$, $p < .001$), and information-seeking from significant others was significantly correlated with test-taking behavior ($r = 0.125$, $z = 5.68$, $p < .001$).

Results for the model as a whole were overall very similar to those for the individual pieces explored in-depth in the previous research sub-questions. The only differences were that school ability beliefs were positively, significantly related to test-taking behaviors in this model and information-seeking from school personnel was significantly, negatively predictive of students' postsecondary enrollment. Relations between the covariates and the model variables were very similar to those described for the earlier sub-questions.

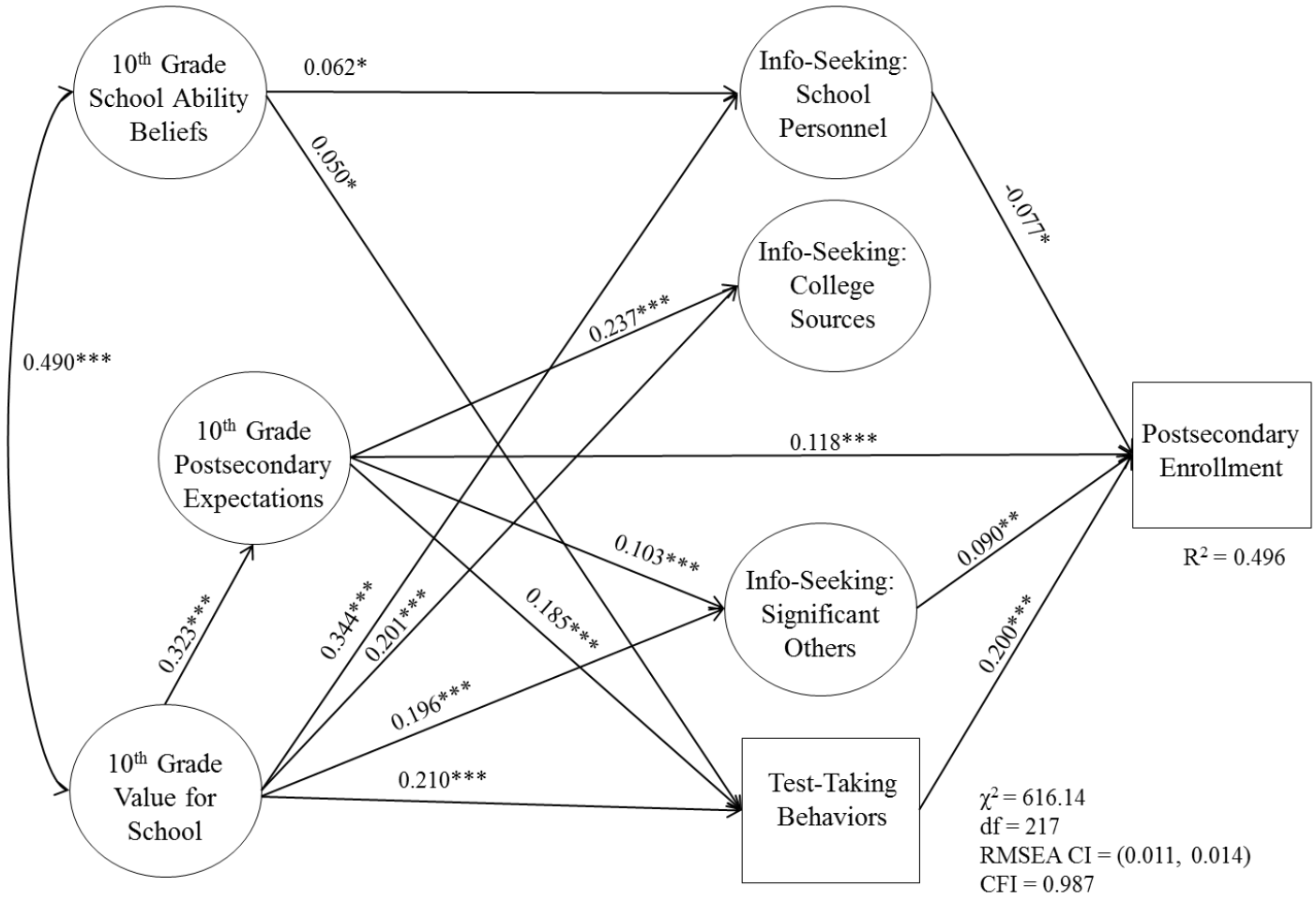


Figure 12. Standardized estimates for RQ2.4
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates, individual items for factors, error terms, and correlations between information-seeking and test-taking behaviors not shown. All non-significant pathways were removed from diagram to conserve space.

Table 18

Estimates for relations between covariates and model variables for RQ 2.4

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.174	0.135	0.013	< 0.001
Math → Ability beliefs	0.118	0.014	0.003	< 0.001
Reading → Ability beliefs	0.123	0.015	0.002	< 0.001
General Program → Ability beliefs	-0.288	-0.341	0.038	< 0.001
Vocational Program → Ability beliefs	-0.199	-0.237	0.055	< 0.001
Parents' Aspirations → Ability beliefs	0.140	0.131	0.015	< 0.001
GPA → Value	0.306	0.135	0.009	< 0.001
Math → Value	-0.175	-0.012	0.002	< 0.001
Reading → Value	0.008	0.001	0.001	0.703
General Program → Value	-0.489	-0.330	0.025	< 0.001
Vocational Program → Value	-0.227	-0.153	0.033	< 0.001
Parents' Aspirations → Value	0.189	0.100	0.008	< 0.001
GPA → Expectations	0.185	0.051	0.012	< 0.001
Math → Expectations	0.092	0.022	0.002	< 0.001
Reading → Expectations	0.110	0.014	0.002	< 0.001
General Program → Expectations	-0.379	-0.082	0.034	0.017
Vocational Program → Expectations	-0.386	-0.242	0.047	< 0.001
Parents' Aspirations → Expectations	0.280	0.222	0.012	< 0.001
GPA → School Personnel	-0.072	-0.033	0.011	0.003
Math → School Personnel	-0.062	-0.004	0.002	0.032
Reading → School Personnel	-0.133	-0.009	0.002	< 0.001
General Program → School Personnel	-0.183	-0.128	0.032	< 0.001
Vocational Program → School Personnel	-0.017	-0.012	0.042	0.781
Parents' Aspirations → School Personnel	-0.042	-0.023	0.013	0.073
GPA → College Sources	-0.043	-0.061	0.030	0.042
Math → College Sources	-0.033	-0.007	0.005	0.128
Reading → College Sources	0.138	0.030	0.006	< 0.001
General Program → College Sources	-0.147	-0.320	0.086	< 0.001
Vocational Program → College Sources	0.031	0.068	0.123	0.582
Parents' Aspirations → College Sources	-0.039	-0.068	0.033	0.039
GPA → Significant Others	-0.007	-0.007	0.022	0.759
Math → Significant Others	-0.028	-0.004	0.004	0.213
Reading → Significant Others	-0.058	-0.009	0.004	0.013
General Program → Significant Others	-0.121	-0.191	0.057	0.001
Vocational Program → Significant Others	-0.041	-0.065	0.084	0.442
Parents' Aspirations → Significant Others	-0.020	-0.025	0.024	0.296

GPA → Test-taking Behaviors	0.069	0.057	0.015	< 0.001
Math → Test-taking Behaviors	0.066	0.009	0.003	0.002
Reading → Test-taking Behaviors	0.070	0.009	0.003	0.002
General Program → Test-taking Behaviors	-0.383	-0.383	0.035	< 0.001
Vocational Program → Test-taking Behaviors	-0.120	-0.120	0.057	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.070	0.020	0.014	0.154
GPA → Enrollment	0.377	0.346	0.013	< 0.001
Math → Enrollment	0.088	0.013	0.002	< 0.001
Reading → Enrollment	0.051	0.007	0.002	0.003
General Program → Enrollment	-0.109	-0.109	0.037	0.003
Vocational Program → Enrollment	-0.206	-0.206	0.051	< 0.001
Parents' Aspirations → Enrollment	0.070	0.078	0.014	< 0.001

The next step was to explore group differences in the overall model. This was done in several different steps. First, means of the groups on the factors were compared by regressing the factors on the group (e.g. ability beliefs regressed on gender). Second, models fully constrained to be equivalent across groups were fit. The constraints for each individual pathway between factors in the model were released and a χ^2 difference test was performed to determine whether the models fit better when the pathways were constrained to be equal versus unconstrained and therefore allowed to vary across groups. Results are reported for each group comparison performed.

Gender. Results when gender was entered in the model to examine mean differences revealed several significant differences across males and females. Due to the specification of the groups and how M*plus* chooses the referent category, negative coefficients indicate that females had higher means on the factor as compared to males whereas positive values indicate females had lower means on the factor as compared to males. Standardized values are reported for all analyses.

Males reported higher ability beliefs in school (β = 0.081, z = 2.66, p = .008), but females reported higher value for school (β = -0.178, z = -5.64, p < .001). Females reported higher expectations for attending postsecondary education than males (β = -0.232, z = -7.52, p < .001). Males were more likely to report seeking information from school personnel (β = 0.120, z = 3.42, p = .001) whereas females were more likely to report seeking information from significant others (β = -0.252, z = -7.30, p < .001) and college sources (β = -0.232, z = -6.42, p < .001), and females were also more likely to engage in test-taking behaviors (β = -0.117, z = -3.12, p < .001). There were no significant differences in actual postsecondary enrollment by gender (β = 0.014, z = 0.38, p = .707).

In order to examine whether pathways differed between males and females the models were first specified in M*plus* as fully constrained to be equivalent across groups. One by one each pathway was released and a χ^2 difference test was performed to examine whether the unconstrained model showed better data-model fit than the constrained model and therefore indicated that the paths were not equivalent across groups. All pathways (19 total) were tested, even those that were non-significant in the full model and the parameter values for the two groups are presented in Table 19.

Only 5 of the pathways showed non-invariance across gender. Ability beliefs were not significantly predictive of seeking information from significant others for females, but they were for males. For all other pathways that showed invariance across genders, the relations for males were stronger than those for females, as evidenced by the larger standardized regression coefficients.

Table 19

Standardized and Unstandardized Estimates for Model Variable Relations by Gender

	Female				Male			
Pathway	Std.	Unstd.	S.E.	p-value	Std.	Unstd.	S.E.	p-value
Ability beliefs → Expectations	-0.027	-0.033	0.029	0.261	0.045	0.057	0.032	0.072
Ability beliefs → School personnel	0.079	0.077	0.042	0.065	0.041	0.039	0.035	0.271
*Ability beliefs → Significant others	-0.031	-0.028	0.033	0.386	0.067	0.061	0.031	0.046
Ability beliefs → College sources	0.028	0.044	0.035	0.211	0.098	0.098	0.037	0.008
Ability beliefs → Test taking	0.043	0.047	0.034	0.171	0.069	0.075	0.032	0.019
*Value → Expectations	0.299	0.313	0.024	< 0.001	0.322	0.373	0.025	< 0.001
Value → School personnel	0.347	0.291	0.039	< 0.001	0.339	0.298	0.038	< 0.001
*Value → Significant others	0.113	0.297	0.032	< 0.001	0.218	0.185	0.032	< 0.001
Value → College sources	0.149	0.128	0.034	< 0.001	0.217	0.204	0.036	< 0.001
Value → Test taking	0.183	0.171	0.031	< 0.001	0.217	0.219	0.031	< 0.001
Expectations → School personnel	0.021	0.017	0.026	0.516	0.051	0.039	0.028	0.163
*Expectations → Significant others	0.026	0.019	0.024	0.416	0.149	0.110	0.024	< 0.001
Expectations → College sources	0.227	0.190	0.025	< 0.001	0.214	0.170	0.025	< 0.001
*Expectations → Test taking	0.140	0.123	0.021	< 0.001	0.213	0.189	0.021	< 0.001
Expectations → Enrollment	0.101	0.101	0.019	< 0.001	0.133	0.133	0.019	< 0.001
School personnel → Enrollment	-0.120	-0.151	0.054	0.005	-0.076	-0.098	0.052	0.057
Significant others → Enrollment	0.086	0.115	0.051	0.025	0.124	0.170	0.052	0.001
College sources → Enrollment	-0.024	-0.029	0.034	0.390	0.010	0.013	0.032	0.692
Test taking → Enrollment	0.184	0.205	0.028	< 0.001	0.217	0.250	0.031	< 0.001

Note that only those pathways marked with an * showed significant differences across males and females.

Ethnicity. In order to first explore mean differences in the factors by ethnicity the dummy-coded variables described in Chapter 3 were used with White as the referent group. Asian and students of other ethnicities were not significantly different from white students in their school ability beliefs, but both Black/African American (β = 0.424, z = 8.56, p < .001) and Hispanic/Latino students (β = 0.209, z = 5.47, p < .001) both reported higher school ability beliefs as compared to White students. All four groups reported significantly higher value for school than White students (Black/African American: β = 0.632, z = 12.66, p < .001, Hispanic/Latino: β = 0.419, z = 9.41, p < .001, Asian: β = 0.207, z = 4.14, p < .001, Other: β = 0.182, z = 2.90, p = .004). Students classified in the other ethnicity category reported higher postsecondary expectations than White students (β = 0.116, z = 2.10, p < .001) whereas Hispanic/Latino students reported lower postsecondary expectations (β = -0.133, z = -2.97, p < .001). Differences between White students and Black/African American and Asian students were not significant.

There were very few differences between groups in their goal-directed behaviors. No differences between ethnic groups were observed in their information seeking from school personnel or information seeking from college sources. Hispanic/Latino students were less likely than White students to seek information from significant others (β = -0.216, z = -4.01, p < .001) but no other mean group differences were observed for this factor. Test-taking behaviors did differ significantly by group. Asian (β = 0.163, z = 2.67, p = .008) and Black/African American students (β = 0.283, z = 4.70, p < .001) reported higher levels of test-taking behaviors than White students whereas Hispanic/Latino students reported less (β = -0.092, z = -2.03, p = .042). Finally, actual enrollment differences were observed across groups with Asian students being more

likely to enroll in postsecondary education than White students (β = 0.257, z = 4.39, p < .001) and students of other ethnicities being less likely to enroll (β = -0.216, z = -3.00, p < .003). There were no enrollment differences between White and Black/African American and White and Hispanic/Latino students.

Next, similar to the procedure for testing gender differences, models were first specified in M*plus* as fully constrained to be equivalent across ethnic groups. One by one each pathway was released and a χ^2 difference test was performed to examine whether the unconstrained model showed better data-model fit than the constrained model and therefore indicated that the paths were not equivalent across groups. All pathways (19 total) were tested, even those that were non-significant in the full model.

Only four of the χ^2 difference tests were significant and therefore offered evidence of non-invariance across ethnicities. Value for school positively predicted expectations across the four groups, but was stronger for some ethnic groups as compared to others with Asian students showing the weakest relation between these two constructs (White: β = 0.320, z = 15.79, p < .001; Asian: β = 0.155, z = 3.74, p < .001; Black/African-American: β = 0.244, z = 5.31, p < .001; Hispanic/Latino: β = 0.250, z = 6.89, p < .001; Other: β = 0.406, z = 8.41, p < .001). Asian students emerged as the group that seemed to differ most from the other ethnic groups in all of the pathways that showed significant group differences. The relation between postsecondary expectations and information-seeking from college sources was non-significant only for Asian students (β = 0.009, z = 0.13, p = .897), but somewhat similar in magnitude for the other ethnic groups (White: β = 0.243, z = 8.96, p < .001; Black/African-American: β = 0.245, z = 4.18, p < .001; Hispanic/Latino: β = 0.251, z = 4.56, p < .001; Other: β = 0.282, z = 3.24, p < .001). This

was also evident in the relation between postsecondary expectations and enrollment (Asian: β = -0.031, z = -0.63, p = .531; White: β = 0.135, z = 7.26, p < .001; Black/African-American: β = 0.114, z = 3.00, p = .003; Hispanic/Latino: β = 0.128, z = 3.71, p < .001; Other: β = 0.097, z = 1.64, p = .100), and test-taking behaviors and enrollment (Asian: β = 0.002, z = 0.03, p = .979; White: β = 0.221, z = 9.26, p < .001; Black/African-American: β = 0.207, z = 4.71, p < .001; Hispanic/Latino: β = 0.161, z = 3.71, p < .001; Other: β = 0.216, z = 2.90, p = .004).

SES. In order to first explore mean differences in the factors by SES the dummy-coded variables described in Chapter 3 were used with the highest quartile as the referent group. Students in the second (β = -0.082, z = -2.36, p = .018) and third (β = -0.082, z = -2.27, p = .023) SES quartiles reported lower mean ability beliefs that those in the highest quartile. Students in the first and second SES quartiles reported higher mean value for school than those in the highest quartile (β = 0.360, z = 8.02, p < .001 and β = 0.159, z = 3.59, p < .001, respectively). Students in all three SES quartiles reported lower postsecondary expectations than those in the highest SES quartile (First: β = -0.347, z = -7.84, p < .001; Second: β = -0.247, z = -5.62, p < .001; Third = β = -0.110, z = -2.58, p = .010).

Students in the lowest SES quartile reported going to significant others for information about college less than those in the highest SES quartile (β = -0.375, z = -7.16, p < .001). Those in the second SES quartile reported going to significant others (β = -0.264, z = -5.59, p < .001) or college sources (β = -0.090, z = -2.00, p = .045) for information less than those in the highest SES quartile. Individuals in all three of the lower SES quartiles also reported less test-taking behaviors (First: β = -0.430, z = -7.77, p

< .001; Second: β = -0.357, z = -7.27, p < .001; Third = β = -0.195, z = -4.04, p < .001). Finally, students in the three lower SES quartiles were also less likely to actually enroll in postsecondary education as compared to those in the highest quartile (First: β = -0.652, z = -12.37, p < .001; Second: β = -0.464, z = -9.29, p < .001; Third = β = -0.262, z = -5.27, p < .001).

Only 5 of the 19 pathways showed evidence of non-invariance across SES quartiles and therefore only those will be discussed. The relation between ability beliefs and postsecondary expectations in 10th grade was only significant for those in the lowest and highest SES quartiles. Further, the relation between these two constructs was positive for those in the lowest quartile (β = 0.105, z = 3.33, p < .001), whereas it was negative for those in the highest quartile (β = -0.072, z = -2.32, p = .019) and was non-significant for those in the second and third SES quartile. Two paths were only significant for the lowest SES quartile, although these paths were also significant in the overall model. These were the paths that represented the relation between ability beliefs and test-taking behaviors (β = -0.072, z = 2.45, p = .019) and information-seeking from significant others on enrollment (β = -0.072, z = 2.30, p = .019).

The other two paths that showed non-invariance across SES quartiles differed in the strength of the relation between groups. The relation between value for school and postsecondary expectations at 12th grade decreased in strength across the quartiles (First: β = 0.391, z = 12.84, p < .001; Second: β = 0.361, z = 11.70, p < .001; Third: β = 0.345, z = 11.03, p < .001; Fourth: β = 0.322, z = 11.40, p < .001). The strength of the relation between test-taking behaviors and enrollment also differed across SES quartiles (First: β

= 0.264, z = 6.80, p < .001; Second: β = 0.140, z = 4.29, p < .001; Third: β = 0.178, z = 4.51, p < .001; Fourth: β = 0.168, z = 4.14, p < .001).

Summary of results for research question two. To summarize, students' school ability beliefs were not significantly related to students' postsecondary expectations or many of the goal-directed behaviors. Value for school, however, was significantly, positively related to students' postsecondary expectations as well as their goal-directed behaviors. Postsecondary expectations were positively related to goal-directed behaviors and positively predicted students' postsecondary enrollment. Relations between the covariates and the model variables were primarily in the expected directions. There were also significant differences in the mean levels of some of the model variables by students' demographics. Further, some of the relations between model variables showed evidence of non-invariance between groups. These differences, as well as their implications, will be discussed in depth in Chapter 5.

Research Question 3

RQ3.1: When students are in 10th grade, how do their ability beliefs and values for school in general influence their postsecondary expectations in 12th grade?

Similar to the procedure for research sub-question 2.1, the model was built from the CFA for ability beliefs and values presented in Chapter 3. From that model, pathways from Ability Beliefs to 12th Grade Postsecondary Expectations and Value and 12th Grade Postsecondary Expectations were specified. Finally, the covariates (GPA, math standardized test score, reading standardized test score, school program, and

parents' aspirations) were examined as predictors of all variables in the model. Postsecondary expectations at 10th grade were also controlled for in this model.

Similar to the approach used for research sub-question 2.1 the same model was run two slightly different ways. The first iteration eliminated those respondents who did not have GPA information using listwise deletion. This model showed very good data-model fit (χ^2 = 162.74, df = 47, CFI = 0.994, RMSEA CI = (0.012, 0.017)). Similar to the results reported for the models for research sub-question 2.1 the model in which a distribution for GPA was specified allowing all cases to be included did not fit as well (χ^2 = 1237.71, df = 45, CFI = 0.949, RMSEA CI = (0.041, 0.045)). Thus, only the results from the model that includes cases not missing GPA are reported here. The final model is presented in Figure 13.

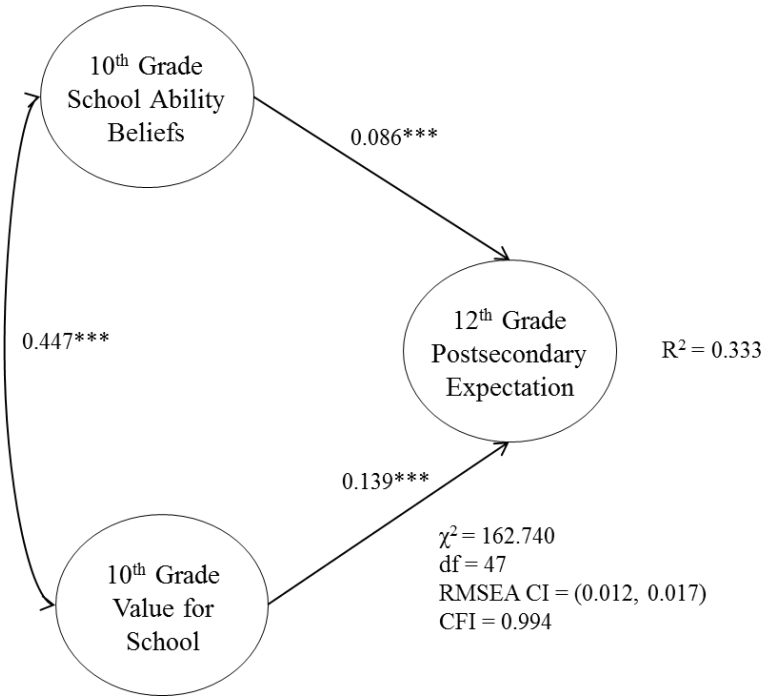


Figure 13. Standardized estimates for RQ3.1
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates and error terms not shown.

The model is similar to the one reported for research sub-question 2.1. The main difference is that school ability beliefs significantly and positively predicted 12th grade expectations whereas this pathway was not significant when 10th grade expectations were in the model. The relations between covariates and the variables in the model are presented in Table 20. Overall the relations between the covariates and the model variables were in the expected directions and were very similar to those found in research sub-question 2.1. Students with high GPAs and standardized test scores also reported higher levels of ability beliefs and value for school as well as expected to complete more school. Students in general high school programs and vocational programs reported lower ability beliefs, value for school, and expectations for postsecondary education than those in college preparatory program tracks. Students' who perceived their parents had higher aspirations for their postsecondary enrollment also reported higher ability beliefs, value, and expectations to attend postsecondary education.

Table 20

Standardized and unstandardized estimates for relations between covariates and model variables for RQ 3.1

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.174	0.090	0.010	< 0.001
Math → Ability beliefs	0.118	0.010	0.002	< 0.001
Reading → Ability beliefs	0.123	0.010	0.002	< 0.001
General Program → Ability beliefs	-0.288	-0.235	0.026	< 0.001
Vocational Program → Ability beliefs	-0.199	-0.163	0.038	< 0.001
Parents' Aspirations → Ability beliefs	0.140	0.090	0.010	< 0.001
GPA → Value	0.306	0.086	0.007	< 0.001
Math → Value	-0.175	-0.010	0.001	< 0.001
Reading → Value	0.008	0.000	0.001	0.724
General Program → Value	-0.488	-282	0.021	< 0.001
Vocational Program → Value	-0.225	-0.130	0.028	< 0.001
Parents' Aspirations → Value	0.188	0.054	0.007	< 0.001
GPA → Expectations	0.203	0.200	0.011	< 0.001
Math → Expectations	0.115	0.017	0.003	< 0.001
Reading → Expectations	0.060	0.009	0.002	< 0.001
General Program → Expectations	-0.066	-0.206	0.035	< 0.001
Vocational Program → Expectations	-0.087	-0.437	0.046	< 0.001
Parents' Aspirations → Expectations	0.192	0.228	0.011	< 0.001

RQ3.2: When students are in 10th grade, how do their ability beliefs and values for school in general influence their goal-directed behaviors?

Structural equation modeling was also used to answer this sub-question. Because the information-seeking behaviors were also measured at 12th grade it was necessary to fit a CFA for the Information-Seeking Behaviors again because the one presented for research sub-question 2.2 used the measures collected when students were in 10th grade. Thus, this CFA is presented first and then the structural equation model was built from these results.

Information Seeking CFA. As presented in Chapter 3, the EFA of the twelfth grade students' responses to this measure suggested that a three factor solution fit well and was the most theoretically justified and interpretable. The three factors were labeled Information-seeking from School Personnel, Information-seeking from Significant Others, and Information seeking from College Sources. Most items loaded clearly on one factor; however, college representative showed evidence of cross-loading on both the School Personnel and the College Sources factor. Therefore, three models were compared to determine which fit the data best. One model specified college representative should load on the School Personnel factor, one specified it should load on the College Sources factor and the final model specified it should load on both factors. Overall model fit values were first compared to determine what model would be best moving forward. Table 21 presents these values.

Table 21

Model comparisons for 12th Grade information-seeking behavior CFAs

Model	χ^2	*df*	RMSEA	CFI
School Personnel Factor Only	718.17	32	0.049	0.920
College Sources Factor Only	419.65	32	0.037	0.955
Cross-loaded on Both Factors	305.49	31	0.032	0.968

Second, as described for research sub-question 2.2, an alternative χ^2 difference test procedure was used to evaluate whether there were significant differences in model fit. These tests indicated that the model where the college representatives cross-loaded on both factors fit significantly better than one in which it only loaded on the school personnel factor ($\chi^2 = 273.68$, $p < .001$) or the college sources ($\chi^2 = 86.45$, $p < .001$). The model in which seeking information from college personnel loads on both factors was the

best fitting model and was used moving forward. The full model with loadings is shown in Figure 14.

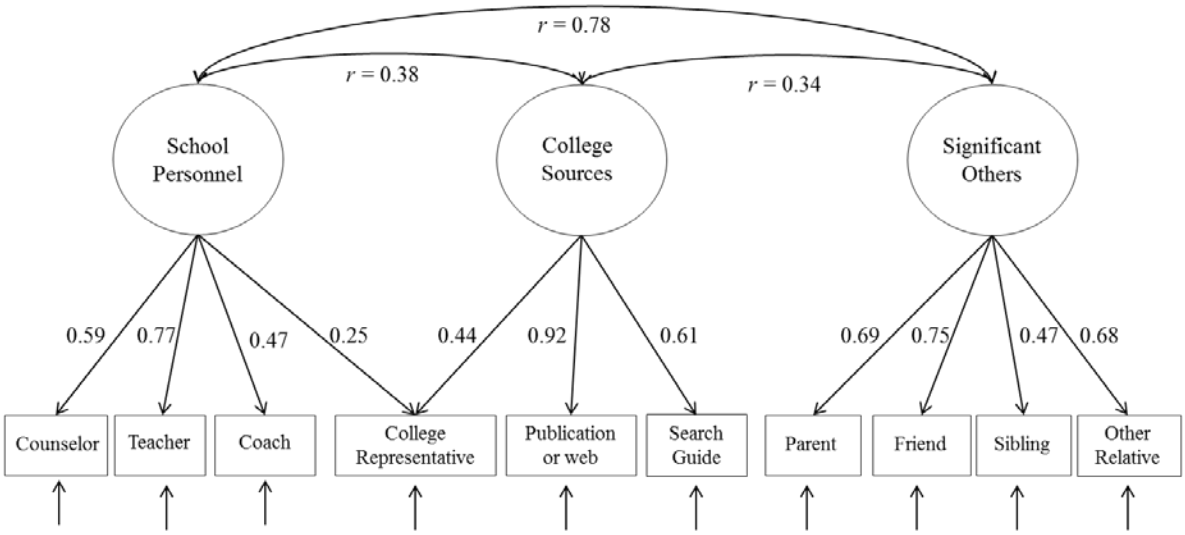


Figure 14. CFA for 12th Grade Information-Seeking Behaviors

To assess reliability of the factors coefficient H was hand-calculated. H was 0.70 for Information-Seeking from School Personnel, 0.87 for Information-Seeking from College Sources and 0.77 for Information-Seeking from Significant Others. These values indicated sufficient reliability of the factors as values at or above 0.70 are considered desirable (Mueller & Hancock, 2010).

Full SEM for RQ3.2. The structural equation model for this sub-question was built from this factor structure. Using the CFA for information-seeking behaviors and the CFA for ability beliefs and value, pathways from ability beliefs to all three information-seeking factors and test-taking behaviors and value to all three information-seeking factors and test-taking behaviors were specified. Finally, the covariates (GPA, math standardized test score, reading standardized test score, school program, and parents' aspirations) were examined as predictors of all variables in the model.

This model was again run two separate ways (using listwise deletion or specifying a distribution for GPA). Again, the model that eliminated the cases missing GPA data using listwise deletion showed better data-model fit that the model for which all cases were included. Therefore, only the model with the cases that have complete GPA information is presented here. Figure 15 shows the full structural equation model and Table 22 shows the relations between covariates and the variables in the model.

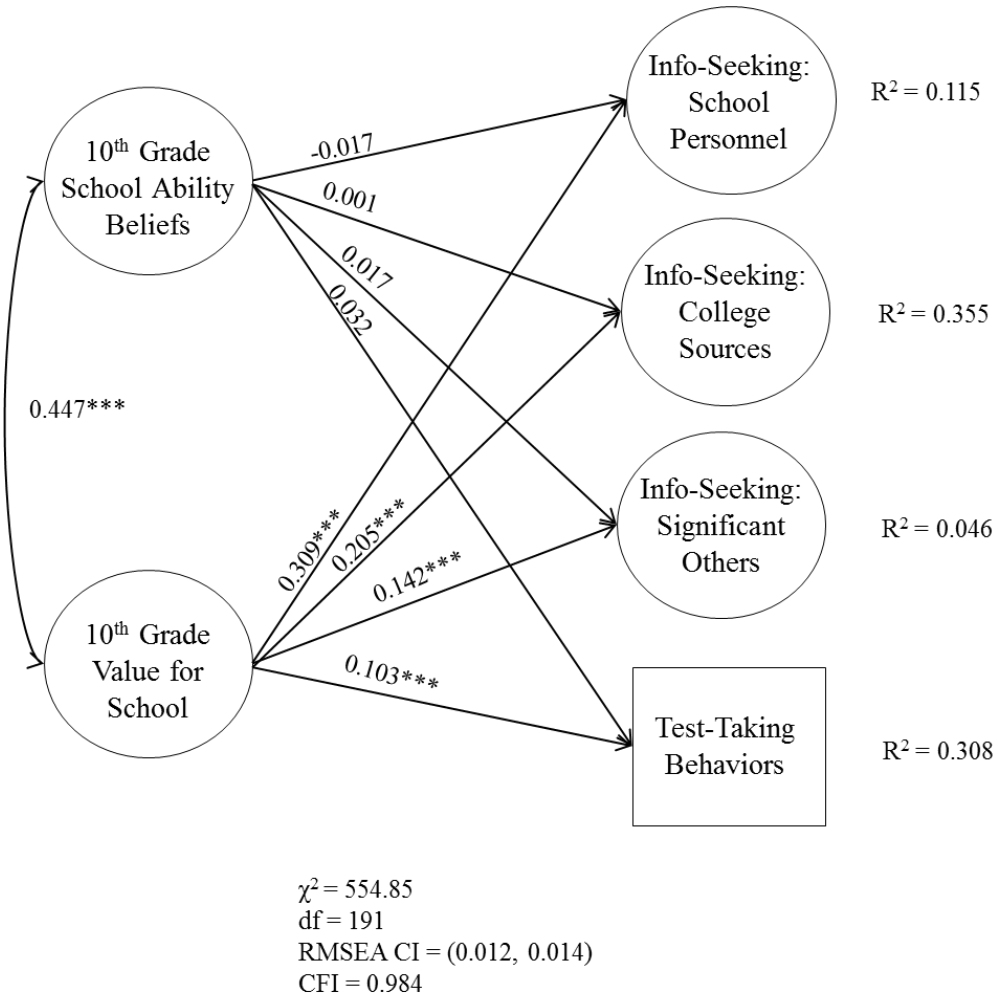


Figure 15. Standardized estimates for RQ3.2
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates, individual items for factors, error terms, and correlations between information-seeking and test-taking behaviors not shown.

Table 22

Estimates for relations between covariates and model variables for RQ 3.2

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.174	0.093	0.009	< 0.001
Math → Ability beliefs	0.118	0.010	0.002	< 0.001
Reading → Ability beliefs	0.123	0.010	0.002	< 0.001
General Program → Ability beliefs	-0.288	-0.236	0.026	< 0.001
Vocational Program → Ability beliefs	-0.199	-0.164	0.038	< 0.001
Parents' Aspirations → Ability beliefs	0.140	0.090	0.010	< 0.001
GPA → Value	0.306	0.116	0.007	< 0.001
Math → Value	-0.175	-0.010	0.001	< 0.001
Reading → Value	0.007	0.000	0.001	0.737
General Program → Value	-0.488	-0.285	0.021	< 0.001
Vocational Program → Value	-0.225	-0.132	0.028	< 0.001
Parents' Aspirations → Value	0.188	0.087	0.007	< 0.001
GPA → School Personnel	0.044	0.017	0.011	0.117
Math → School Personnel	-0.023	-0.001	0.002	0.461
Reading → School Personnel	-0.048	-0.003	0.002	0.140
General Program → School Personnel	-0.073	-0.043	0.026	0.105
Vocational Program → School Personnel	-0.148	-0.087	0.042	0.038
Parents' Aspirations → School Personnel	0.050	0.023	0.010	0.028
GPA → College Sources	0.154	0.104	0.018	< 0.001
Math → College Sources	0.096	0.010	0.003	< 0.001
Reading → College Sources	0.281	0.030	0.003	< 0.001
General Program → College Sources	-0.055	-0.058	0.039	0.142
Vocational Program → College Sources	-0.096	-0.100	0.058	0.087
Parents' Aspirations → College Sources	0.097	0.080	0.014	< 0.001
GPA → Significant Others	0.042	0.019	0.012	0.123
Math → Significant Others	0.041	0.003	0.002	0.149
Reading → Significant Others	-0.076	-0.005	0.002	0.008
General Program → Significant Others	-0.087	-0.060	0.028	0.031
Vocational Program → Significant Others	-0.250	-0.171	0.045	< 0.001
Parents' Aspirations → Significant Others	0.046	0.025	0.010	0.015
GPA → Test-taking Behaviors	0.130	0.101	0.016	< 0.001
Math → Test-taking Behaviors	0.155	0.019	0.003	< 0.001
Reading → Test-taking Behaviors	0.149	0.018	0.002	< 0.001
General Program → Test-taking Behaviors	-0.294	-0.294	0.038	< 0.001
Vocational Program → Test-taking Behaviors	-0.430	-0.430	0.056	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.138	0.130	0.012	< 0.001

Not shown on the figure to present a clearer picture of the model are the correlations between the information-seeking factors and the test-tasking behavior variable. All of the factors were significantly, positively correlated with one another. Information-seeking from school personnel was significantly correlated with information-seeking from college sources ($r = 0.356$, $z = 11.40$, $p < .001$), information-seeking from significant others ($r = 0.776$, $z = 17.60$, $p < .001$), and test-taking behaviors ($r = 0.136$, $z = 4.59$, $p < .001$). Information-seeking from college sources was significantly correlated with information-seeking from significant others ($r = 0.339$, $z = 12.87$, $p < .001$) and test-taking behavior ($r = 0.320$, $z = 11.64$, $p < .001$), and information-seeking from significant others was also significantly correlated with test-taking behavior ($r = 0.125$, $z = 5.13$, $p < .001$).

Overall the relations between the covariates and the model variables were in the expected directions and paralleled the results seen for research sub-question 2.2. Ability beliefs were unrelated to goal-directed behaviors, but value for school was positively related to all the goal-directed behaviors. The most amount of variance was accounted for in students' information seeking from college sources as well as their test-taking behaviors. Students with higher achievement reported engaging in more test-taking behaviors whereas those students in general and vocational educational programs reported engaging in fewer test-taking behaviors than those in college preparatory programs. Higher perceived parental aspirations for postsecondary education were positively related to all of the goal-directed behaviors.

RQ3.3: When students are in 12th grade, how do their postsecondary expectations predict postsecondary enrollment, and do their goal-directed behaviors mediate the relation between their postsecondary expectations and their actual enrollment?

The recoded outcome variable described in research sub-question 2.3 was also used in the analyses for this sub-question. Because as discussed earlier, the goal-directed behaviors were measured at a different point in time, mediation models parallel to those run in research sub-question 2.3 were also explored at this step.

In order to examine whether goal-directed behaviors mediated the relation between postsecondary expectations and postsecondary enrollment, two specific models were examined at this step. The first model was one in which students' expectations for postsecondary education in 12th grade were allowed to have both a direct effect on postsecondary enrollment patterns and an indirect effect through information-seeking and test-taking behaviors (χ^2 = 418.17, *df* = 94, CFI = 0.970, RMSEA CI = (0.016, 0.019)). The second model was one in which these expectations were specified to have only an indirect effect on enrollment through information-seeking and test-taking behaviors (χ^2 = 487.57, *df* = 95, CFI = 0.964, RMSEA CI = (0.017, 0.020)). Although both models fit the data well, the model which specified both direct and indirect effects of expectations on enrollment showed significantly better data-model fit based on the χ^2 difference test χ^2 = 74.47, *df* = 1, $p < .001$). The final model is presented in Figure 16.

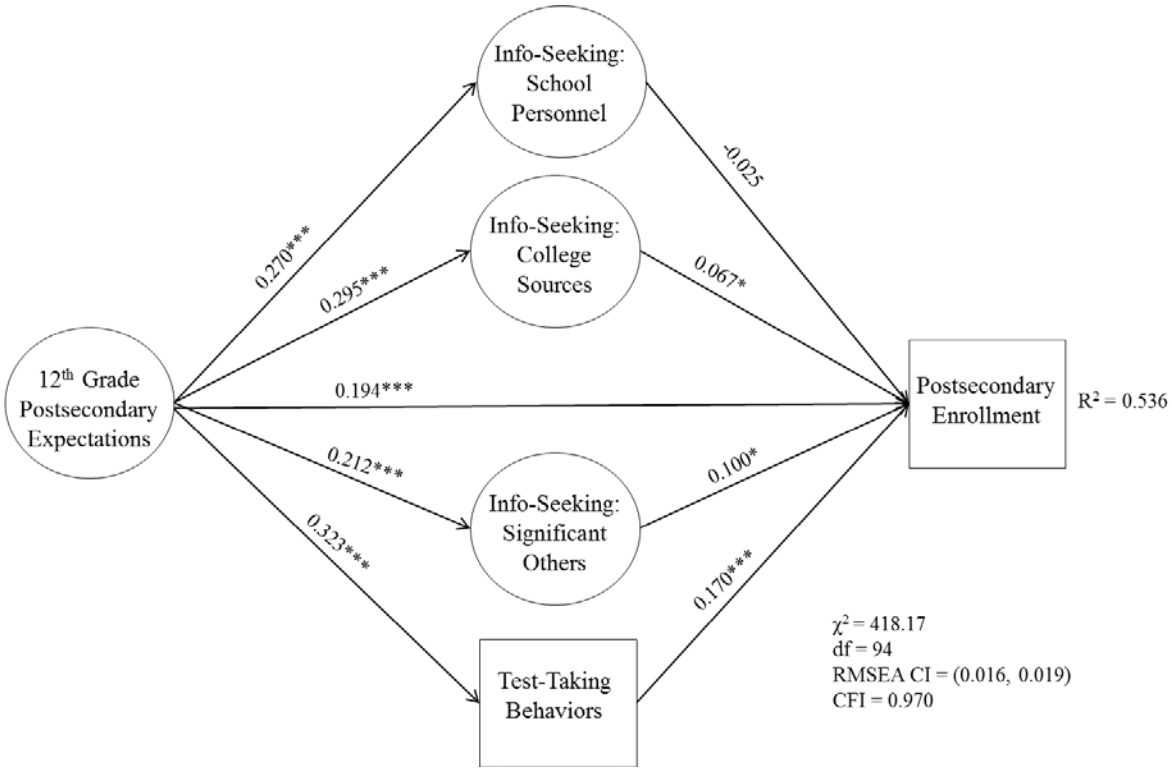


Figure 16. Standardized estimates for RQ3.3
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates, individual items for factors, error terms, and correlations between information-seeking and test-taking behaviors not shown.

In addition to the direct effect of 10th grade postsecondary expectations on college enrollment, these expectations also had an indirect effect on enrollment through test-taking behavior ($\beta = 0.055$, $z = 8.00$, $p < .001$), and information seeking from significant others ($\beta = 0.021$, $z = 2.42$, $p = .016$), similar to those found in research sub-question 2.3. Additionally, the indirect effect through information seeking from college sources was also significant ($\beta = 0.020$, $z = 2.52$, $p = .012$), but the indirect effect through school personnel was not. Table 23 shows the relations between covariates and the variables in the model.

Table 23

Estimates for relations between covariates and model variables for RQ3.3

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Expectations	0.261	0.257	0.011	< 0.001
Math → Expectations	0.100	0.015	0.002	< 0.001
Reading → Expectations	0.072	0.011	0.002	< 0.001
General Program → Expectations	-0.347	-0.347	0.033	< 0.001
Vocational Program → Expectations	-0.511	-0.511	0.046	< 0.001
Parents' Aspirations → Expectations	0.230	0.274	0.011	< 0.001
GPA → School Personnel	0.066	0.031	0.013	0.021
Math → School Personnel	-0.105	-0.008	0.002	0.001
Reading → School Personnel	-0.070	-0.005	0.002	0.032
General Program → School Personnel	-0.158	-0.114	0.033	< 0.001
Vocational Program → School Personnel	-0.129	-0.093	0.054	0.087
Parents' Aspirations → School Personnel	0.044	0.025	0.013	0.054
GPA → College Sources	0.066	0.180	0.035	< 0.001
Math → College Sources	-0.105	0.006	0.005	0.200
Reading → College Sources	-0.070	0.052	0.006	< 0.001
General Program → College Sources	-0.077	-0.174	0.070	0.012
Vocational Program → College Sources	-0.039	-0.085	0.107	0.427
Parents' Aspirations → College Sources	0.044	0.104	0.026	< 0.001
GPA → Significant Others	0.034	0.021	0.017	0.221
Math → Significant Others	-0.002	0.000	0.003	0.944
Reading → Significant Others	-0.088	-0.008	0.003	0.002
General Program → Significant Others	-0.112	-0.105	0.038	0.006
Vocational Program → Significant Others	-0.214	-0.201	0.062	0.001
Parents' Aspirations → Significant Others	0.026	0.019	0.014	0.175
GPA → Test-taking Behaviors	0.083	0.068	0.016	< 0.001
Math → Test-taking Behaviors	0.108	0.014	0.002	< 0.001
Reading → Test-taking Behaviors	0.131	0.017	0.002	< 0.001
General Program → Test-taking Behaviors	-0.094	-0.292	0.037	< 0.001
Vocational Program → Test-taking Behaviors	-0.090	-0.355	0.056	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.088	0.087	0.013	< 0.001
GPA → Enrollment	0.339	0.325	0.013	< 0.001
Math → Enrollment	0.073	0.011	0.002	< 0.001
Reading → Enrollment	0.040	0.006	0.003	0.033
General Program → Enrollment	-0.094	-0.094	0.037	0.010
Vocational Program → Enrollment	-0.090	-0.090	0.051	0.078
Parents' Aspirations → Enrollment	0.052	0.061	0.014	< 0.001

Students' 12th grade postsecondary expectations were significantly, positively related to their goal-directed behaviors at this time. Additionally, these expectations were predictive of postsecondary enrollment. Students' test-taking behaviors as well as information seeking from college sources and significant others were positively predictive of students' postsecondary enrollment. Relations between the covariates and the model variables were similar to those found for the earlier sub-questions. Additionally, the relations between covariates and postsecondary enrollment were the same as those described for RQ3.2 with the exception that in this model, students' in vocational programs were not significantly less likely than those in college preparatory programs to enroll in postsecondary education, although this relation was marginally significant (p = 0.078).

RQ3.4: How does the final proposed model fit for students in 12th grade? How does the final model depicting motivational processes in 12th grade differ by gender, Ethnicity and SES quartiles?

Initially, the models at this step were specified with actual enrollment included as a five category nominal outcome, but similar to RQ2.4 this model would not converge and the recoded three category outcome was used instead. For this research question a measurement model was initially fit to the data in which no structural paths were specified and all variables were allowed to correlate. The measurement model showed good data-model fit (χ^2 = 611.80, df = 215, CFI = 0.984, RMSEA CI = (0.011, 0.014)). Next, the structural model was specified and run and a χ^2 difference test was performed. The results of this test indicated that the structural model was not a worse fit to the data than the measurement model (χ^2 = 1.322, df = 2. p = .52). The final model for the full

sample is shown in Figure 17 and the relations between the covariates and the model variables are presented in Table 24.

Not shown in the figure for the sake of parsimony are the correlations between goal-directed behaviors. Information seeking from school personnel was significantly correlated with information seeking from college sources ($r = 0.329$, $z = 7.82$, $p < .001$), information seeking from significant others ($r = 0.777$, $z = 11.63$, $p < .001$), and test-taking behaviors ($r = 0.089$, $z = 2.83$, $p = .005$). Information seeking from college sources was significantly correlated with information seeking from significant others ($r = 0.313$, $z = 7.73$, $p < .001$) and test-taking behavior ($r = 0.265$, $z = 7.27$, $p < .001$), and information-seeking from significant others was also significantly correlated with test-taking behavior ($r = 0.083$, $z = 3.15$, $p < .001$). Postsecondary expectations and information-seeking behaviors in 10th grade were also entered into the model as controls, but these are not presented in the figure for the sake of parsimony.

Relations between variables in the full model are very similar to those presented for the earlier sub-questions. Ability beliefs were only significantly related to students' postsecondary expectations. Value for school was significantly related to postsecondary expectations as well as goal-directed behaviors. Postsecondary expectations were related to goal-directed behaviors and also predicted students' postsecondary enrollment. Finally, information seeking from college sources and significant others as well as students' test-taking behaviors significantly predicted students' postsecondary enrollment.

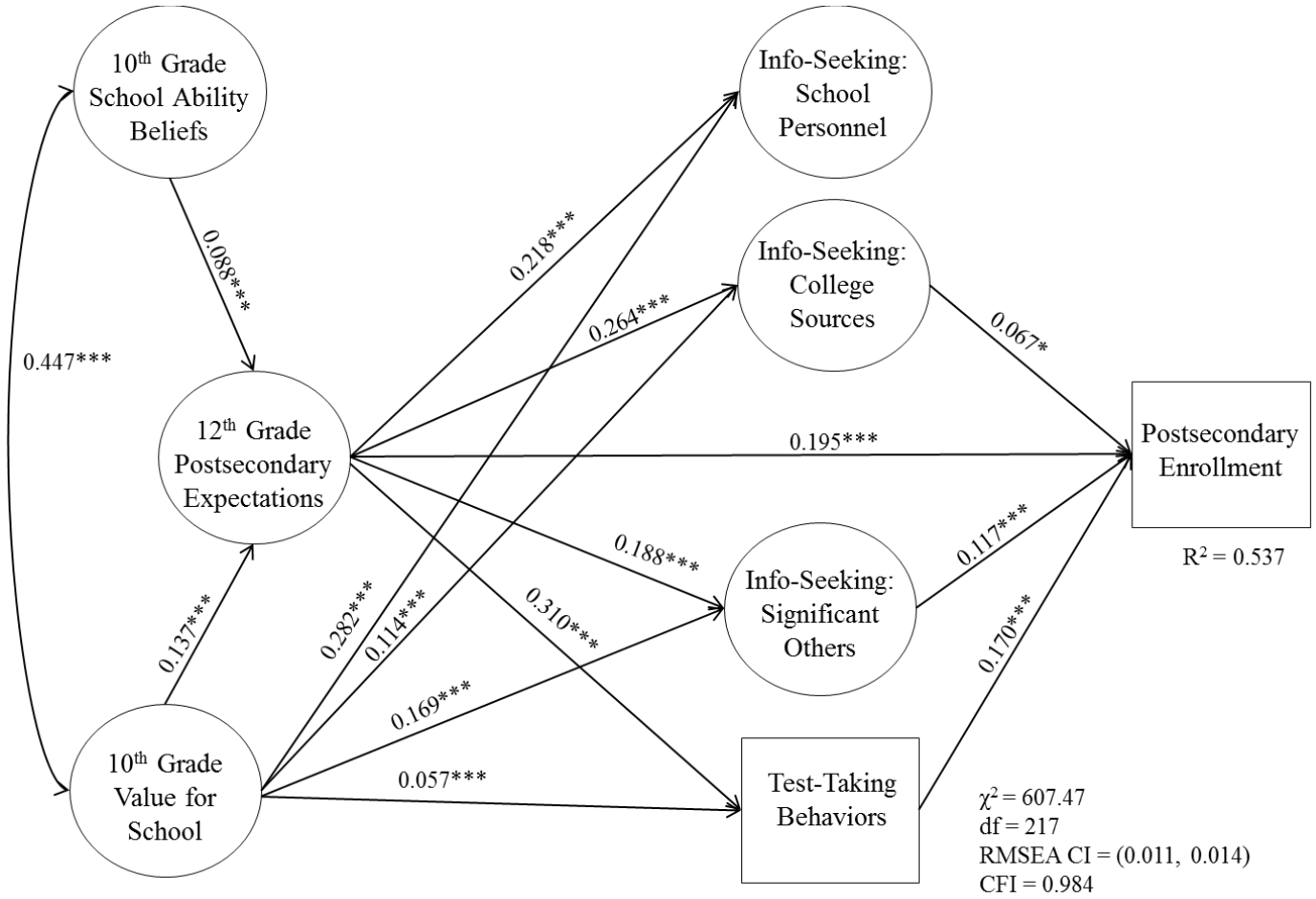


Figure 17. Standardized estimates for RQ3.4
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$; Covariates, individual items for factors, error terms, and correlations between information-seeking and test-taking behaviors not shown. All non-significant pathways were removed from diagram to conserve space.

Table 24

Estimates for relations between covariates and model variables for RQ3.4

Pathway	Std.	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.174	0.134	0.013	< 0.001
Math → Ability beliefs	0.118	0.014	0.003	< 0.001
Reading → Ability beliefs	0.123	0.015	0.002	< 0.001
General Program → Ability beliefs	-0.288	-0.340	0.038	< 0.001
Vocational Program → Ability beliefs	-0.199	-0.236	0.055	< 0.001
Parents' Aspirations → Ability beliefs	0.140	0.130	0.015	< 0.001
GPA → Value	0.306	0.135	0.009	< 0.001
Math → Value	-0.175	-0.012	0.002	< 0.001
Reading → Value	0.008	0.001	0.001	0.723
General Program → Value	-0.488	-0.331	0.025	< 0.001
Vocational Program → Value	-0.225	-0.153	0.033	< 0.001
Parents' Aspirations → Value	0.189	0.101	0.008	< 0.001
GPA → Expectations	0.204	0.201	0.011	< 0.001
Math → Expectations	0.114	0.017	0.003	< 0.001
Reading → Expectations	0.060	0.009	0.002	< 0.001
General Program → Expectations	-0.207	-0.207	0.035	< 0.001
Vocational Program → Expectations	-0.437	-0.437	0.046	< 0.001
Parents' Aspirations → Expectations	0.192	0.228	0.011	< 0.001
GPA → School Personnel	0.000	0.000	0.014	0.988
Math → School Personnel	-0.047	-0.003	0.002	0.141
Reading → School Personnel	-0.063	-0.005	0.002	0.055
General Program → School Personnel	-0.044	-0.032	0.033	0.331
Vocational Program → School Personnel	-0.089	-0.065	0.053	0.225
Parents' Aspirations → School Personnel	0.008	0.005	0.013	0.722
GPA → College Sources	0.101	0.127	0.034	< 0.001
Math → College Sources	0.066	0.013	0.005	0.010
Reading → College Sources	0.266	0.052	0.006	< 0.001
General Program → College Sources	-0.020	-0.038	0.071	0.590
Vocational Program → College Sources	-0.020	-0.039	0.108	0.720
Parents' Aspirations → College Sources	0.046	0.071	0.026	0.007
GPA → Significant Others	0.005	0.003	0.017	0.866
Math → Significant Others	0.020	0.002	0.003	0.500
Reading → Significant Others	-0.088	-0.008	0.003	0.002
General Program → Significant Others	-0.062	-0.058	0.038	0.123
Vocational Program → Significant Others	-0.195	-0.183	0.061	0.003
Parents' Aspirations → Significant Others	0.010	0.008	0.014	0.587

GPA → Test-taking Behaviors	0.068	0.056	0.017	0.001
Math → Test-taking Behaviors	0.119	0.015	0.003	< 0.001
Reading → Test-taking Behaviors	0.131	0.017	0.002	< 0.001
General Program → Test-taking Behaviors	-0.259	-0.259	0.039	< 0.001
Vocational Program → Test-taking Behaviors	-0.343	-0.343	0.056	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.079	0.078	0.013	< 0.001
GPA → Enrollment	0.068	0.325	0.013	< 0.001
Math → Enrollment	0.119	0.011	0.002	< 0.001
Reading → Enrollment	0.131	0.006	0.002	0.033
General Program → Enrollment	-0.097	-0.097	0.037	0.009
Vocational Program → Enrollment	-0.088	-0.088	0.051	0.083
Parents' Aspirations → Enrollment	0.079	0.061	0.014	< 0.001

The next step was to explore group differences in the overall model. This was done in using the same steps as RQ2.4. First, means of the groups on the factors were compared by regressing the factors on the group (e.g. ability beliefs regressed on gender). Second, models fully constrained to be equivalent across groups were fit. The constraints for each individual pathway between factors in the model were released and a chi-square different test was performed to determine whether the models fit better when the pathways were constrained to be equal versus unconstrained and therefore allowed to vary across groups. Results are reported for each group comparison performed.

Gender. Results when gender was entered in the model to examine mean differences revealed several significant differences across males and females. Due to the specification of the groups and how M*plus* chooses the referent category, negative coefficients indicate that females had higher means on the factor as compared to males whereas positive values indicate females had lower means on the factor as compared to males.

Males reported higher ability beliefs in school (β = 0.081, z = 2.66, p = .008), but females reported higher value for school (β = -0.177, z = -5.66, p < .001). Females reported higher expectations for attending postsecondary education than males (β = -0.174, z = -5.16, p < .001). Males were more likely to report seeking information from school personnel (β = 0.171, z = 4.21, p = .001) whereas females were more likely to report seeking information from significant others (β = -0.151, z = -4.11, p < .001) and college sources (β = -0.202, z = -5.19, p < .001). There were no significant differences in test-taking behaviors (β = -0.057, z = -1.70, p = .075) or actual postsecondary enrollment by gender (β = 0.009, z = 0.23, p = .821).

In order to examine whether pathways differed between males and females the models were first specified in M*plus* as fully constrained to be equivalent across groups. One by one each pathway was released and a χ^2 difference test was performed to examine whether the unconstrained model showed better data-model fit than the constrained model and therefore indicated that the paths were not equivalent across groups. All pathways (19 total) were tested, even those that were non-significant in the full model.

Only 3 of the pathways showed non-invariance across gender. The relation between value for school and postsecondary expectations at 12th grade was stronger for males (β = 0.144, z = 6.50, p < .001) than for females (β = 0.106, z = 4.64, p < .001). The relation between value and information seeking from significant others was only significant for males (β = 0.134, z = 3.32, p < .001; Females β = 0.046, z = 1.06, p = .287). Finally, the relation between postsecondary expectations and information seeking from significant others was stronger for males (β = 0.255, z = 7.29, p < .001) than females (β = 0.115, z = 3.81, p < .001).

Ethnicity. In order to first explore mean differences in the factors by ethnicity the dummy-coded variables described in Chapter 3 were used with White as the referent group. Results for ability beliefs and value for school were identical to those found for RQ2.4 because those variables were only measured during the baseline wave. Asian students (β = 0.235, z = 3.90, p < .001) and Black/African-American students (β = 0.340, z = 6.68, p < .001) reported higher mean postsecondary expectation at 12th grade as compared to white students, but there were no differences in postsecondary expectations between Hispanic/Latino students and white students and students of other ethnicities and white students.

There were more mean differences between groups in their goal-directed behaviors than in the model with these constructs measured during 10th grade. Black/African-American students reported more information-seeking behaviors from school sources as compared to white students (β = 0.142, z = 2.18, p = .029). Hispanic/Latino students were less likely than White students to seek information from significant others (β = -0.182, z = -2.96, p = .003) whereas Asian students were more likely to seek information from significant others (β = 0.166, z = 2.89, p = .004) as compared to white students. Black/African-American students reported more information seeking from college sources than white students (β = 0.150, z = 2.78, p = .005) whereas Hispanic/Latino students reported less (β = -0.139, z = -2.45, p = .014). Asian (β = 0.175, z = 2.50, p = .012) and Black/African American students (β = 0.195, z = 3.13, p = .002) reported higher levels of test-taking behaviors than White students. Finally, actual enrollment differences were observed across groups with Asian students being more likely to enroll in postsecondary education than White students (β = 0.193, z

= 3.53, $p < .001$) and students of other ethnicities being less likely to enroll (β = -0.267, z = -3.59, $p < .001$). There were no enrollment differences between White and Black/African American and White and Hispanic/Latino students.

Next, similar to the procedure for testing gender differences, models were first specified in M*plus* as fully constrained to be equivalent across ethnic groups. One by one each pathway was released and a χ^2 difference test was performed to examine whether the unconstrained model showed better data-model fit than the constrained model and therefore indicated that the paths were not equivalent across groups. All pathways (19 total) were tested, even those that were non-significant in the full model.

At this wave, 5 of the χ^2 difference tests were significant and therefore offered evidence of non-invariance across ethnicities. The relation between postsecondary expectations and test-taking behaviors differed in magnitude across the ethnic groups (White: β = 0.325, z = 17.94, $p < .001$; Asian: β = 0.226, z = 5.39, $p < .001$; Black/African-American: β = 0.196, z = 4.33, $p < .001$; Hispanic/Latino: β = 0.288, z = 6.93, $p < .001$; Other: β = 0.378, z = 5.41, $p < .001$). This was also the case with the relation between postsecondary expectations and actual enrollment (White: β = 0.217, z = 12.82, $p < .001$; Asian: β = 0.180, z = 3.86, $p < .001$; Black/African-American: β = 0.157, z = 4.89, $p < .001$; Hispanic/Latino: β = 0.147, z = 4.80, $p < .001$; Other: β = 0.239, z = 4.24, $p < .001$). The relation between information seeking from significant other and enrollment was significant for white (β = 0.147, z = 3.17, p = .002) and Asian (β = 0.142, z = 2.07, p = .039) students only and the relation between information seeking from college sources and enrollment was only significant for white students (β = 0.114, z = 3.17, $p < .001$). Finally, the relation between test-taking behaviors and enrollment

differed in magnitude across white (β = 0.213, z = 9.30, p < .001), Asian (β = 0.171, z = 2.67, p = .007), Black/African-American (β = 0.100, z = 2.22, p = .028), and students of other ethnicities (β = 0.211, z = 11.57, p = .001), but was not significant for Hispanic/Latino students (β = 0.031, z = 0.81, p = .426).

SES. In order to first explore mean differences in the factors by SES the dummy-coded variables described in Chapter 3 were used with the highest quartile as the referent group. Results for ability beliefs and value for school were identical to those found for RQ2.4 because those variables were only measured during the baseline wave. Students in all three SES quartiles reported lower postsecondary expectations than those in the highest SES quartile (First: β = -0.516, z = -10.05, p < .001; Second: β = -0.388, z = -7.86, p < .001; Third = β = -0.227, z = -4.77, p = .010).

Students in the three lower SES quartiles reported going to significant others for information about college less than those in the highest SES quartile (First: β = -0.303, z = -5.19, p < .001; Second: β = -0.233, z = -4.58, p < .001; Third = β = -0.112, z = -2.30, p = .021). Similarly, they reported going to college sources for information less than those in the highest SES quartile (First: β = -0.248, z = -4.17, p < .001; Second: β = -0.119, z = -2.37, p = .018; Third = β = -0.092, z = -2.02, p = .043). Additionally, individuals in all three of the lower SES quartiles also reported less test-taking behaviors (First: β = -0.426, z = -7.22, p < .001; Second: β = -0.370, z = -6.89, p < .001; Third = β = -0.214, z = -3.95, p < .001). Finally, students in the three lower SES quartiles were also less likely to actually enroll in postsecondary education as compared to those in the highest quartile (First: β = -0.580, z = -10.54, p < .001; Second: β = -0.414, z = -7.84, p < .001; Third = β = -0.221, z = -4.48, p < .001).

Eight of the 19 pathways showed evidence of non-invariance across SES quartiles and therefore only those will be discussed. The relation between ability beliefs and postsecondary expectations in 12th grade was only significant for those in the first (β = 0.134, z = 3.76, p < .001), second (β = 0.086, z = 2.64, p = .044), and third (β = 0.108, z = 3.70, p < .001) SES quartiles, but not the fourth (β = 0.021, z = 0.70, p = .478). The relation between value for school and postsecondary expectations in 12th grade differed in magnitude across the quartiles (First: β = 0.206, z = 6.14, p < .001; Second: β = 0.175, z = 5.49, p < .001; Third: β = 0.205, z = 7.00, p < .001; Fourth: β = 0.092, z = 3.00, p = .003). A similar difference in magnitude was observed in the relation between value for school and information seeking from college sources (First: β = 0.225, z = 4.09, p < .001; Second: β = 0.167, z = 3.02, p = .002; Third: β = 0.210, z = 3.96, p < .001; Fourth: β = 0.199, z = 3.22, p < .001). The relation between value and test-taking behaviors was only significant for students in the first (β = 0.152, z = 3.51, p < .001) and second (β = 0.128, z = 3.64, p < .001) SES quartiles.

Several of the relations between postsecondary expectations and information-seeking behaviors differed across SES quartiles. The relation between postsecondary expectations and information seeking from school sources differed in magnitude across the first three quartiles (First: β = 0.337, z = 6.14, p < .001; Second: β = 0.260, z = 4.92, p = .002; Third: β = 0.239, z = 422, p < .001), but was not significant for the fourth quartile (β = 0.075, z = 1.71, p = .090). This same pattern emerged for the relation between postsecondary expectations and information seeking from significant others (First: β = 0.232, z = 4.65, p < .001; Second: β = 0.212, z = 8.74, p = .002; Third: β = 0.169, z = 3.91, p < .001; Fourth: β = 0.066, z = 1.79, p = .075). The relation between

postsecondary expectations and seeking information from college sources differed in magnitude across the quartiles (First: $\beta = 0.265$, $z = 6.19$, $p < .001$; Second: $\beta = 0.220$, $z = 5.53$, $p = .002$; Third: $\beta = 0.291$, $z = 6.29$, $p < .001$; Fourth: $\beta = 0.218$, $z = 4.45$, $p < .001$), as did the relation between expectations and test-taking behaviors (First: $\beta = 0.340$, $z = 10.65$, $p < .001$; Second: $\beta = 0.302$, $z = 9.68$, $p = .002$; Third: $\beta = 0.275$, $z = 5.18$, $p < .001$; Fourth: $\beta = 0.217$, $z = 6.50$, $p < .001$). Finally, the relation between test-taking behaviors and actual enrollment differed in magnitude across the quartiles (First: $\beta = 0.133$, $z = 3.63$, $p < .001$; Second: $\beta = 0.105$, $z = 3.44$, $p = .002$; Third: $\beta = 0.196$, $z = 6.14$, $p < .001$; Fourth: $\beta = 0.207$, $z = 5.22$, $p < .001$).

Summary of results for research question three. To summarize, students' school ability beliefs and value for school were significantly related to their 12th grade postsecondary expectations. Value for school was significantly, positively related to students' goal-directed behaviors in 12th grade. Postsecondary expectations at 12th grade were positively related to students' 12th grade goal-directed behaviors and positively predicted students' postsecondary enrollment. There were demographic differences both in the mean levels and relations between variables in the model that will be discussed in depth in Chapter 5. Overall, covariates were related to the model variables in the expected ways. Additionally, the inclusion of motivational factors with these covariates accounted for over 50% of the variance in students' postsecondary enrollment.

Chapter 5: Discussion

The overarching goals of the current study were threefold. First, changes in students' postsecondary expectations from 10th grade to 12th grade were examined. Additionally, demographic predictors of these patterns of change, and the ways in which these patterns of change predict postsecondary enrollment were explored. The second goal was to understand how ability beliefs, value for school, postsecondary expectations, and goal-directed behaviors measured in both 10th grade and 12th grade predicted postsecondary enrollment. Finally, the third goal was to examine how motivational processes differed by students' gender, ethnicity, and SES quartile due to the demonstrated demographic differences between groups of individuals in their motivation for postsecondary education (Bohon et al., 2006; Cheng & Starks, 2002; Gonzalez, Stein & Huq, 2012), enrollment in postsecondary education (Fuligni & Witkow, 2004; Long, 2007; NCES, 2012b), and relations between motivation and postsecondary enrollment (Kao & Tienda, 1998; Mello, 2008; Trusty, 2002; Wood et al., 2011).

Overview of Results

Overall, the current study found support for the importance of including motivation-related constructs in the study of students' postsecondary enrollment. In particular, several important findings emerged that will be discussed in depth:

(1) Postsecondary expectations showed different patterns of change for different groups of students

(2) Patterns of change were differentially predictive of students' postsecondary enrollment

(3) Students' ability beliefs and value for school predicted their postsecondary expectations

(4) Students' value for school predicted most types of students' goal-directed behaviors, but ability beliefs, for the most part, did not

(5) Students' postsecondary expectations and goal-directed behaviors predicted their postsecondary enrollment

(6) Both means levels of students' motivation and goal-directed behavior as well as the relations between these constructs differed somewhat based on demographic characteristics

(7) Motivation-related constructs appear important to consider above and beyond other variables often measured in studies examining students' postsecondary enrollment such as academic performance, academic track, and parents' aspirations for postsecondary education

(8) Findings from the current study can inform our understanding of the relations between constructs central to expectancy-value theory and social cognitive theory

Each of these key findings will be discussed in turn, but, where appropriate, demographic differences will be considered in relation to the overall findings to offer additional information as to how motivation-related processes may differ for different students. Results on the effect of the covariates will also be reviewed throughout the discussion of the key findings to further illuminate possible reasons for the findings as well as offer additional information on how the current results build on prior studies in

the literature. Finally, results will be discussed with regard to implications for both expectancy-value theory and social cognitive theory.

Explanations of Key Findings

Postsecondary Expectations

Common patterns of change and group differences. Results from the crosstabs showed that the majority of students actually maintain their postsecondary expectations from 10th to 12th grade. Interestingly, prior research has rarely examined maintenance of postsecondary expectations over time and has instead focused on mean-level changes in expectations (e.g., Kao & Tienda, 1998; Mello, 2008). The current study adds to these prior findings by examining different patterns of change rather than mean-level changes.

The current study also found that a larger percentage of students decreased their expectations from 10th grade to 12th grade rather than increased their expectations. This finding is overall consistent with earlier studies that have shown mean level decreases in students' postsecondary expectations over time (Hanson, 1994; Mau & Bikos, 2000; Mello, 2008, 2009). The finding that more students decrease, rather than increase, their expectations is also notable because higher postsecondary expectations were related to more college information-seeking behaviors as well as a higher likelihood for college enrollment when expectations were included in the full conceptual model examined in research questions 2 and 3. It is also noteworthy that patterns of change in expectations differed by gender, ethnicity, and SES, with SES differences being the most striking.

A greater percentage of females reported expectations to graduate from college or pursue a graduate degree at both time points as compared to males. Mello (2008) and Hanson (1994) both similarly found that females had higher expectations for the amount

of education they would complete than males in high school. While this alignment with prior research is notable, the current study adds to the literature with the finding that males were more likely than females to increase their expectations relative to maintaining their expectations from 10th grade to 12th grade. This finding is especially interesting when considering that increased expectations did not significantly predict postsecondary enrollment in the current study. However, the current study was unable to examine the nuanced ways in which students' reduced, maintained, or increased their expectations. Future studies should consider examining these subcategories of maintenance or change in postsecondary expectations individually more in depth to determine how the degree of change as well as the specific change (e.g., high school graduate only to college graduate) differentially relates to postsecondary enrollment.

Ethnic differences were also observed in the patterns of change in postsecondary expectations in the current study. A higher percentage of White and Asian students maintained their postsecondary expectations as compared to Black/African American, Hispanic/Latino, and students of other ethnicities. Additionally, a higher percent of Asian students maintained the expectation to obtain a graduate degree as compared to students of other ethnicities. Enrollment trends show that Asian students enroll in postsecondary education at greater rates than any other ethnic group (NCES, 2012b). However, Asian students have not often been examined in other studies looking at changes in students' expectations and aspirations over time as the majority of these studies have focused specifically on Black/African American students or Hispanic/Latino students (Gonzalez et al., 2012; Hanson, 1994; Kao & Tienda, 1998; Martinez & Cervera, 2012). The current study suggests that Asian students' higher levels of postsecondary

expectations could be one factor related to these higher rates of postsecondary enrollment.

The current study also found that Black/African American and Hispanic/Latino students were more likely than White students to increase their postsecondary expectations as compared to maintain them. Prior research findings on Black/African American and Hispanic/Latino students' expectations have been mixed. Kao & Tienda (1998) found that the decline in postsecondary aspirations was the most dramatic for Black/African American males, whereas Mello (2009) found that Black/African American students reported higher educational expectations than White students. Hispanic/Latino students have reported lower educational expectations than White students (Mello, 2009). However, both Mello and Kao and Tienda examined mean-level changes rather than patterns of change, which could help to account for these mixed findings. In fact, there was a mean-level decrease in expectations in the current study as well which indicates that examining mean-level differences masks some of the within-group and between-group differences in students' change in expectations over time.

It is also important to note that the majority of studies on students' postsecondary expectations across racial and ethnic groups have used NELS:88 data (Glick & White, 2004; Kao & Tienda; Mau & Bikos, 2000; Mello, 2009), and few studies have explored these differences in the more up to date ELS:2002 dataset. Thus, it could be that the more recent cohort of students included in the ELS:2002 sample is quite different from the cohort of students going from high school to college in the late 1980s/early 1990s and the findings from the current study reflect these differences. One such difference could be the fact that enrollment rates for Black/African American and Hispanic/Latino

students are now almost equivalent to the enrollment rates for White students (NCES, 2012b). Additionally, the recent increased pressure for the majority of students to attend postsecondary education (Domina et al., 2011; Goyette, 2008; Rosenbaum, 2001) and the belief that a college education is an important step to obtaining a higher social status (Haveman & Smeeding, 2006) could also help to explain why ethnic minority students in the current study were more likely to increase their educational expectations as compared to White students.

Although race/ethnicity and SES are often confounded, prior research found that SES was the strongest predictor of students maintaining their aspirations with higher SES students more likely to maintain high aspirations over time (Kao & Tienda, 1998; Trusty & Harris, 1999). The current study found very similar results with the percentage of students maintaining their aspirations highest for those in the highest SES quartile and decreasing sequentially with each lower quartile. In the current study, the highest percentage of students who reduced their postsecondary expectations was observed in the lowest SES quartile while the lowest percentage to reduce their expectations was observed in the highest SES quartile. Further, the majority of those students in the highest SES quartile who reduced their expectations went from expecting to earn a graduate degree to expecting to earn a four year degree, thus still maintaining an expectation they would graduate from college. This is perhaps reflective of how realistic students' expectations are. Those students in the highest SES quartile likely have very few financial barriers to college entrance and therefore the expectation to graduate from college is a realistic one that does not need to be adjusted over time.

What was somewhat surprising in the current study was that students in the three lower SES quartiles were also more likely to increase their expectations as compared to those in the highest SES quartile. However, the nuanced ways in which these expectations may be increasing were not examined in the current study and should be further teased out in subsequent research. That is, increased expectations were collapsed across categories so students who reported going from only expecting to complete high school to completing college were included with those students who reported going from expecting to complete a four year degree to expecting to complete a graduate degree.

The fact that lower SES students were more likely to both increase as well as decrease their educational expectations indicates that students' from households with lower SES are more variable in their educational expectations. Because students' with higher postsecondary expectations at 10th as well as 12th grade were more likely to enroll in postsecondary education, it may be important focus on helping low SES students to maintain high postsecondary expectations throughout school in order to combat currently lower enrollment rates for these students (NCES, 2012b). However, the realistic nature of expectations is important to consider again in this regard. While maintenance of high expectations seems positive overall, just having high expectations is not enough to ensure students enroll in postsecondary education. Thus, future research should examine the ways in which students adjust their expectations in regard to the reality of their access to postsecondary education dependent upon financial, academic and geographic factors.

Patterns of change and postsecondary enrollment. The current study also examined the ways in which patterns of change in postsecondary expectations predicted

postsecondary enrollment patterns. Most prior research on postsecondary enrollment has examined enrollment as a dichotomous outcome (Eccles et al., 2004; Wells et al., 2011; Wojtkiewicz & Donato, 1995) whereas the outcome in this set of analyses was a more nuanced treatment of postsecondary enrollment. That is, five enrollment categories were explored by examining students who delayed enrollment (delayers), initially enrolled but then left their postsecondary institution (leavers), delayed enrollment then left after enrolling for a period of time (delayer-leavers) in addition to standard enrollees and non-enrollees.

Perhaps not surprisingly, the current study found that students who reduced their expectations as compared to those who maintained their expectations were more likely to be classified into any of the other four enrollment categories as compared to standard enrollees. That is, they were less likely to be enrolled in postsecondary education continuously following graduation from high school. Again, it is important for future research to examine the reasons why students reduced their expectations. Perhaps postsecondary enrollment was no longer a viable option for these students and they therefore adjusted their expectations to be more realistic in terms of their expected postsecondary attainment.

Kao and Tienda (1998) similarly found that maintenance of high expectations may be particularly important in that students' high expectations positively predicted their actual postsecondary enrollment. However, Kao and Tienda (1998) only examined minority students and did not look at how changes in expectations and aspirations related to postsecondary enrollment for all students. Thus, the current study additionally shows that, regardless of demographic background, students who reduce their educational

expectations are less likely to be continuously enrolled in postsecondary education. Continuous enrollment is important for students' future educational attainment as well because research has shown that those students who remain continuously enrolled are more likely to graduate from college (Alon et al., 2010; Bozick & DeLuca, 2005; Mello, 2008).

Motivational Processes and Postsecondary Enrollment

Ability beliefs, value and expectations. Overall, the relations between students' ability beliefs, value for school and postsecondary expectations were consistent with those suggested by expectancy-value theorists (Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). However, one surprising result that emerged was that students' ability beliefs measured in 10th grade were unrelated to their expectations at 10th grade, but were related to these expectations at 12th grade. One possible explanation for this is that students' expectations when they were in 12th grade were more realistic, and therefore more closely tied to their ability beliefs, than their expectations in 10th grade. Because data for ELS:2002 was collected in the spring, it is likely that the majority of students reporting on their postsecondary expectations at this wave were aware of whether or not they would be attending college in the fall.

Another possibility is that the inclusion of the achievement-related covariates accounted for a large portion of the variance in students' school ability beliefs. Students' ability beliefs and their actual performance are often highly correlated, especially as students get older and become more aware of their strengths in certain academic areas (Denissen, Zarrett, & Eccles, 2007). Additionally, it is possible that the more general

nature of the ability beliefs scale used in the current study was not able to capture students' underlying ability beliefs completely.

Most studies include domain specific measures of students' self-perceived ability (Eccles et al., 2004; Watt et al., 2012; Wood et al., 2011); however, in the ability beliefs scale in the current study was not specific to any domain. Perhaps domain specific ability beliefs would better capture students' thoughts about their capabilities in particular school subjects and/or college and thus would thus be significant predictors of students' postsecondary expectations at both waves. Bandura argues that predictor and outcome measures should be at the same level of specificity (Bandura, 1986). Therefore a college going self-efficacy measure (Gonzalez et al., 2012) should be included in future research to determine whether this more college specific measure would be a better predictor of students' postsecondary expectations, their behaviors, and their eventual enrollment.

A final possibility is that because students' ability beliefs are more strongly related to postsecondary expectations for particular groups of students, as shown in the group comparisons of the model, the investigation of a model that included all students masked these differences. For example, students' ability beliefs were only significantly, positively predictive of their 10th grade expectations for the lowest SES quartile and students' ability beliefs were positively predictive of their 12th grade expectations for all three lower SES quartiles. Thus, the relation between students' ability beliefs and their postsecondary expectations was stronger for lower SES students.

Very few studies based in expectancy-value theory have examined whether the relations between constructs central to the theory differ between groups, with the exception of several studies examining gender differences (Jacobs et al., 2002; Musu-

Gillette et al., 2013; Simpkins et al., 2006; Watt et al., 2012; Wigfield et al., 1997; Wood et al., 2011). Even in most of these studies, mean-level differences in students' ability beliefs, task values, and academic outcomes were of primary interest (Jacobs et al., 2002; Musu-Gillette et al., 2013; Watt et al., 2012; Wigfield et al., 1997) rather than possible differences in how these constructs relate to one another. Findings from the current study suggest that there are nuanced differences in how constructs central to expectancy-value theory are related for different groups of students, and future research should investigate the possible reasons for these differences.

Students' value for school was related to their postsecondary expectations in both 10th grade and 12th grade with greater valuing of school related to higher expectations. This finding is consistent with expectancy-value theory (Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000) as well as prior research. Domina et al. (2011) found that task valuing was positively related to high school students' expectations for postsecondary education. Similarly, Wood et al. (2011) found that students' valuing of the utility of school was related to their postsecondary expectations, and these expectations were predictive of on time enrollment in postsecondary education. Thus, it appears that students' value for school may have a particularly important influence on their postsecondary expectations.

Several differences emerged in both mean levels of students' value for school as well as the relation between value for school and postsecondary expectations. Consistent with prior research (Mello, 2008; Wigfield et al., 1997; Wood et al., 2011) females reported higher mean levels of value for school and postsecondary expectations. However, there was a stronger relation between students' value for school and

postsecondary expectations for males. This is also consistent with Wood et al. (2011) who found that utility value predicted postsecondary enrollment for boys only. Taken together, these studies suggest that high value may be particularly beneficial for boys, who are more at risk for not continuing their education after high school (NCES, 2012b; Wells et al., 2011). Similar to the findings for ability beliefs, this builds on prior research examining gender differences within an expectancy-value framework because differences in the strength of the relation between students' value and their expectations were observed, rather than just mean-level differences in either of these constructs. Although, consistent with the theory, students' value for school was significantly, positively related to expectations for all students.

All ethnicities reported higher value for school as compared to White students. This is consistent with prior research that shows minority students, especially those who have successfully enrolled in college, place a particularly high value on postsecondary education (Cavazos et al., 2010; Richardson & Skinner, 1992). Some researchers have suggested that postsecondary education is seen as a pathway to social class mobility (Crowley & Shapiro, 1982; Domina, Conley, & Farkas, 2011; Richardson & Skinner, 1992). Because race/ethnicity and SES are often confounded (Alon et al., 2010; Bloom, 2007; Gonzalez et al., 2012; Long, 2007) education as a means for social mobility may be particularly salient for these students.

Further evidence of the significant influence of SES on students' reported value for school was observed when examining the SES differences. Students in the two lower SES quartiles reported higher mean value for school. Further, the relation between value for school and postsecondary expectations in 10th grade was strongest for the lowest

quartile and decreased in strength as the SES quartiles increased. This same difference in strength emerged when 12th grade expectations were included in the model. Similar to the findings for boys, this suggests that high value for school may be particularly beneficial in fostering high educational expectations for those students who are less likely to enroll in postsecondary education. However, while the findings for low SES students are promising, disparities in students' postsecondary enrollments continue to persist (NCES, 2012b).

One possible reason for the persistent disparities in students' postsecondary enrollment could be that, despite reporting higher value for school, lower SES students and minority students' academic performance is lower than that of higher SES or White students (Aikens & Barbarin, 2008; Boardman & Robert, 2000; NCES, 2010). Further, other studies have shown that the relation between students' ability beliefs and achievement is weaker for students from ethnic minorities (Baker & Wigfield, 1999; Roeser, Midgley, & Urdan, 1999; Stevenson, Chen, & Uttal, 1990) suggesting that, for these students, ability beliefs and values may not be as closely tied to their actual performance in school.

Findings from the current study suggest that while there is overall support for the predictive relations between students' ability beliefs, values and expectations, there are nuanced differences between groups. Future research within expectancy-value theory should be careful to examine demographic differences both in mean levels of students' ability beliefs, values, and expectations as well as differences in the nature of the relations between these constructs. Additionally, the current study did not examine the possible reasons that underlie these differences. It seems likely that students from lower

SES households or those who are from ethnic minority groups who have historically lower academic performance may face additional constraints on their academic motivation and choice outcomes. For example, schools in lower SES and neighborhoods with a high concentration of minority students are less likely to offer the academically rigorous courses that are often necessary for postsecondary preparation (Heller, 1997; Wolniak & Engeberg, 2010).

Ability beliefs, value, and goal-directed behaviors. Students' value for school in 10th grade was related to students' goal-directed behaviors at both 10th grade and 12th grade, although, surprisingly, for the most part students' ability beliefs and goal-directed behaviors were unrelated. Students' ability beliefs were only related to their information seeking from school personnel at 10th grade and were not related to any of the goal-directed behaviors at 12th grade. It is not clear why students' value for school was significantly related to these behaviors whereas their ability beliefs were not. However, qualitative research with students offers some corroboration for this finding. Interviews with students who successfully enrolled in postsecondary education included numerous mentions of the value of a college education (Richardson & Skinner, 1992) and students' expectations for attending college (Hines et al., 2005), but very few students mentioned beliefs about their ability as an important factor influencing their enrollment.

Another possible explanation for the lack of a relation between students' ability beliefs and their goal-directed behaviors is that students' have more opportunities to take non-traditional routes into the postsecondary education pipeline that may not be as dependent on prior performance or their beliefs about their abilities. For example, community college or online degree programs often have very few, if any, requirements

for enrollment other than a high school diploma (USDE, 2013). Thus, it could be that students' ability beliefs are more of a factor influencing which *type* of postsecondary education a student decides to pursue rather than whether or not they enrolled in any sort of postsecondary institution. Future research is needed to investigate this possibility as well as to further illuminate why students' ability beliefs and their goal-directed behaviors were not significantly related.

Students' ability beliefs and value for school accounted for more of the variance in test-taking behaviors as compared to the information-seeking behaviors. This is likely because test-taking is the most important goal-directed behavior for students seeking to pursue postsecondary education as these tests are often a required component of applying to schools (Klasik, 2012; 2013; U.S. Department of Education, 2013). While not a lot of variance was explained in the majority of students' goal-directed behaviors, about 30% of the variance in seeking information from college sources was explained in 12th grade. The 12th grade wave was collected in the spring and therefore students should have already known whether or not they would be enrolling in some sort of postsecondary institution after high school graduation. Thus, they were probably more likely to be looking up information from college websites and brochures at this time.

Females reported engaging in more of the goal-directed behaviors at both waves. While previous research on information seeking did not examine differences by gender, it is perhaps not surprising that females were more likely to seek information as they also had higher expectations for postsecondary education and students' who talk with counselors, parents, peers, or teachers about college are more likely to apply and enroll in

postsecondary education (Bryan, 2005; Cheng & Starks, 2002; Farmer-Hinton & Adams, 2006; Merdinger et al., 2005; Plank & Jordan, 2001; Reddick et al., 2011).

There were no differences in the relations between students' ability beliefs and goal-directed behaviors and value for school and goal-directed behaviors by ethnicity or SES quartile when students were in 10th grade. There were also very few mean-level differences in students' goal-directed behaviors at 10th grade. Hispanic/Latino students reported seeking help from significant others less often than White students. This same mean-level difference was also observed when students' goal-directed behaviors at 12th grade were included in the model. This is perhaps because parents of Hispanic/Latino students are less likely to have attended college compared to parents of White students (Alon et al., 2010) and they therefore may not have the information necessary to help their children navigate the college enrollment process.

More mean-level ethnic differences emerged when goal-directed behaviors at 12th grade were included in the model. Black/African American students reported more information-seeking behaviors from school sources and college sources as compared to White students. While there were not mean-level differences in White and Black/African American students' information-seeking from significant others, these other differences could have emerged because parents of Black/African American students are less likely to have attended college (Cheng & Starks, 2002). Therefore, Black/African American students needed to go to sources outside the family for college information. Asian students were more likely to seek information from significant others as compared to White students. Parents of Asian students have reported higher educational expectations for their children (Cheng & Starks, 2002), so it seems likely that these expectations

would translate into more conversations about attending college. These findings are also consistent with human capital theory (Coleman, 1988) as resources such as academic support from schools and families have been shown to be important predictors of students' access to and enrollment in postsecondary education. (Cabrera & La Nasa, 2001; Engenberg & Wolniak, 2010; Wolniak & Engeberg, 2010).

Asian and Black/African American students reported higher levels of test-taking behaviors than White students; however, no study could be located that examined ethnic or racial differences in test-taking behaviors. Because students' test-taking behaviors positively related to enrollment, it makes sense that Asian students reported more of these behaviors as they are more likely to enroll in postsecondary education. The higher reported levels for Black/African American students are a little more puzzling as enrollment patterns are similar for Black/African American and White students. However, as discussed in several places, it could be that those students that are more at risk of not enrolling in postsecondary education need to engage in more goal-directed behaviors in order to successfully enroll in college. This is also supported by the finding that although there were mean level differences in students' goal-directed behaviors, the relations between ability beliefs and value and goal-directed behaviors were invariant across ethnic groups.

Students in the two lower SES quartiles reported seeking less information from significant others in 10th and 12th grade. This could be because students in lower SES households are more likely to have parents that did not attend college (Goldrick-Rab, 2006; Mello, 2009) and therefore do not think that significant others would have the relevant information they need. At 12th grade students in the bottom three SES quartiles

had lower mean information seeking from college sources than those in the highest quartile. However, the relation between students' value for school and information seeking from college sources was stronger in the bottom three quartiles as compared to the top quartile. Additionally, students' in the bottom three SES quartiles reported lower mean test-taking behaviors than those in the top quartile at both 10th and 12th grade. The relation between value and test-taking behaviors was stronger in the bottom three quartiles, and was not even significant in the top quartile of students. It could be that those students who are from lower SES households who have a high value for school must engage in these behaviors more often or to a greater extent due to the economic barriers in place.

It was somewhat surprising that students' ability beliefs were overall not significantly related to their goal-directed behaviors as this is inconsistent with what social cognitive theory (Bandura, 1986, 1997) would predict. Due to possible measurement issues with the ability beliefs scale, more research is necessary to determine whether other measures of students' ability beliefs, perhaps using a more traditional self-efficacy scale, are predictive of students' college oriented goal-directed behaviors. The significant relations between students' value and goal-directed behaviors are consistent with social cognitive theory (Bandura, 1986, 1997). According to Bandura and Schunk (1981), individuals actively pursue those outcomes that are personally valued, and would therefore be more likely to engage in goal-directed behaviors in highly valued domains. The current study offers additional empirical support for the supposed connection between value and goal-directed behaviors.

Postsecondary expectations, goal-directed behaviors and postsecondary enrollment. Overall, the findings at both waves conformed to what would be expected based on expectancy-value and social cognitive theory. That is, students' expectations predicted both their goal-directed behaviors as well as their actual enrollment. Additionally, students' expectations had a direct effect on postsecondary enrollment as well as indirect effects through the goal-directed behaviors. This was true both when measured in 10th grade as well as 12th grade. It is perhaps not surprising that those students who had higher postsecondary expectations sought more information from significant others, school personnel, and college sources, as well as engaged in more test-taking behaviors.

Students' who sought information from significant others and engaged in test-taking behaviors (planning for and taking the SAT/ACT) were more likely to enroll in postsecondary education whether students engaged in these behaviors in 10th grade or 12th grade. Information seeking from college sources was only significant when students were in 12th grade. As discussed earlier in this chapter, this is likely because by 12th grade students would have a good idea of the schools that they would want to apply to and therefore would be more focused and concentrated on seeking information from sources related to that college.

Surprisingly, very few studies have examined the relations between students' postsecondary expectations, goal-directed behaviors, and postsecondary enrollment. In fact, scant research has focused on how students' goal-directed behaviors, such as seeking out college information or preparing to take and taking standardized assessments, may relate to their pursuit of postsecondary education on their own (Klasik, 2012).

However, a few studies have found that access to information about college is a key component of students' eventual college enrollment (Cabrera & La Nasa, 2001).

Additionally, the variety of sources of college information that students have access to in high school influences their college enrollment (Leslie et al., 1977). That is, students' who are able to access multiple sources of information, such as school counselors, family members, and college publications, are more likely to enroll in college. Cabrera and La Nasa (2001) similarly found that high school students approach a variety of different sources of information when seeking information about college applications and enrollment, although the researchers did not examine how these patterns of information seeking actually predicted enrollment. Given the importance of engaging in certain behaviors for successful college enrollment, this gap in the literature is important to address and the current study adds to our understanding of how these behaviors contribute to an overall model of the motivational processes influencing postsecondary enrollment.

Mean differences in students' goal-directed behaviors and expectations were discussed in previous sections and are not discussed again here. However, there were mean differences in students' actual postsecondary enrollment as well as differences in the relations between goal-directed behaviors, expectations and enrollment that were observed. Somewhat surprisingly, there were no differences in enrollment for males and females, despite enrollment trends that suggest otherwise (NCES, 2012b). This is likely because all types of postsecondary institutions were included in the current study, whereas national trends have primarily looked at student enrollment in four-year institutions. Another possibility is that including achievement in the model accounted for

the differences in enrollment by gender. Mello (2008) found similar enrollment levels for males and females in the NELS:88 dataset when controlling for students' achievement.

Similar to national trends (NCES, 2012b), Asian students had higher enrollment in postsecondary education. The strength of the relation between students' postsecondary expectations and their enrollment differed across ethnic groups, with it being strongest for White students and weaker for other students. This is consistent with other studies that have found high expectations may be less likely to translate to actual enrollment for students from some ethnic minorities, particularly Black/African American and Hispanic/Latino students (Bohon et al., 2006; Hanson, 1994; Kao & Tienda, 1998; Mau & Bikos, 2000). Similar to findings discussed above that have shown that for some ethnic minority students, beliefs about their ability were not highly correlated with their actual academic achievement (Baker & Wigfield, 1999; Roeser, Midgley, & Urdan, 1999; Stevenson, Chen, & Uttal, 1990), it seems possible that in the current study, some ethnic minority students' postsecondary expectations were not well calibrated with their ability to actually successfully enroll in school.

Consistent with social cognitive theory (Bandura, 1986, 1997), it seems that students' behaviors also play an important role in their postsecondary enrollment choices. The relation between information seeking from significant others and enrollment was significant for White and Asian students only. This finding lends further evidence to the assertion above that significant others of Back and Hispanic/Latino students may have less knowledge of postsecondary settings and therefore be less instrumental in enrollment for these students. Finally, the relation between students' test-taking behaviors and their enrollment differed in magnitude across White, Asian, and Black/African American

students, but was not significant for Hispanic/Latino students. It is surprising that the relation between students' test-taking behaviors and their enrollment was not significant for Hispanic/Latino students as these tests are often prerequisites of enrollment. However, 2-year colleges are less likely to require these tests and Hispanic/Latino students have been found to be more likely to enroll in 2-year colleges (Alon et al., 2010).

SES differences in enrollment were quite pronounced. Students in the three lower SES quartiles were all less likely to enroll in postsecondary education compared to those in the highest quartile. Additionally, the relations between students' goal-directed behaviors, expectations, and enrollment were often stronger for lower SES students indicating that these students likely need higher levels of motivation and actions in order to successfully enroll in postsecondary education. The theory of reasoned action (Fishbein & Ajzen, 2010) posits that individuals' control beliefs and degree of actual control may be important mediators of intentions and behavior and thus could be important to include along with goal-directed behaviors. In particular, students' control beliefs could mediate the relation between their postsecondary expectations and their goal-directed behaviors. Future studies should consider including control beliefs in the examination of students' postsecondary enrollment outcomes. Additionally, students from families with lower SES may see pursuit of postsecondary education as less in their control due to things like financial barriers and therefore need higher levels of motivation to maintain their postsecondary expectations and engage in goal-directed behaviors.

Consistent with social cognitive theory (Bandura, 1986, 1997), students' expectations had a direct, positive relation with students' goal-directed behaviors. As

Bandura (1986) explained, cognitive representations of a future outcome can help individuals' generate specific behaviors aimed at fulfilling that goal or expectation. Additionally, consistent with expectancy-value theory (Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000), expectations were also directly predictive of students' postsecondary enrollment. Thus, while students' behaviors are indeed an important part of their successful enrollment in postsecondary education, it is also important for students to have high expectations for their pursuit of postsecondary education.

Demographic Differences

Although many of the demographic differences that were found have already been discussed in conjunction with the findings for the motivation-related variables, there are a few broader conclusions that can be drawn from the examination of demographic differences as a whole. Overall, changes in students' expectations were relatively consistent for males and females. There were also relatively few differences in both mean levels of the motivation-related constructs included in the model as well as the relations between the constructs for males and females. Those differences that did emerge were consistent with prior literature (Mello, 2008; Wigfield et al., 1997; Wood et al., 2011).

Overall, differences between ethnic groups were consistent with prior research. It is promising that enrollment rates were not different for White, Black/African American, and Hispanic/Latino students, although all three of these groups lag behind Asian students in their enrollment. The SES differences observed in the current study were perhaps the most striking. This is also consistent with prior research that has shown that

SES is one of the most important contributors to students' postsecondary enrollment (Glick & White, 2004; Goldrick-Rab, 2006; Mello, 2009). The current study begins to add some insight into how motivation-related variables may contribute to some of these enrollment differences by SES. Results imply that those students who face more barriers to college enrollment may need stronger levels of motivation in order to successfully enroll in postsecondary education.

The important influence of SES on both students' motivation as well as their postsecondary enrollment is consistent with Perna's (2010) model which considers that students' postsecondary decisions are nested within a number of layers. The broadest of these layers is the social, economic, and policy context, which permeates all other layers of the model. Thus, economic factors influence all other levels of Perna's model, including the school and community context, and the individual and family context. While her model, as well as expectancy-value theory and social cognitive theory, consider individuals' beliefs and behaviors to be the most proximal context influencing students' college enrollment choices, it is clear that there are significant differences in motivation for and enrollment in postsecondary education based on students' economic circumstances.

Contribution of Academic and Social Predictors Combined with Motivation

Also consistent with Perna's (2010) emphasis on context, parents' educational aspirations and the academic rigor of the courses in which students are enrolled in their school were significantly related to the variables in the model as well as students' actual enrollment. For almost all of the models, students in college preparatory tracks had higher mean levels of all constructs included in the model as compared to those in a

general track or those in a vocational track. Additionally, those in the college preparatory track were more likely to enroll in postsecondary education. Further, students' standardized test performance and GPA were significantly related to most of the variables included in the model. This is consistent with prior research that shows students' grade point average (Goldrick-Rab, 2006; Wolniak & Engeberg, 2010), standardized test scores (Goldrick-Rab, 2006; Heller, 1997; Fuertes & Sedlacek, 1994; Wolniak & Engeberg, 2010) and academic rigor of the school curriculum (Engeberg & Wolniak, 2010; Deil-Amen & Turley, 2007; Goldrick-Rab, 2006; Wolniak & Engeberg, 2010) are important predictors of college enrollment.

There are additional contextual variables that were not included in the current study that likely account for additional variation in students' postsecondary enrollment. As mentioned previously, the quality of academic courses offered at the high schools students attend likely influences their postsecondary enrollment options (Heller, 1997; Wolniak & Engeberg, 2010). Previous research by Nagengast and Marsh (2012) found that students' high ability self-concept was a protective factor in maintaining high expectations for science-related careers when the average achievement level of the school was low. Further, quality of the academic curriculum is often closely tied school-level SES (Heller, 1997) and it would therefore be important for future research to examine the influence of SES at the school level. Other contextual influences are discussed in the future directions section.

The current study explained around 50% of the variance in postsecondary enrollment, which is much larger than the 25% that is often explained in studies that only include students' academic performance and demographic characteristics (Alon et al.,

2010; Cheng & Starks, 2002). Thus, including motivation-related variables in the study of how and why students enroll in college is important for future research. It is clear that individual-level factors such as students' value for school, their expectations, and their goal-directed behaviors make a significant contribution to understanding whether students enroll in postsecondary education.

Theoretical Contributions

The body of research on the motivational precursors to postsecondary enrollment is limited. In previous research, models such as status attainment theory and human capital theory have often been applied in the literature on postsecondary enrollment (e.g. Alon et al., 2010; Bryan, Holcomb-McCoy, Moore-Thomas & Day-Vines, 2009; Engeberg & Wolniak, 2010; Farmer-Hilton & Adams, 2006; Hanson, 1994; Kao & Tienda, 1998; Mau & Bikos, 2000; Reddick et al., 2011; Trusty, 2002; Trusty & Harris, 1999; Wolniak & Engeberg, 2010); however, the current study chose to apply motivation-related theoretical frameworks in order to better understand the contribution of motivation-related variables to postsecondary expectations and enrollment. Only a few studies have explicitly used motivation-related theories to examine how motivation over time relates to students' postsecondary enrollment patterns.

A caution is warranted about the tenability of the findings from the current study given that the constructs included in the models were not drawn from previously validated measures. This is discussed in detail within the context of each of the theories undergirding the story, but this point should be noted at the outset, and has particular relevance to the theoretical implications of the current study. The measures that were

included in this study should be considered proxies for the theoretical constructs discussed in expectancy-value theory and social cognitive theory.

Expectancy-value theory. The current study supports many of the relations between constructs central to expectancy-value theory. However, students' ability beliefs were not significantly related to their postsecondary expectations in 10th grade. The ability beliefs scale included very general items about students' perceptions of their ability to learn. It could be that students were not thinking specifically about in-school learning when responding to these items. It is also possible that the items were too general in nature and therefore did not appropriately capture students' beliefs about their ability to be successful in school. Whatever the reason, the finding that students' ability beliefs were not significantly related to other variable in the model should be interpreted with caution due to possible measurement issues with the scale.

While ability beliefs and postsecondary expectations were only significantly related to one another when examining students'12th grade expectations, students' value for school was predictive of both their 10th and 12th grade expectations. In fact, the current study suggests that students' value for school may be a particularly salient predictor of students' postsecondary directed expectations and behaviors. Specifically, the items used to create the value measure asked students about how much they liked school, as well as whether they believed that school was useful and important for pursuit of future outcomes. Thus, utility value, attainment value, and intrinsic value all seem to be important aspects of students' value for school as it relates to postsecondary expectations.

Due to the small number of items related to value for school included in the ELS:2002 dataset, separate value scales could not be created. It is important for future research to examine each of the different components of task-value to determine whether these components are individually predictive of students' postsecondary expectations, their behaviors, and their postsecondary enrollment outcomes. We know from previous research that these components are highly related (Eccles & Wigfield, 1995); however, it still is likely they have different predictive relations of outcomes such as college expectations and enrollment.

This study extends expectancy-value theory by adding goal-directed behaviors to the model. While this is consistent with some prior empirical research (Cabrera & La Nasa, 2001; Eccles et al., 2004), such behavior has been discussed infrequently in the theory. The current study indicates that these behaviors may be important to include as value for school and postsecondary expectations were both significantly related to goal-directed behaviors. Further, students' goal-directed behaviors were related to their students' postsecondary enrollment. However, it is also important to note that expectations made a unique contribution to postsecondary enrollment, indicating that students' expectations likely influence their academic outcomes over and above goal-directed behaviors.

While there has been some research on the longitudinal connection between students' ability beliefs and task values, very little of this research has examined postsecondary enrollment as an outcome (for exceptions see Diemer & Li, 2012; Eccles et al., 2004). However, Eccles et al. (2004) examined a relatively homogenous sample and Diemer and Li (2012) only included students' educational expectations and not their

ability beliefs or values as predictors of postsecondary outcomes. Findings from the current study suggest that there may be nuanced differences in how constructs central to expectancy-value theory are related to one another over time. In particular, the strength of the relation between students' ability beliefs, value for school, postsecondary expectations, and postsecondary enrollment was variable across some of the groups indicating that future research should continue to investigate how these constructs relate to one another over time and relate to students' academic choices in diverse samples. Additionally, findings from the current study suggest that expectancy-value theory should emphasize that there could be group differences in the ways in which variables central to the theory relate to one another. These differences should be further examined in future research using an expectancy-value framework.

Social cognitive theory. The current study also supports many of the relations between constructs outlined in social cognitive theory. Goal-directed, self-regulatory behaviors have been shown to be predictive of a wide variety of educational outcomes (Bandura, 1991; Pintrich, 2000; Schunk & Pajares, 2009; Zimmerman, 2000; 2011). In the current study, students' goal-directed behaviors, while not necessarily strongly related to enrollment, were significantly related to their postsecondary enrollment. Students' goal-directed behaviors are therefore important to include in an overall model examining students' postsecondary enrollment, but more research is needed to determine which goal-directed behaviors may be most central to ensuring students' successful enrollment in postsecondary education.

Future research should examine the role that other self-regulated behaviors play in students' postsecondary enrollment. Self-regulated behaviors are a key component of

social cognitive theory (Bandura, 1991) and are related to a number of academic outcomes such as academic performance, course selection, and career outcomes (Lent, 2013; Pintrich, 2000; Schunk & Pajares, 2009; Zimmerman, 2000). While test-taking behaviors were included in the current study, this construct represents only one of the many behaviors necessary for college enrollment. Other self-regulated behaviors that would be important to investigate in future research include filling out college applications, writing college entrance essays, and filling out financial aid forms such as the FAFSA. It is important for future research to include a broader selection of these self-regulated behaviors.

As mentioned earlier, it is quite surprising that students' ability beliefs were not related to their postsecondary expectations in 10th grade as social cognitive theory would suggest (Bandura, 1986, 1997). Within a social cognitive framework, both self-efficacy beliefs and self-regulatory behaviors are expected to predict educational outcomes (Bandura, 1991; Pintrich, 2000; Schunk & Pajares, 2009; Zimmerman, 2000). While the behaviors were related to enrollment outcomes, students' ability beliefs were not related to expectations at 10th grade, and their relation to 12th grade expectations was not very strong. Additionally, students' ability beliefs were not significantly related to the majority of their goal-directed behaviors. As discussed earlier, this could be because the current study did not include a typical measure of self-efficacy. Future studies should examine the relation between a more traditional self-efficacy scale and postsecondary beliefs and behaviors. As mentioned previously, a college going self-efficacy scale would likely be a better measure to include in future research.

There are additional variables central to social cognitive theory that should also be investigated in future research. While the current study included a measure of students' postsecondary expectations, students' outcome expectations should also be examined in future research. Outcome expectations differ from the more specific postsecondary expectation variable included in the current study in that outcome expectations as discussed in social cognitive theory are closely tied to an individuals' behavior. That is, outcome expectations reflect individuals' beliefs about the expected consequences of a set of behaviors and are also conditional on individuals' beliefs about their ability to perform those behaviors (Bandura, 1986, 1997). To successfully achieve desired outcomes, individuals must possess the necessary skills and believe that they are capable of producing the desired outcomes. Thus, the inclusion of both students' outcome expectations in conjunction with their self-efficacy in regards to college enrollment should be included in future research as these constructs are both key aspects of whether or not an individual achieves the intended outcome.

Similarly, the intentionality of students' postsecondary plans and behaviors should be investigated in future research. Intentionality refers to the representation of a future course of action (Bandura, 2001) and is closely tied to individuals' planning. Thus, intentionality is also connected to behavior as individuals must plan out a course of action for a future goal; even with high ability beliefs or self-efficacy for college students may not enroll if they don't have strong intentions to do so. Students' planned course of action in regard to postsecondary application and enrollment should therefore be investigated in future research.

The current study also examined both cross-sectional and longitudinal connections between students' ability beliefs, value for school, expectations, goal-directed behaviors, and enrollment. While social cognitive theory is focused on explaining individuals' future actions and choices, many empirical studies have been cross-sectional or short-term longitudinal studies (Bandura & Schunk, 1981; Kember, Ho & Hong, 2010; Schutz, 1997). Thus, the current study empirically shows that there are long-term connections between students' motivation-related beliefs, their goal-directed behaviors, and their postsecondary enrollment. Finally, the current study provides evidence that it is important to include components of social cognitive theory, most notably goal-directed behavior, in conjunction with those constructs central to expectancy-value theory in understanding students' postsecondary enrollment choices.

Future Directions

The current study addressed an important gap in the literature on how motivation-related beliefs and behaviors relate to students' postsecondary enrollment. In particular, the current study showed that inclusion of students' motivation-related beliefs and behaviors in addition to students' academic achievement, academic track, and perceived parental aspirations can account for a significant amount of the variance in postsecondary enrollment. However, the current study also raises questions for further research.

Overall the relations between students' goal-directed behaviors and postsecondary enrollment were not particularly strong. While these variables do appear to make an important contribution to understanding students' postsecondary enrollment, it is important that we consider additional behaviors that may also contribute to students' enrollment. Future research should investigate what these behaviors might be.

Additionally, previous research examining students' information and help-seeking behaviors with regard to postsecondary education has primarily examined applying to college as the outcome of interest (Cabrera & La Nasa, 2001; Martinez & Cervera, 2012). It could be that students' seek information from these sources to help more with tasks that are central for enrollment, such as applying to schools and filling out financial aid forms, and perhaps these behaviors would be more strongly related to these more specific tasks rather than the very general enrollment variable used in the current study.

Future research is also needed to examine the type of information students are seeking from significant others, school personnel and college sources as well as whether or not these sources are actually able to provide appropriate information about college. It is likely that some sources would be better able to provide students' with appropriate information than other sources. Future research is needed to examine both the type of information students are receiving from sources as well as the quality of that information. The effectiveness of a particular source to provide appropriate information and assistance are essential for ensuring students are able to use that information to achieve desired outcomes (Makara & Karabenick, 2013).

While the inclusion of the information-seeking behaviors gives some indication of students' access to information, other contextual variables are important to include in future research. Post-secondary expectations and attainment are impacted by significant others and the social context. Cheng and Starks (2002) found that parents, teachers and peers aspirations influenced students' own aspirations in terms of how far they planned to go in school. Examining community effects on educational attainment in mostly minority, low SES communities, South, Baumer and Lutz (2003) found that individuals

in low SES communities are exposed to peers who devalue education and are therefore more likely to not attend a 2- or 4-year college. These community and social influences are important to consider and likely overlap with additional factors in the academic context mentioned earlier, such as the SES level of the school. These variables should be examined in future research on students' postsecondary motivation and enrollment.

The current study examined different patterns of postsecondary enrollment, but did not look at the types of institutions in which students enroll. It would be important for future studies to examine how motivation factors into the types of postsecondary institutions in which students enroll. These include community colleges, online colleges, and many different types of four-year institutions (e.g. liberal arts colleges, state schools, selective institutions). Given that motivation-related variables were important components of postsecondary enrollment in general, it seems like that motivation would also be a key component affecting these enrollment choices. For many community colleges and online colleges there are often very few requirements for admission and these types of institutions may therefore require less motivation on the part of students in order to successfully enroll. Thus, the relation between the motivation-related beliefs and behaviors may be weaker in students who pursue their education from less selective colleges and universities. However, this possibility needs to be addressed in future research.

Additionally, the current study collapsed several different enrollment types in the structural equation models. Notably, those that delayed enrollment and those that enrolled but then left their postsecondary institution were combined into one category. Students could have very different reasons for delaying enrollment versus leaving school

and these reasons should be explored in future research. Similarly, the non-enrollee outcome category does not illuminate the possible reasons why students did not enroll in postsecondary education (e.g., they could not afford college, they applied but were not accepted, etc.) and these reasons should therefore be explored in future research.

Finally, while college enrollment is an important outcome in and of itself, recent estimates show that only 59% of students who enroll in 4-year institutions actually persist to completion of their degree, and only 31% of students who enroll in 2-year institutions do so (NCES, 2013b). Only a few long-term, longitudinal studies have examined how students' earlier motivation in school relates to their eventual educational attainment and these studies have only focused on one or two components of students' motivation such as their intrinsic motivation (Gottfried et al., 2013) or their educational expectations (Mello, 2008, 2009). Thus, the long-term connections between multiple components of students' motivation as they relate to college retention, persistence, and eventual graduation, remain underexplored. The current study showed that multiple components of students' motivation-related beliefs and behaviors contribute to students' postsecondary enrollment and it would be important for future research to extend these connections even longer term to examine students' postsecondary persistence.

Limitations

There are several limitations to the current study that must be considered when interpreting the findings and thinking about the implications of the results. First, while structural equation modeling offers a way to test the theoretical, and therefore often causal, relations between constructs, it is important to note that no causal conclusions can be drawn from the current study. That is, while the results of the study offer supportive

evidence for the relations between constructs that would be suggested by the theories that guided the research, the study lacks a number of necessary components of a design appropriate for investigations into cause and effect. Most notably, the design is not experimental. Thus, while there is support for the proposed causal pathways between constructs included in the current study, causal conclusions cannot be drawn. However, the nationally representative sample and longitudinal nature of the data does allow for some confidence that the results of the current study offer important contribution to our understanding of how these variables at the very least relate to one another over time. Further, establishing that motivation-related variables are important to the understanding of college enrollment opens the door for further research on interventions that might target students' motivation as a way to increase college enrollment.

While the longitudinal nature of the current study provided some indication of how the constructs relate to one another over time, not all variables were included at all waves. Most notably, the items for ability beliefs and value for school were only asked when students were in the 10th grade. Cross-lagged relations between ability beliefs and values have been found in prior research (Lent et al., 2008, 2010; Spinath & Spinath, 2005; Spinath & Steinmayer, 2008) and these findings show that there are likely feedback loops in how students' are motivated over time. Further, bidirectional, reciprocal interactions between personal, behavioral and environmental factors is a central aspect of social cognitive theory (Bandura, 1986, 1997). It is also probable that students' behaviors both influence and are influenced by their ability beliefs, expectations, and values. Thus, future research should examine how students' motivation-related beliefs

and their behaviors influence one another over time and guide the ways in which students think about postsecondary education and potential enrollment.

The data for the current study was collected by National Center for Education Statistics and thus the analyses relied on items that existed in the dataset. While this dataset offers a number of strengths, such as a large and nationally representative sample of students, the items included in the survey were not always drawn from pre-existing measures. However, exploratory and confirmatory factor analysis procedures confirmed that the items did form scales consistent with previous literature. Additionally, item wording was closely examined to ensure that it was consistent with other commonly used motivation scales.

An additional limitation of using an existing data source is that it is possible that variables that may be important to the conceptual model may not have been asked. The conceptual model for the current study was grounded in theory and supported by empirical research; however, the research questions and statistical analyses were limited by the data that was available in the dataset. This was most notably a problem for the analysis procedure for research question 1. Although the proposed analysis procedure was a good fit for the research question, the data available was insufficient to be able to estimate the model as proposed. Finally, as in any study utilizing self-report measures, it is not known if, for example, participants' reports of their goal-directed behaviors reflect the actual behaviors in which they engaged.

For many students, aspirations to obtain a college education begin to develop well before they enter high school (Bohon et al., 2006; Day, Borkowski, Punzo, & Howsepian, 1994; Yowell, 2002). Because the ELS:2002 data collection began when students were

in 10th grade it is not possible to examine the longer-term development of postsecondary expectations. Prior nationally representative datasets, most notably NELS:88, included more data points and therefore allowed for longer term examinations of students' educational expectations as they develop over time. While this is a current limitation of ELS:2002, a new wave of data is scheduled for release this year. This new wave will allow for additional longitudinal queries that can examine both changes in students' educational expectations over time as well as how these changes may affect occupational outcomes, something which has yet to be explored fully in longitudinal research.

Given the longitudinal nature of the current study, it was certainly necessary to have data that spanned at least several years. However, given that the data was first collected in 2002 and there has been a growth in college enrollment even in the past decade (NCES, 2012b) it is possible that the data for the current study may not completely account for the motivational processes and enrollment trends in the current generation of college-bound students. This is a common issue with longitudinal research as it requires a great deal of resources to follow students over time. While this is certainly a limitation, it is important to acknowledge that the relations between constructs included in the current study are supported both by theory and prior research. Thus, it appears that although there are certainly differences between cohorts in terms of the context of entering postsecondary education, it does not seem likely that the overall relations between the constructs included in the conceptual model for the current study would differ significantly over time.

The availability of online education options over the past several years is one significant change for the current cohort of students entering postsecondary education.

Online educational options could possibly provide some students with access to postsecondary education that was previously not possible. For example, students who live in rural areas far from postsecondary institutions may be better able to access online education. This possibility should be explored in future research.

In regard to the investigation of whether results found in the current study could be replicated with a more recent cohort of students, The National Center for Education Statistics is currently collecting data for a new longitudinal survey called the High School Longitudinal Study of 2009 (HSLS:09). The base year wave of data was collected from 9th graders in 2009, and a first follow up wave was collected in 2012 when students were in 12th grade. Additionally, a second follow is scheduled to be collected in 2016. Similar research questions to those explored in the current study could be investigated in the HSLS:09 study to determine whether and to what extent there may be cohort effects in the relations between motivational processes and postsecondary enrollment.

Implications

Although additional questions and directions for future research were raised by the current study, several important findings can contribute to our understanding of how motivation-related variables may influence students' college enrollment. Most notably, the current study was able to explain a greater amount of the variance in students' postsecondary enrollment than prior studies by including motivation-related variables in addition to demographic and academic variables. This suggests that motivation is a key component of students' postsecondary enrollment and should continue to be included in the models used to examine and explain factors that relate to postsecondary enrollment.

The fact that students' value and expectations in particular were stronger predictors of their goal-directed behaviors and postsecondary enrollment suggests that fostering students' value for school and positive postsecondary expectations would be beneficial for programs that aim to increase students' postsecondary enrollment. Further, differences in the strength of the relation between value for school and postsecondary expectations suggest that this relation may be especially important for students in groups that are traditionally under enroll in postsecondary education. Thus, these constructs may be especially important as a focus for interventions aimed at increasing postsecondary enrollment in these groups.

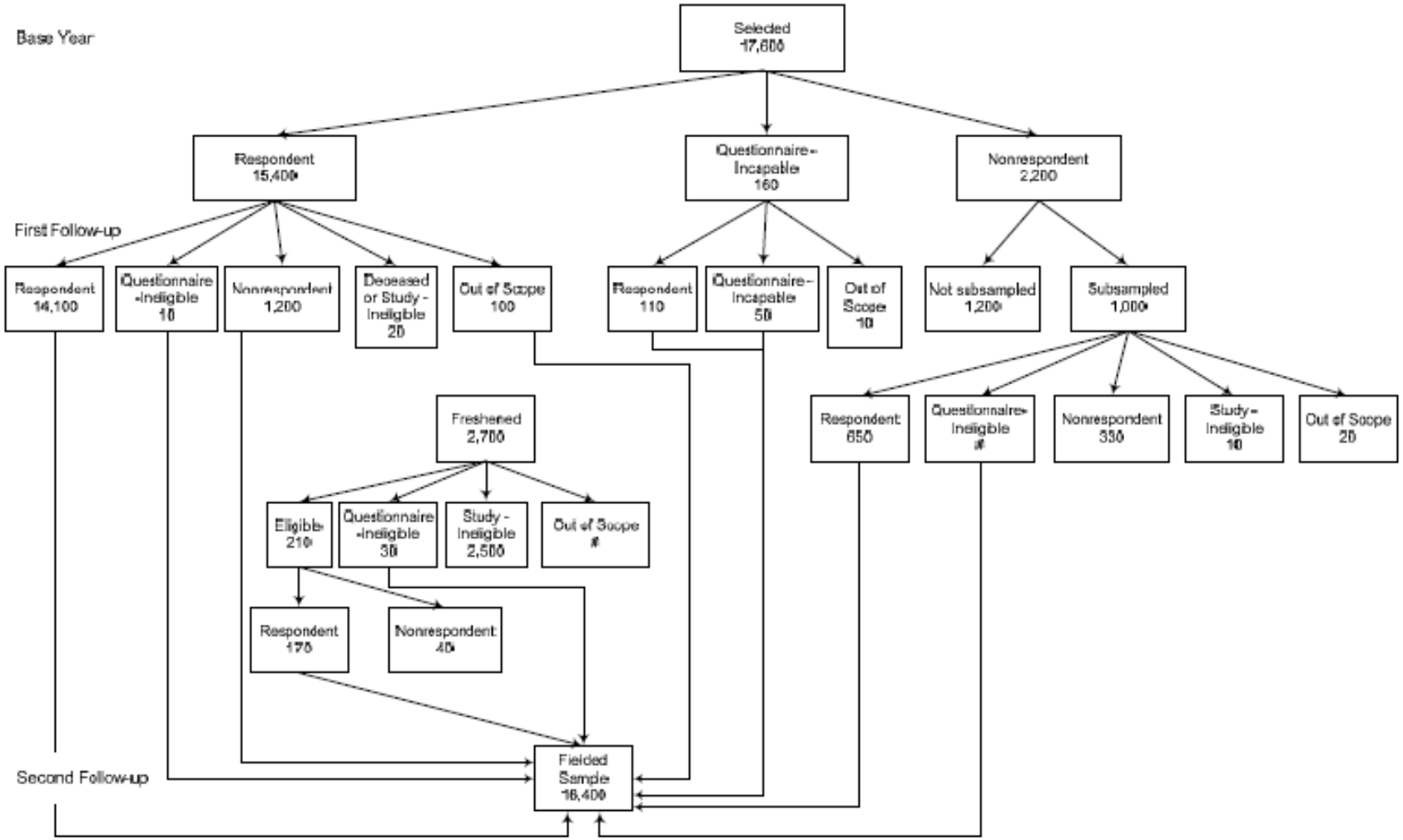
Many of the variables typically studied in regard to postsecondary enrollment are things that would be difficult, if not impossible, to target with simple interventions. For example, the quality of the courses offered at a particular school would likely involve large-scale intervention efforts. And while interventions can be targeted toward certain groups (e.g. boys, at-risk students), it may be difficult to select only certain groups of students based on demographic characteristics for interventions aimed at increasing postsecondary enrollment. However, several recent studies have shown that interventions targeting students' motivation can be implemented at a low cost and with relative ease and still show positive effects (for a recent review see Yeager & Walton, 2011). Thus, the motivational-processes examined in this study may be ideally suited for intervention work. This is especially true when considering that several of the motivational interventions have been aimed at increasing students' value in particular (Cohen, Garcia, Apfel, & Master, 2006; Cohen, Garcia, Purdie-Vaugns, Apfel, & Brzustoski, 2009; Hulleman, Godes, Henricks, & Harackiewicz, 2011; Hulleman & Harackiewicz, 2009;

Miyake et al., 2010) and value was significantly related to many other aspects of the model explored in the current study.

Conclusion

Education is one of the biggest factors impacting individuals' upward social mobility (Crowley & Shapiro, 1982; Domina, Conley, & Farkas, 2011; Richardson & Skinner, 1992), and is thus seen as one of most important investments for future success in the labor market (Haveman & Smeeding, 2006). The current push in schools is towards all students pursuing some postsecondary education, and these high expectations are even echoed by the current presidential administration (Welsch, 2013). In this era of "college-for-all" (Domina et al., 2011; Goyette, 2008; Rosenbaum, 2001) it is important to consider the wide array of variables that can influence how or why a student chooses to pursue postsecondary education. If projections remain on track then by 2018, approximately 60% of U.S. jobs will require some level of postsecondary education (Carnevale, Smith & Strohl, 2010). While enrollment in postsecondary education is at an all-time high (NCES, 2012b), there are still many students who do not enroll in postsecondary education and the current study indicates that motivation could be one factor that should be integrated into models for understanding postsecondary enrollment.

Appendix A: Sample sizes for each category of respondent from baseline to second follow-up.



Appendix B: Descriptive Statistics for Full Sample and Selected Sample

Table B1

Means and Standard Deviations for Weighted Full Sample and Selected Sample

Variable	Full Sample Mean (SD)	Selected Sample Mean (SD)
Covariates		
Gender	0.50 (0.50)	0.50 (0.50)
ELL	0.86 (0.35)	0.87 (0.34)
SES	-0.01 (0.72)	0.00 (0.72)
Parents' Aspirations	5.32 (1.29)	5.33 (1.27)
Math Standardized Test Score	50.02 (10.00)	50.49 (9.84)
Reading Standardized Test Score	50.02 (10.00)	50.47 (9.80)
GPA	3.80 (1.56)	3.82 (1.56)
Model Variables		
Value 1	2.58 (0.76)	2.59 (0.76)
Value 2	3.57 (0.60)	3.58 (0.59)
Value 3	2.12 (0.58)	2.13 (0.58)
Value 4	3.36 (0.74)	3.38 (0.74)
SCA 1	2.81 (0.91)	2.82 (0.90)
SCA 2	2.98 (0.93)	3.00 (0.92)
SCA 3	2.96 (0.87)	2.98 (0.86)
Postsecondary Expectations	5.12 (1.44)	5.17 (1.42)
Counselor	0.44 (0.50)	0.44 (0.50)
Teacher	0.32 (0.47)	0.32 (0.47)
Coach	0.10 (0.30)	0.10 (0.30)
Parent	0.56 (0.50)	0.56 (0.50)
Sibling	0.25 (0.43)	0.25 (0.44)
Other Relative	0.27 (0.44)	0.27 (0.44)
Friend	0.40 (0.49)	0.41 (0.49)
College Representative	0.15 (0.35)	0.15 (0.35)
College Publication or Website	0.34 (0.48)	0.35 (0.48)
College Search Guide	0.32 (0.47)	0.33 (0.47)
Took/Plans to take PSAT/PACT	0.66 (0.47)	0.68 (0.47)
Took/Plans to take SAT/ACT	0.68 (0.46)	0.70 (0.46)

Appendix C: Descriptive Statistics for Scale Variables

Table C1

Descriptive Statistics for Items Included in School Ability Beliefs Factor

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SCA10a	9323	1.00	4.00	2.8641	.89654	-.177	.025	-.976	.051
SCA10b	9192	1.00	4.00	3.0294	.91328	-.467	.026	-.850	.051
SCA10c	8968	1.00	4.00	3.0183	.85042	-.371	.026	-.796	.052
Valid N (listwise)	8763								

Table C2

Descriptive Statistics for Items Included in Value for School Factor

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Val10a	12021	1.00	4.00	2.6158	.74983	-.175	.022	-.262	.045
Val10b	11983	1.00	4.00	3.6004	.57972	-1.427	.022	2.495	.045
Val10c	12163	1.00	3.00	2.1426	.57312	-.004	.022	-.137	.044
Val10d	12070	1.00	3.00	2.8353	.39725	-2.280	.022	4.458	.045
Valid N (listwise)	11166								

Appendix D – Ability Beliefs and Values Scale Item Alignment

Table D1

Scale Alignment for School Ability Beliefs Items

Scale Source	Current Study	School Motivation Questionnaire	CAB Dataset	MSALT Dataset	MSLQ	PALS
Scale Name	School Ability Beliefs	Ability Beliefs	Self-Concept of Ability	Self-Concept of Ability	Self-efficacy for learning and performance	Academic Efficacy
Scale Reliability	H = 0.88	CFA consistent with prior literature, no α's or H given	α = 0.94 for similar age group	α = 0.85 for similar age group	α = 0.93	α = 0.78
	When I sit down myself to learn something really hard, I can learn it	I am very confident at school	How good at [subject] are you?	How good at [subject] are you?	Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class	Even if the work is hard, I can learn it
	If I decide to not get any bad grades, I can really do it	Generally I am pleased with myself at school	How well do you expect to do in [subject] next year?	Compared to other subjects, how good are you in [subject]?	I believe I will receive an excellent grade in this class	I can do even the hardest work in this class if I try

If I want to learn something well, I can	I think I can do quite well in school	How good would you be at learning something new in [subject]?	If you were to rank all the students in [subject] the worst to the best in [subject], where would you put yourself?	I'm confident I can do an excellent job on the assignments and tests in this course	I'm certain I can master the skills taught in class this year
	I succeed at whatever I do in school	Compared to other subjects, how good are you in [subject]?		I'm certain I can understand the basic concepts taught in this course	I'm certain I can figure out how to do the most difficult class work
		If you were to list all students from best to worst in [subject] where are you?		I'm confident I can understand the most complex material presented by the instructor in this course	
				I expect to do well in this class	
				I'm certain I can master the skills being taught in this class	

Table D2

Scale Alignment for Value for School Items

Scale Source	Current Study	School Motivation Questionnaire	CAB Dataset	MSALT Dataset	MSLQ	PALS
Scale Name	Value for School	Utility Value of School	Academic Value and Interest	Academic Value	Task Value	No parallel scale
Scale Reliability	H = 0.81	CFA consistent with prior literature, no α's or H given	α = 0.90 for similar age group	α = 0.85 for similar age group	α = 0.90	NA
	I go to school because I think the subjects I'm taking are interesting and challenging	I want to do well at school so that I can have a good future	I find working on [subject] assignments… (response options range from not at all interesting to very interesting)	For me, being good at [subject] is… (response options range from not at all important to very important)	I am very interested in the content area of this course	
	I go to school because education is important for getting a job later on	I aim my schooling towards getting a good job	For me, being good in [subject] is (response options range from not at all important to very important)	How useful do you think [subject] will be for what you want to do after you graduate and go to work?	I think I will be able to use what I learn in this course in other courses	

How much do you like school?	I try hard to do well at school so that I can get a good job	How much do you like [subject]?	How much do you like doing [subject]?	I like the subject matter of this course
How important in your life is getting a good education?	It is good to plan ahead to complete my schooling	Compared to other activities, how important is it to be good at [subject]?	For me, being good in [subject] is (response options range from not at all important to very important)	Understanding the subject matter of this course is very important to me
		How useful is what you learn in [subject]?		I think the course material in this course is useful for me to learn
		Compared to other subjects, how useful is [subject]?		It is important for me to learn the course material in this course

Appendix E: Comparisons between models for RQ 2.1 using the full sample and the reduced sample

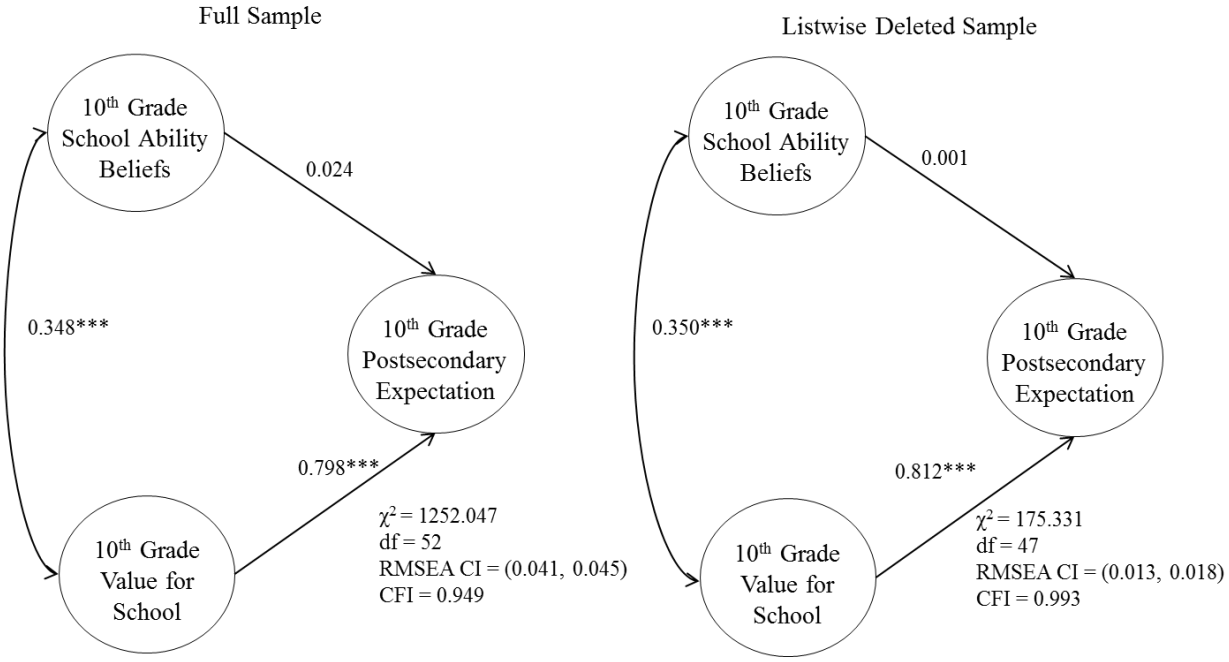


Figure E1. Unstandardized loadings and model fit information for SEM RQ2.1

Table E1

Unstandardized estimates for RQ2.1

	Full Sample			Listwise Deleted Sample		
Pathway	Unstd.	S.E.	p-value	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.092	0.009	< 0.001	0.093	0.009	< 0.001
Math → Ability beliefs	0.015	0.002	< 0.001	0.010	0.002	< 0.001
Reading → Ability beliefs	0.013	0.002	< 0.001	0.010	0.002	< 0.001
General Program → Ability beliefs	-0.253	0.025	< 0.001	-0.236	0.026	< 0.001
Vocational Program → Ability beliefs	-0.179	0.036	< 0.001	-0.163	0.038	< 0.001
Parents' Aspirations → Ability beliefs	0.099	0.010	< 0.001	0.090	0.010	< 0.001
GPA → Value	0.113	0.007	< 0.001	0.114	0.007	< 0.001
Math → Value	-0.004	0.001	0.002	-0.010	0.001	< 0.001
Reading → Value	0.004	0.001	0.002	0.000	0.001	0.701
General Program → Value	-0.312	0.019	< 0.001	-0.280	0.021	< 0.001
Vocational Program → Value	-0.152	0.027	< 0.001	-0.130	0.028	< 0.001
Parents' Aspirations → Value	0.093	0.006	< 0.001	0.085	0.007	< 0.001
GPA → Expectations	0.083	0.012	< 0.001	0.079	0.012	< 0.001
Math → Expectations	0.026	0.002	< 0.001	0.021	0.002	< 0.001
Reading → Expectations	0.018	0.002	< 0.001	0.015	0.002	< 0.001
General Program → Expectations	-0.174	0.031	< 0.001	-0.151	0.033	< 0.001
Vocational Program → Expectations	-0.272	0.046	< 0.001	-0.280	0.046	< 0.001
Parents' Aspirations → Expectations	0.258	0.011	< 0.001	0.245	0.011	< 0.001

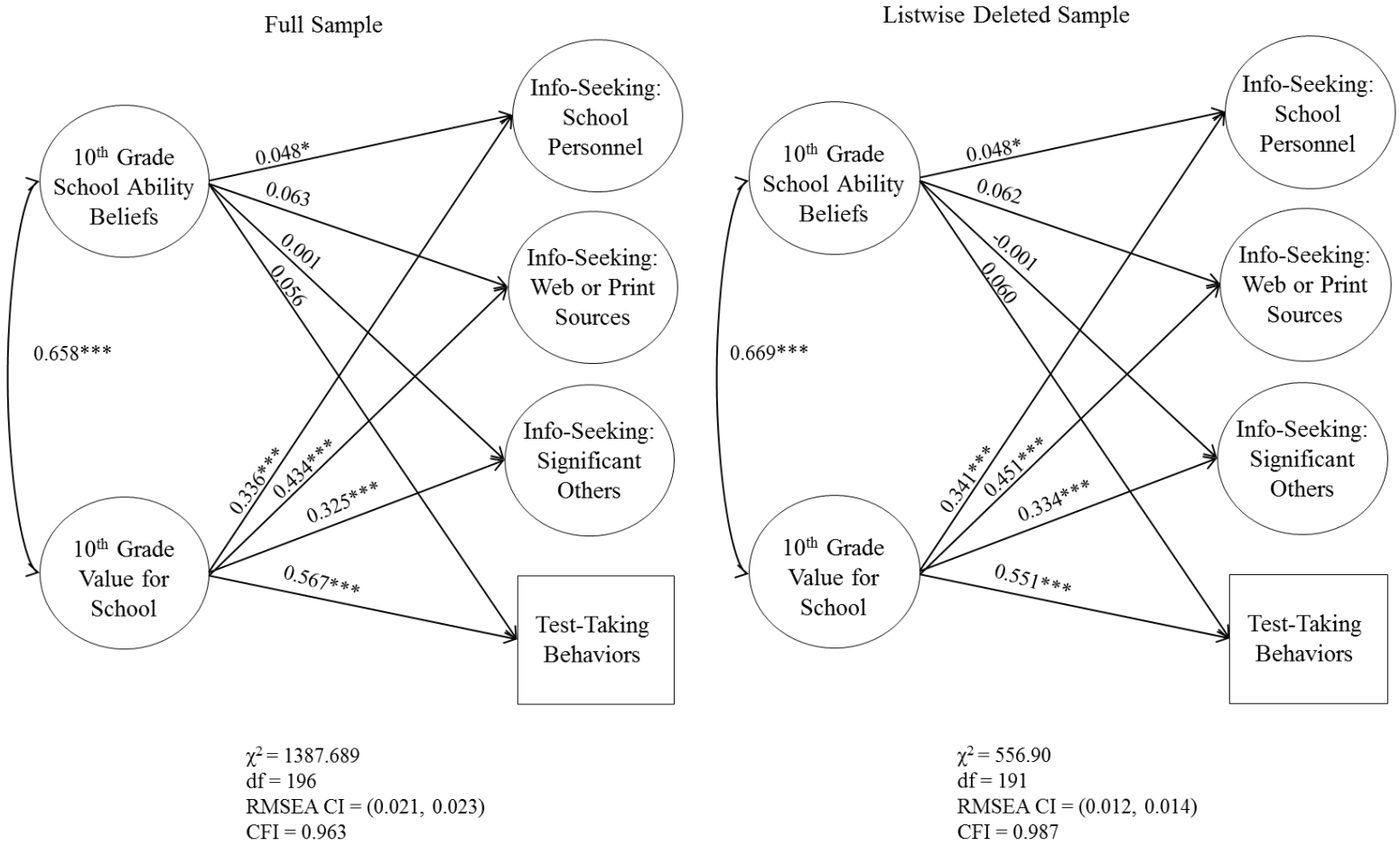


Figure E2. Unstandardized loadings and model fit information for SEM RQ2.2

Table E2

Unstandardized estimates for RQ2.2

	Full Sample			Listwise Deleted Sample		
Pathway	Unstd.	S.E.	p-value	Unstd.	S.E.	p-value
GPA → Ability beliefs	0.093	0.009	< 0.001	0.093	0.009	< 0.001
Math → Ability beliefs	0.015	0.002	< 0.001	0.010	0.002	< 0.001
Reading → Ability beliefs	0.013	0.001	< 0.001	0.010	0.002	< 0.001
General Program → Ability beliefs	-0.254	0.025	< 0.001	-0.236	0.026	< 0.001
Vocational Program → Ability beliefs	-0.179	0.036	< 0.001	-0.164	0.038	< 0.001
Parents' Aspirations → Ability beliefs	0.099	0.010	< 0.001	0.090	0.010	< 0.001
GPA → Value	0.116	0.007	< 0.001	0.117	0.007	< 0.001
Math → Value	-0.004	0.001	0.002	-0.010	0.001	< 0.001
Reading → Value	0.004	0.001	0.002	0.000	0.001	0.732
General Program → Value	-0.319	0.020	< 0.001	-0.287	0.021	< 0.001
Vocational Program → Value	-0.155	0.027	< 0.001	-0.133	0.028	< 0.001
Parents' Aspirations → Value	0.095	0.006	< 0.001	0.087	0.007	< 0.001
GPA → School Personnel	-0.034	0.010	< 0.001	-0.035	0.010	< 0.001
Math → School Personnel	0.001	0.002	0.575	0.002	0.002	0.184
Reading → School Personnel	-0.006	0.002	< 0.001	-0.005	0.002	0.005
General Program → School Personnel	-0.066	0.025	0.009	-0.078	0.026	0.003
Vocational Program → School Personnel	-0.043	0.032	0.170	-0.038	0.034	0.256
Parents' Aspirations → School Personnel	0.010	0.009	0.265	0.014	0.009	0.122
GPA → College Sources	-0.018	0.014	0.196	-0.021	0.014	0.144
Math → College Sources	0.005	0.002	0.014	0.006	0.002	0.011
Reading → College Sources	0.018	0.002	< 0.001	0.019	0.002	< 0.001
General Program → College Sources	-0.128	0.036	< 0.001	-0.141	0.036	< 0.001

Vocational Program → College Sources	-0.077	0.052	0.143	-0.046	0.054	0.398
Parents' Aspirations → College Sources	0.045	0.012	< 0.001	0.044	0.012	< 0.001
GPA → Significant Others	-0.005	0.012	0.698	-0.006	0.013	0.608
Math → Significant Others	0.004	0.002	0.013	0.004	0.002	0.054
Reading → Significant Others	-0.002	0.002	0.207	-0.002	0.002	0.375
General Program → Significant Others	-0.093	0.030	0.002	-0.088	0.031	0.004
Vocational Program → Significant Others	-0.071	0.044	0.105	-0.072	0.046	0.117
Parents' Aspirations → Significant Others	0.258	0.011	0.058	0.024	0.012	0.049
GPA → Test-taking Behaviors	0.049	0.014	< 0.001	0.051	0.014	< 0.001
Math → Test-taking Behaviors	0.021	0.002	< 0.001	0.018	0.003	< 0.001
Reading → Test-taking Behaviors	0.015	0.002	< 0.001	0.014	0.003	< 0.001
General Program → Test-taking Behaviors	-0.333	0.034	< 0.001	-0.330	0.034	< 0.001
Vocational Program → Test-taking Behaviors	-0.209	0.048	< 0.001	-0.182	0.052	< 0.001
Parents' Aspirations → Test-taking Behaviors	0.100	0.012	< 0.001	0.092	0.012	< 0.001

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