EXAMINING DIMENSIONS OF EXPECTANCY-VALUE THEORY AS PREDICTORS OF U.S. LATINO HIGH SCHOOL STUDENTS' ACADEMIC BEHAVIORS AND MATHEMATICS PERFORMANCE

by

David S. Chirinos
A Dissertation
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of
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Dedication

This work is dedicated to the pursuit of knowledge. May this effort, and my future efforts, contribute (howbeit small) to this worthwhile and meaningful endeveor.

This work is also dedicated to my family. Thank you for believing in me, for your support, and for instilling in me the beauty that is learning.

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There are many people who I'd like to thank for their contributions. First and foremost, I'd like to thank my family for their love, support, and for believing in me. I couldn't have done this (whatever this turns out to be) without you.

Thank you Dr. Gorrell for taking an interest in me early on during my Masters studies. That simply action had a large positive effect on me. Thank you for your continuing support and for being part of my dissertation committee.

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Thank you for chairing my dissertation Dr. Kitsantas. Thank you for your mentoring. Your kind ways are appreciated.

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List of Abbreviations

AF	Attention Focusing
ESCS	Economic, Social, and Cultural Status
LOC	Locus of Control
MATH	Mathematics Performance
MSE	Mathematics Self-Efficacy
PER	Persistence
SB-F	Socializer's Beliefs—Parents
SB-P	Socializers' Beliefs—Friends
SSME	Self-Sustained Mathematics Efforts
TIV	Task Interest Value
TUV	Task Utility Value

Abstract

EXAMINING DIMENSIONS OF EXPECTANCY-VALUE THEORY AS PREDICTORS OF U.S. LATINO HIGH SCHOOL STUDENTS' ACADEMIC BEHAVIORS AND MATHEMATICS PERFORMANCE

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George Mason University, 2017

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The purpose of the present exploratory study was to examine Latino and Caucasian students' utility value beliefs, interest value beliefs, expectancy beliefs, academic locus of control beliefs, and perceptions of socializers' beliefs as predictors of academic behaviors and mathematics performance. Using Eccles et al.'s (1983) expectancy-value theory of achievement motivation to ground the study, six research questions examined: (a) the direct and indirect effects of expectancy and value beliefs as predictors of students' attention focusing, self-sustained mathematics efforts, persistence and mathematics performance, (b) the direct and indirect effects of cognitive processes on students' expectancy-value beliefs, and (c) whether differences emerged in the relationships of interest as a result of group membership. Using the 2012 U.S. PISA dataset, the study sample consisted of 781 (*n* = 781) U.S. Latino high school students and 1,707 (*n* = 1,707) U.S. Caucasian students. Path analysis results suggest that cognitive

processes predicted students’ expectancy and value beliefs, task value beliefs only predicted academic behaviors, while expectancy beliefs predicted both academic behaviors and mathematics performance. Study results have important implications for theory and practice. First, in regards to theory, (a) differences emerged in the functioning of expectancy and value beliefs as interest value was a stronger predictor of effort than utility value and self-efficacy, (b) efficacy beliefs more strongly predicted persistence than value beliefs, and (c) efficacy beliefs predicted mathematics performance. Further, it was found that parental influences had a stronger effect on students’ expectancy-value beliefs than peer influences, while locus of control predicted expectancy-value beliefs at similar rates. Second, study findings have educational implications as results: (a) further highlight the importance of students’ efficacy beliefs in predicting academic behaviors and performance, (b) suggest that utility value and interest value are two different venues through which educators can influence their students’ academic behaviors, and (c) suggests that parental beliefs can influence their children’s expectancy-value beliefs—particularly their utility value beliefs.

Chapter One

General Statement of the Problem

According to the Pew Hispanic Center—one of seven projects conducted by the Pew Research Center—Latino students make up 23.1% of all U.S. children age 17 and younger (Fry & Gonzalez, 2008; Passel, Cohn, & Lopez, 2011). As the largest ethnic minority group in the United States, the proportion of Latino school age children will continue to grow as recent estimates project Latinos to make up 29% of the total U.S. population by the year 2050, roughly translating to 128 million Latinos living in the United States (Passel & Cohn, 2008; Passel, Cohn, & Lopez, 2011).

In addition to their large size, Latino students present special challenges for educational researchers as Latino students have consistently underperformed in the area of academic attainment (Ceballo, 2004; Ramirez & de la Cruz, 2003). Achievement gaps have been observed throughout the K-12 years, as well as in higher education (Fry & Gonzalez, 2008; Garcia, Jensen, & Cuellar, 2006). Latino students are less likely to graduate high school than any other racial/ethnic group (Urdan, 2012; U.S. Department of Education, 2010). A 2002 U.S. Census report found that only 11% of Latinos over the age of 25 held a bachelor's degree, compared with 29% for their Caucasian counterparts (Ramirez & de la Cruz, 2003). This same report also found that 27% of Latinos over 25 had less than a 9th grade education (Ramirez & de la Cruz, 2003). This combination of

Latinos' large (and growing) populace and low levels of educational attainment has serious and far reaching ramifications as failure to gain postsecondary education is associated with lower median earnings and higher rates of unemployment (U.S. Bureau of Labor Statistics, 2016), as well as with lower probabilities of economic upward mobility and lower overall life well-being (Cox & Yang, 2012).

As such, a need exists to identify factors associated with Latino student academic success so that researchers can have greater understandings as to ways through which to address this problem (Alfaro, Umaña-Taylor, & Bamaca, 2006; Chun & Dickson, 2011; Conchas, 2001; Mena, 2011). Although the factors that contribute to Latino students' academic success are many (i.e. English language acquisition, acculturation, socioeconomic status, documentation status, family support, non-discrimination, teacher support, etc.) and beyond the scope of a single study—this study will examine the role of student-level factors, particularly student-level motivational factors—as these factors have been shown to be key determinants of academic achievement (Schunk, Pintrich, & Meece, 2008; Schunk & Zimmerman, 2008; Wigfield & Eccles, 1992, 2000; Zimmerman, 2000, 2008). Further, by examining student-level motivational factors with a large Latino student sample, this study aims to contribute to the motivational literature as few academics efforts have been made in examining the functioning of motivational variables with Latino students (Riconscente, 2014; Stevens, Olivarez, Lan, & Tallent-Runnels, 2004; Trevino & DeFreitas, 2014).

Background of the Problem

As with previous waves of immigration to this country, much of the American ethos which attracts migrants is the belief that subsequent generations will be able to attain better lives than those afforded by one's home countries (Slavin & Calderon, 2000). Unfortunately, this ethos has proven to be as much myth as reality for many Latino migrants (and subsequent generations) as the ladders to the American economic mainstream are largely dependent on one's level of educational attainment (Slavin & Calderon, 2000). Dating back to the 1970's, when the National Assessment of Educational Progress (NAEP) first began tracking Latino student achievement (NAEP only tracked White and Black student achievement as recent as 1971) (Hemphill & Vanneman, 2011), achievement gaps have been widely and consistently documented throughout the K-12 years, across numerous NAEP state assessments (U.S. Department of Education, 2003, 2005, 2010), with Latino students graduating from high school at lower rates than any other racial/ethnic minority group (Urdan, 2012; U.S. Department of Education, 2010).

As educational researchers (particularly policy oriented researchers) have attempted to understand the reasons behind the persistence of gaps in student achievement, explanatory frameworks have been constructed which attempt to explain achievement gaps in terms of its underlying factors (Garcia, 2000; National Education Association, n.d.). One such framework, proposed by Garcia (2000), makes the case that achievement gaps can be understood in term of three broad categories of factors. These categories include: factors that are personally focused (Category I), factors that are environmental in nature (Category II), and factors that are associated with schools/learning environments (Category III) (Garcia, 2000). A closer look at these categories suggest that Category I factors are associated with personal features and characteristics of the student, factors which begin to define a student's readiness to learn. Next, Category II factors describe the surroundings of the student in terms of where the student is born and where the student grows up. Lastly, Category III factors are associated with the institution of the school, in terms of its readiness to effectively serve students (Garcia, 2000).

Using this general framework, Garcia (2000) considered these broad categories (by examining the educational research literature) in terms of factors that underline Latino student underachievement. For Category I (personal factors), Garcia identified 29 factors which place Latino students at-risk of educational failure. A sample of these factors include: (a) limited English proficiency, (b) recent immigrant, (c) immigrant with little formal schooling in native country, (d) has not received early childhood education services, (e) lives in poverty, (f) repeated or was held back at least one grade, (g) is overage for grade/school level, (h) is pregnant, (i) is unmarried or married teen parent, (j) belongs to a gang, (k) feels psychologically isolated or socially unattached to peers, and (l) works 20 hours per week (or more). For Category II (environmental factors), Garcia listed 22 factors, with sample factors including: (a) parents are recent immigrants, (b) at least one parent does not speak English, (c) adults in the household infrequently engage in conversations with the student regarding school matters, (d) parents have little connections to the school, (e) student attends school with high concentration of poor students, (f) adults in household do not read to students, (g) family is highly mobile, (h) family lives in rural (isolated) areas, and (g) parents have odd work shifts. For Category III (institutional factors), Garcia listed 14 factors. Sample factors include: (a) school/school districts with high teacher turnover, (b) high number of uncertified/unlicensed teacher, (c) poor physical conditions of school building, (d) inadequate access to counseling and other school services, (e) minimal parental involvement at the school, (f) school district does not have adequate improvement plans, and (g) curriculum not adequately aligned with state curriculum.

As evident by the long list of factors (though not exhaustive) which contribute to Latino academic underachievement in the United States, achievement gaps are complex phenomena made up of numerous underlying factors. Although Garcia's (2000) analysis of the complexity of Latino student underachievement may seem overwhelming, it does provide a number of venues through which to attempt to better understand and ameliorate this problem, with this study considering a Category I factor which has not received much attention (in the literature) with Latino students—academic motivational beliefs (Riconscente, 2014; Stevens, Olivarez, Lan, & Tallent-Runnels, 2004; Trevino & DeFreitas, 2014).

Accordingly, the present study will consider the role of student-level non-cognitive factors (i.e. expectancy beliefs, motivational beliefs, etc.) on Latino students' academic achievement as: (a) non-cognitive factors have been shown to contribute (and to play an important role) in the acquisition of academic learning (Bembenutty, Cleary, & Kitsantas, 2013; Schunk et al., 2008; Schunk & Zimmerman, 2008; Wigfield & Eccles, 2002; Zimmerman & Schunk, 2003), (b) student-level factors may be easier to change than environmental factors or systematic factors (Garcia, 2000), (c) far less is known about the functioning student-level non-cognitive factors among Latino students (Graham, 1992; Schunk et al., 2008; Schunk & Usher, 2013; Wigfield & Eccles, 2002), and (d) student-level non-cognitive factors, particularly motivational factors, may function differently as result of one's culture (Bandura, 2002; Hong et al., 2009; Shechter et al., 2011)—a key assertion in support for the rationale of this study. As such, a brief discussion regarding the relationship between culture and motivation (in general terms) will be presented, followed by a longer discussion regarding four salient aspects of Latino culture: interdependence, familism, respect, and *educación*—aspects which may affect the theorized functioning of well-researched non-cognitive motivational factors (Bandura, 2002; Markus & Kitayama, 1991; Morling & Kitayama, 2008).

Culture and motivation. Broadly speaking, the relationship between motivation (used as an umbrella term) and culture has been described in the literature as intricately linked as culture is believed to provide information structures, including shared systems of meaning, which in turn provide people with directives and goals (D'Andrade, 1992; Markus & Kitayama, 1991; Morling & Kitayama, 2008). Along these lines, culture has also been described as consisting of schemas, defined as organized sets of knowledge which communicate to people what they should do or what things mean (D'Andrade, 1992). Similarly, Markus and Kitayama (1991) argue that the construal of the self is influenced by culture, which in turn influences psychological processes including cognition, emotion, and motivation. In particular, Markus and Kitayama (1991) make the case that individuals from more independent cultures have motivations which are typically rooted in some type of internal and individually rooted need or motive, while those from interdependent cultures have motivations which are more rooted in realizing one's connectedness to others. This distinction between independent and interdependent cultures are typically exemplified in terms of Asian cultures and Western cultures (American, Western-European), though Latin-American cultures have also been characterized by interdependence (Delgado-Gaitan, 1993; Fuligni & Fuligni, 2007; Halgunseth, Ispa, & Rudy, 2006; Hurtado, 1995; Markus & Kitayama, 1991).

Because culture is believed to affect the construal of the self, including the construal of psychological processes such as motivation (in broad general terms), a closer look at some salient aspects of Latino culture will now be examined. In doing so, this study seeks to make the case that: (a) there are distinct features of Latino culture (i.e. interdependence, familism, respect, *educación*, etc.) that have been documented in the literature (Cauce & Domech-Rodriguez, 2002; Delgado-Gaitan, 1993; Fuligni & Fuligni, 2007; Hurtado, 1995; La Roche & Shriberg, 2004; Valdes, 1996) and (b) these distinct features of Latino culture may influence the construal of students' expectancy beliefs and motivational value beliefs (D'Andrade, 1992; Markus & Kitayama, 1991; Morling & Kitayama, 2008).

Latino culture. The term "Latino" is a label of convenience that refers to individuals of different nationalities and ethnicities which can trace their lineage to Spanish-speaking countries (Cauce & Domech-Rodriguez, 2002; La Roche & Shriberg, 2004). This term is used in the United States to describe both foreign born immigrants (of

Latin-American descent) and subsequent U.S. born generations. In the United States, the vast majority of Latinos are of Mexican descent, followed by Central-American, Caribbean, and South-American descent (Hurtado, 1995). Although Latinos in the United States are not a homogenous group, given the differences that exist between the various nationalities, there are a number of salient similarities that have been found across Latinos of different national origins that are believed to constitute Latino culture (Cauce & Domech-Rodriguez, 2002; Durand, 2011). Chief among these cultural similarities is the interdependent orientation that is found among Latino families (Delgado-Gaitan, 1993; Halgunseth, Ispa, & Rudy, 2006). Interdependence has been described as: (a) the importance of maintaining complaisant interpersonal relationships, (b) believing that the group is central to one's identity, and (c) the importance of conforming to external standards (Fuligni & Fuligni, 2007; Hurtado, 1995).

Support for a Latino interdependence orientation was documented in an ethnographic case study by Mintrum and Lambert (1964). This ethnographic field study investigated the child training practices and child socialization practices of mothers from six different cultures. The study was conducted in Mexico, the Philippines, Japan, India, Kenya, and the United States. A total of 133 mothers were selected for interviews and observations, with observations examining various child rearing practices. Once the data was analyzed, it was found (among a number of findings) that Mexican mothers were more likely to punish their children's usage of aggression towards peers than were parents from any of the other five cultures (Mintrum & Lambert, 1964). The authors attributed this finding to the desire for close social ties, particularly family ties, and to the value assigned to maintaining those close social ties that existed within Mexican families—aspects which are interdependent in nature. Further, Mintrum and Lambert (1964) described a distinct desire among Mexican mothers to maintain strong family ties, or *familism*, which is another salient feature of Latino culture—a feature which has been observed across all Latino subgroups (Halgunseth, Ispa, & Rudy, 2006; La Roche & Shriber, 2004; Valdes, 1996; Vega, 1995) and which stems from the larger interdependent cultural orientation observed in Latino culture (Mintrum & Lambert). Familism will now be discussed.

Familism. Familism has been defined by researchers in a number of ways, including: (a) the desire to maintain strong family ties, the expectation that family will be the primary source of support, and the commitment to the family over individual needs (Halgunseth et al. 2006); (b) family closeness, cohesion, interdependence, and the expectation and reliance on intergenerational and extended kin family members as primary sources of support (Durand, 2011); (c) the value of the central role of the family in individual psychology, identity, and socialization (Kuhlberg, Peña, & Zayas, 2010); and (d) the tendency to place great importance on family attachments, loyalty and reciprocity, and the tendency to devalue relationships outside the family (La Roche & Shriberg, 2004).

Familism research. In a three year ethnographic study of ten Mexican-American immigrant families, Valdes (1996) documented how various practices, beliefs, and values held by these families were rooted in familism. For instance, Valdes described a socialization practice that occurred (over and over again) in all ten of the households which she visited: whenever the author and her assistants would walk into the home, the mother would signal the oldest child, often through a simple nod or raised eyebrow, to take the younger siblings and to leave the room. This practice was attributed to the collective childrearing understanding held by the family members (a feature of familism). Further, Valdes (1996) described that if the mother was busy, it was the oldest child's responsibility to care for the younger siblings. Valdes also discussed how this practice did not produce any questioning from the children, no complaints, no acting out in front of the guests, exemplifying the desired family cohesion and loyalty that is understood within familism.

Valdes (1996) documented another instance of familism when she asked the mothers about how they approached teaching their children to perform household tasks. Valdes explained that the mothers tended to adhere to a general philosophy that children learn through doing things. Many of the mothers described scenarios where the children learned to perform household tasks by observing their older siblings perform the task. This finding is in line with the familial notion that older siblings are expected to look after younger siblings and are even given the authority to enforce family rules. It was postulated that these practices emerged from the traditions and necessities of large families typically found in agrarian rural Mexico (Valdes).

Familism has also been studied in terms of its stability. For example, Halgunseth et al. (2006) report that familism tends to remain generally stable across generations and across varying levels of acculturation, though some aspects do decline with time. For instance, one study with Cuban and Nicaraguan immigrants looked at familism and the effects of acculturation. This study surveyed 885 middle school adolescents and one of their parents and found mixed results. One aspect of familism, the belief in the value of family support increased with acculturation while the sense of family cohesion and family pride decreased with acculturation (Gil & Vega, 1996). It is believed that the value of family increased as new immigrants were more dependent on familial support while family cohesion and pride decreased as a result of acculturative stress (Gil & Vega, 1996). It is also believed that some aspects of familism fluctuate with acculturation as familism is made up of several components, with immigrants electing to continue some aspects and not others (Gil & Vega).

Familism and motivation. In terms of academic motivation, familism has been found affect Latino students' motivation, though findings are mixed in terms of whether the effects are positive or negative. For instance, Suarez-Orozco and Suarez-Orozco (1995) found that some immigrant students use their strong sense of family obligation to motivate them in their academic endeavors as students interpret their sense of family obligation as a responsibility to succeed academically, with students recognizing the sacrifices their parents made in leaving their homelands in search for better opportunity. Other researchers have also found that Latino immigrant students are often reminded of the sacrifices made in coming to this country, which students interpret as a sense of obligation towards the family and a sense of not wasting these newfound opportunities (Urdan, 2012).

However, this same sense of obligation towards family can thwart academic motivation as some students feel a sense of obligation to help out the family financially, which then leads some students to drop out of school in order to obtain employment (Urdan, 2012). This reason is often cited in the literature that examines the Latino achievement gap (Ceballo, 2004), with the Pew Hispanic Center (2009) citing dropping out of school to support family (financially) as the most common explanation given by Latino students who drop out. Overall, these studies highlight how familism can affect a host of behaviors and practices, including non-cognitive factors such as academic motivation and perseverance. Further, Urdan's (2012) and Suarez-Orozco and Suarez-Orozco's (1995) works highlight important efforts in considering motivation among Latino students—yet these efforts conceptualized motivation in general terms (instead of particular motivational theories)—a limitation which this study will attempt to address (by examining a particular motivational theory: expectancy-value theory of achievement motivation). Next, the cultural understanding of respect will now be discussed.

Respect. Another salient feature of Latino culture is the cultural goal of respect (Durand, 2011). This goal can be understood as an extension of familism in that respect reflects the value of maintaining harmonious interpersonal relationships and the expectation of family cohesion (Durand, 2011; Halgunseth et al., 2006). Valdes (1996) described respect as a broad set of attitudes toward individuals and the roles that they occupy, with certain roles requiring particular types of behavior. Respect involves behaving in accordance to specific views that are understood to accompany a given familial role (e.g. husband, wife, daughter, son, etc.). In her ethnographic study, Valdes (1996) observed interplays between familial roles, role obligations, and respect. When families were asked to describe what it meant for a family to function well, the participants always made references to the characteristics of particular roles that were thought to be important in successful families. Valdes also observed familial roles as reflecting sets of rules that were accepted as governing the behavior of individuals occupying such roles. The roles served as guides to the expected behavior of the individual, as well as, to the responses deemed appropriate to the roles of the individual. For example, Valdes documents that the role of the father was seen as the provider, the authority figure, and the exemplar for his sons, while the mother was seen in terms of managing the household and in raising the children to become good human beings.

The role of children was less defined, though some distinctions were made between the eldest and the younger children, with the eldest having certain responsibilities to the family and to the younger siblings. The children were expected to be “good children” or considerate, obedient, and appreciative of their parents. From a young age, children were expected not to be selfish, to care for their siblings, and to conform to the family goals. From early on, children were socialized to accept certain definitions for these roles, with the understanding that compliance to these roles would earn them respect. The interplay between these factors was observed to be tricky at times. For instance, Valdes described one of the fathers as a problem drinker. Though the father had this negative characteristic, it was the role of the mother to act as though the father’s role, rather than his behavior, entitled him to respect from his children. Valdes also found that by age four, children were taught the verbal and non-verbal rules of respect. These rules included: not challenging an elder’s point of view (a finding which may have important educational implications), not interrupting adult conversations, and politely greeting elders. Breaking these rules were deemed to be serious affronts to respect and family cohesion, with such actions interpreted as deliberate acts, even with children as young as four.

Further studies have sought to understand how respect is manifested behaviorally by Latino children and how parents socialize their children to show respect. Calzada, Fernandez, and Cortes (2010) conducted focus groups with 48 Dominican and Mexican mothers of children ages 3-6 in search of these questions. The focus groups began with the mothers being asked to describe what their top core cultural values were as Dominican and Mexican mothers. All the participants reported respect as their first or second top core cultural value held (Calzada et al., 2010). Respect was described as the foundation of successful child development, with mothers describing respect as the primary focus of child rearing (Calzada et al., 2010).

The researchers then asked the mothers to describe in detail what a respectful or disrespectful preschooler would say or do. The behavioral manifestations described by the mothers were then coded, with four categorizations emerging: (a) obedience, (b) deference, (c) decorum, and (d) public behavior (Calzada et al.). *Obedience* was explained as conformity to authority, the importance of following commands and accepting rules without question. Behavioral examples of obedience were described as: (a) obeying parents no matter what, (b) accepting parental authority without questioning it, (c) looking parents in the eye during commands, (d) staying quiet when reprimanded, and (e) never talking back. *Deference* was described as the expectation of courtesy owed to elders, reflecting a hierarchical aspect to respect, with special status reserved for grandparents. Deference practices were described as: (a) never listen in on or participate in adult conversations, (b) never express disagreement with adults, (c) never interrupt adults, (d) offer seat to elders, and (e) deferring to adult wishes. Next, *decorum* was categorized as the dictates of appropriate behaviors for social interactions. Decorum practices were described as: (a) avoiding bad words, (b) avoiding a rude tone of voice, (c) greeting adults politely, and (d) addressing elders formally. Lastly, *public behavior* was described as boundaries set on children's public behaviors, reflecting the idea that children's behavior in public reflects on the entire family. Public behavior practices were described as: (a) not touching things without permission when visiting other homes and (b) staying quiet in public situations (Calzada's et al., 2010). Overall, Calzada et al. provide a number of examples of how one salient aspect of Latino culture can manifest itself in numerous ways, with these practices having the ability to shape academic non-cognitive factors (i.e. accepting authority without questioning it, staying quiet in public situations, etc.)

Respect and academic learning. Few studies have sought to understand the educational implications of the cultural value of respect on Latino students, but the potential for a meaningful relationship between the two exists. For example, according to Hofer and Bendixen (2012), students who view knowledge as finite, certain, and handed down from authority are likely to perceive learning differently than students who view knowledge as tentative, evolving, and constructed by the learner—with Latino students more likely to fit the first description given the cultural importance of respect, authority, and not questioning authority. If this assumption were to hold true, it could have implications for metacognitive practices as students who accept knowledge as being handed down from authority could spend less time thinking about the source of knowledge and could miss out on the benefits associated with metacognitive practices (Hofer & Bendixen, 2012).

Similarly, Gonzalez-Ramos, Zayas, and Cohen (1998) report that low-SES Puerto Rican mothers tend to rank values of obedience and respect over independence, autonomy, and assertiveness. This finding also has potential educational implications as the cultural values of independence, autonomy, and assertiveness have been positively associated with school success among Caucasian-American families (Gonzalez-Ramos et al., 1998). Although little work has been done in this area with Latino students, the potential exists for this cultural practice to affect Latino students' educational behaviors as American school systems place value (and encourage) the practices of independence, autonomy, and assertiveness (Gonzales-Ramos et al.). Next, the cultural understanding of education, or *educación*, will now be discussed.

Educación. The notion, cultural understanding, and childrearing goal of *educación* is another salient feature of Latino culture. Research has consistently found that Latinos have a broader and more comprehensive understanding of the term "education", with additional emphasis given to moral development, training in responsibility, and respectfulness through training in good manners (Azmitia & Brown, 2002; Durand 2011; Halgunseth et al., 2006; Valdes, 1996). Valdes documented examples of this broader understanding of *educación* (education) during her ethnographic study as nearly all the mothers in her study were in agreement that their primary responsibility in childrearing was the *educación* of their children—meaning the moral education of their children. During a home observation, Valdes described an incident where a child was caught picking his nose. The mother scolded the child while telling the child that his behavior was "bad education"—meaning that this behavior was considered to be bad manners. Another example of this broader understanding of education occurred whenever a child or adult was described by the mothers as being "poorly educated" —in that—"poorly educated" was understood to mean someone who has not been properly reared. Similarly to the cultural value of respect, little work has been done in examining the potential effects of this broader understanding of *educación* on Latino students' academic attainment, though the potential exists that this cultural understanding could influence students' views and motivations for academic education.

Background of the problem summary. In summary, Latino academic underachievement has long been documented in this country (Slavin & Calderon, 2000). The causes for such underachievement are complex in nature, with underlying factors ranging from student-level factors, to environmental factors, to systematic factors (Garcia, 2000). When considering student-level factors, non-cognitive factors (i.e. motivational beliefs) have been shown to be important facilitators of learning among Western (American, European) students (Schunk et al., 2008), a finding which suggests that the study of non-cognitive factors could be beneficial for increasing Latino student achievement. However, because few studies have considered the effects and functioning of non-cognitive motivational factors on Latino students' academic learning (Graham, 1992; Wigfield & Eccles, 2002), it is not clear whether non-cognitive factors, including expectancy beliefs and motivational value beliefs, function as expected with Latino students—particularly given that motivation is believed to be influenced by one's culture (Bandura, 2002; D'Andrade, 1992; Markus & Kitayama, 1991; Morling & Kitayama, 2008)—and that there are number of distinct aspects of Latino culture (e.g. interdependence, familism, respect, *educación*) which may affect the construal of students' achievement motivation beliefs.

As such, this study will consider the direct and indirect effects of a number of variables associated with Eccles' and colleagues' expectancy-value theory of achievement motivation (Eccles et al., 1983; Eccles & Wigfield, 1995; Wigfield & Eccles, 2000, 2002) (see Figure 1) on Latino high school students' academic behaviors and academic performance (within the context of mathematics). More specifically this study will examine the relationship between the following independent variables associated with expectancy-value theory of achievement motivation: (a) locus of control, (b) socializers' beliefs—parents, (c) socializers' beliefs—friends, (d) task interest value, (e) task utility value, and (f) efficacy expectancies—and the following dependent variables: (a) attention focusing, (b) self-sustained mathematics efforts, (c) academic persistence, and (d) mathematics literacy performance.

Significance of the Problem

The problem that this study is trying to address is twofold. From a macro perspective, Latino academic underachievement is problematic, both for individual Latino families and for the country as a whole (Ceballo, 2004; Ramirez & de la Cruz, 2003; Slavin & Calderon, 2000; Urdan, 2012). As described earlier, academic underachievement, particularly high school and higher education underachievement, is problematic as not graduating from high school or college is associated with lower median earnings and higher rates of unemployment (U.S. Bureau of Labor Statistics, 2016). This is particularly important as even in weak job markets (as has been the case for the past few years in the United States), those with greater educational attainment fare better economically than those with lesser educational attainment (U.S. Bureau of Labor Statistics, 2016). The consequences of academic underachievement not only affect individuals and their families, but also the country at-large as lower earnings and higher rates of unemployment are often associated with greater dependency on social safety net programs (Kingston, Hubbard, Lapp, Schroeder, & Wilson, 2003). In other words, if Latinos in the United States can make gains in greater educational attainment, they can obtain higher earning jobs, which in turn benefit the country in terms of a higher tax base and lesser need for social safety net programs (Kingston, Hubbard, Lapp, Schroeder, & Wilson, 2003). Thus, from an economic perspective (which has far reaching consequences including greater life well-being), an argument can be made that making progress in greater Latino academic achievement can have significant positive impacts on the lives of a large (and growing) segment of the American populace, as well as for the country as a whole.

Second, a large part of the rationale for this study is that non-cognitive motivational factors, including expectancy beliefs and value beliefs, have been shown to be significant contributors to academic learning (Schunk et al., 2008). As stated by prominent educational psychologists, individual students can have strong academic abilities, yet without motivation these abilities lie largely dormant (Zimmerman & Schunk, 2008). Consequently, numerous motivational theories (i.e. attribution theory, goal orientation theory, self-efficacy theory, self-determination, etc.) have been developed and tested across the decades which have shown that motivational beliefs are important predictors, mediators, and moderators of academic success (Schunk et al.)—yet these theories have largely been developed and tested with Caucasian middle class students (Graham, 1992; Schunk et al., 2008).

This general lack of diversity of participants used in the development of well-known motivational theories represents a problem as social science theories need to be tested across various groups of people and under various contexts in order for these theories to gain in predictive power. Thus, by testing the general premise of a well-established motivational theory (expectancy-value theory: Wigfield & Eccles, 2000) (see Figure 1) with Latino students, this study aims to address the above mentioned theoretical limitation by examining whether the basic tenants of this theory holds true for an understudied group of students—a group of students who are culturally different (Delgado-Gaitan, 1993; Gonzalez-Ramos et al., 1998; Hurtado, 1995; Suarez-Orozco & Suarez-Orozco,1995; Valdes, 1996; Vega, 1995) than the group of students with whom this theory was largely developed and tested (Graham, 1992; Wigfield & Eccles, 2002).

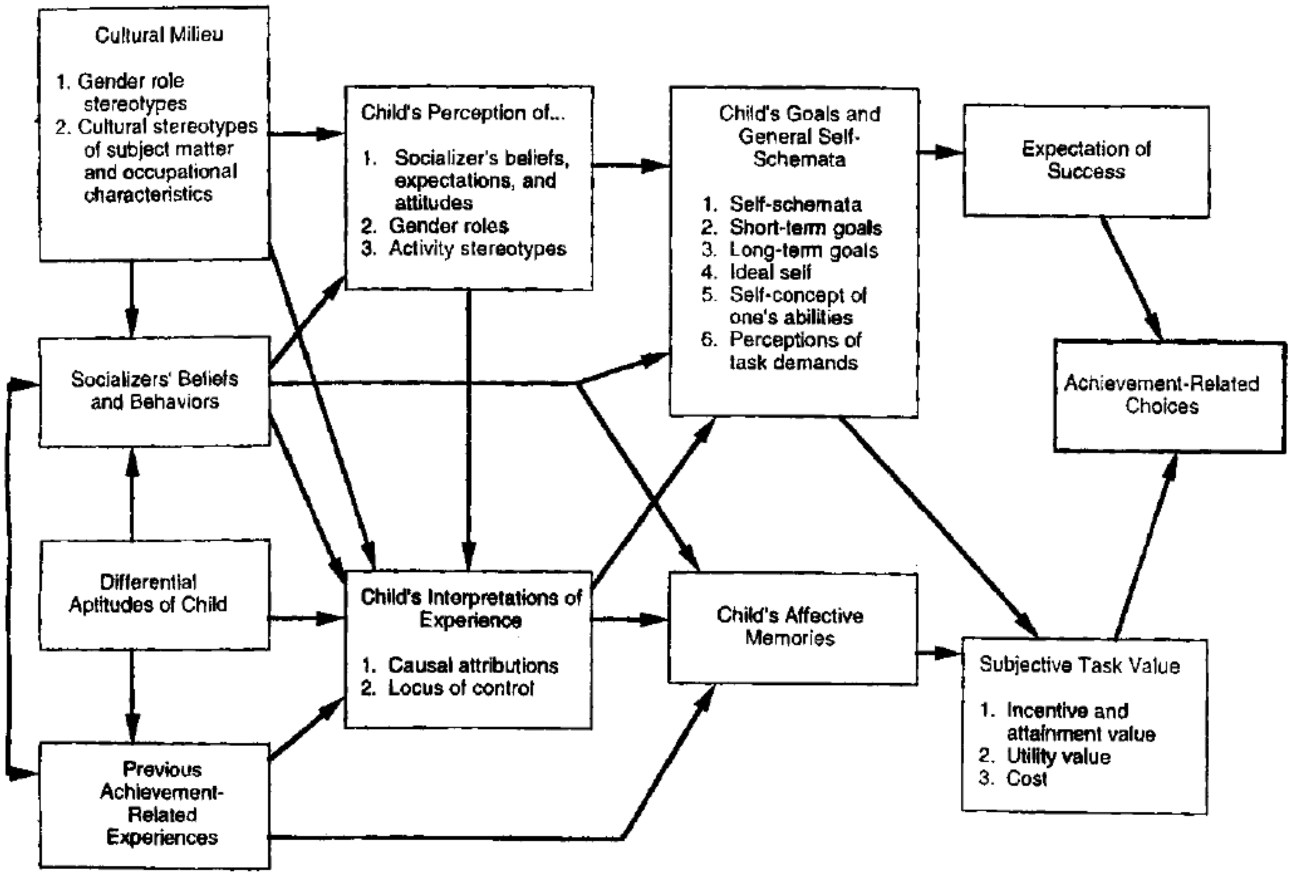

Figure 1. Expectancy-value theory of achievement motivation. From "Expectancy-Value Theory of Achievement Motivation" by A. Wigfield and J. S. Eccles, 2000, *Contemporary Educational Psychology, 25,* p. 69. Copyright 2000 by Elsevier.

Specific Statement of the Problem

More specifically, this study examined dimensions of Eccles' and colleagues' expectancy-value theory of achievement motivation (Wigfield & Eccles, 2000) by testing a path analysis model (see Figure 2) which examined: (a) the direct effects of students' expectancies for success and subjective value beliefs (e.g. utility value, interest value) on students' achievement-related behaviors (e.g. attention focusing, self-sustained mathematics efforts), persistence, and mathematics performance; (b) the direct and indirect effects of students' cognitive processes (e.g. locus of control, interpretations of socializers' beliefs) on students' expectancy and value beliefs, and (c) the direct and indirect effects of cultural milieu factors (e.g. gender, parental occupational characteristics/SES) on students' cognitive processes, expectancy beliefs, and value beliefs. Further, the above mentioned relationships were compared between Latino and Caucasian students in order to better understand whether the relationships between these variables function differently as a result of students' culture. In particular, this study attempted to answer the following the research questions:

RQ1. Do U.S. Latino high school students' expectancy and task value beliefs (e.g. interest value and utility value) predict students' attention focusing, self-sustained mathematics efforts, persistence, and mathematics performance?

RQ2. Of the two dimensions of task value beliefs (interest value, utility value) being considered, which is a stronger predictor of Latino students' academic behaviors (e.g. attention focusing, self-sustained efforts, persistence) and mathematics performance?

RQ3. What are the direct effects of Latino students' interpretations of socializers' beliefs (parental beliefs, friend beliefs) and locus of control beliefs on students' expectancy and value beliefs?

RQ4. What are the indirect effects of Latino students' interpretations of socializers' beliefs and locus of control beliefs on students' academic behaviors (e.g. attention focusing, self-sustained efforts, persistence) and mathematics performance?

RQ5. Are there significant differences in the relationships established by research questions 1-5 between Latino and Caucasian students?

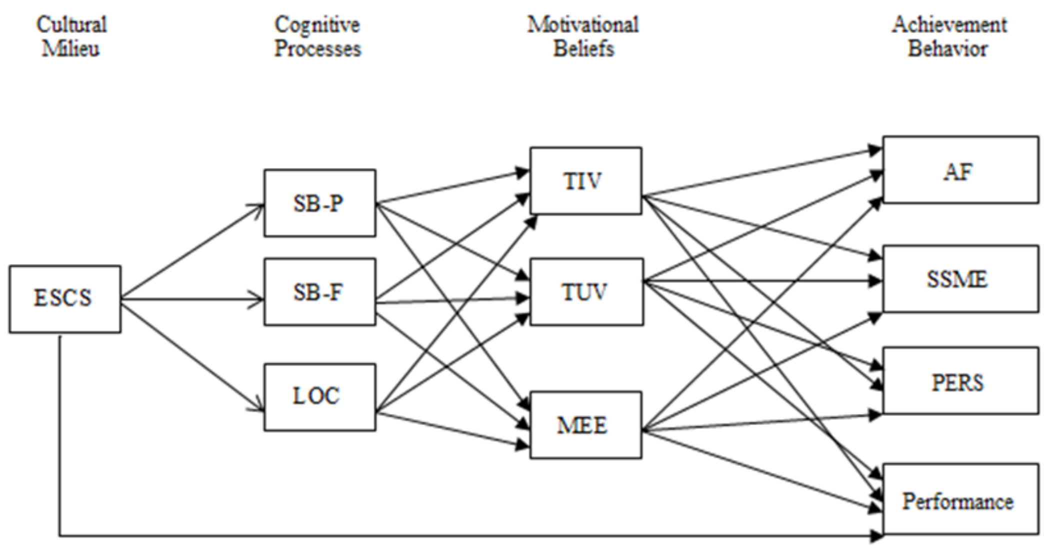

Figure 2. Hypothesized expectancy-value model. ESCS = PISA index of economic, social, and cultural Status; SB-P = Interpretation of socializer's beliefs–parents; SB-F = Interpretation of socializer's beliefs–friends; LOC = Locus of control; TIV = Task interest value; TUV = Task utility value; MEE = mathematics efficacy expectancies; AF = Attention focusing; SSME = Self-Sustained mathematics efforts; PERS = Persistence; Performance = 2012 PISA Mathematics performance mean score (plausible value).

Definition of Key Terms

Attention focusing. Generally speaking, attention focusing is considered to be a self-control process through which individuals purposely attend to aspects of their environments. From an academic learning perspective, attention focusing refers to a self-control process which supports the self-regulation of learning (Schunk et al., 2008). For the purposes of this study, attention focusing refers to students: (a) paying attention in class; (b) actively listening in class; and (c) avoiding distractions while studying.

Caucasian high school students. For the purposes of this study, Caucasian high school students refers to U.S. 15-year-old students who participated in the 2012 U.S. PISA administration and identified themselves as <u>not</u> Hispanic or Latino (item: USA_ST116A01) and as White (item: USA_ST117A01) on the student questionnaire.

Economic, social, and cultural status (ESCS). Created by PISA, ESCS refers to a standardized index of students' economic, social, and cultural status. This index was created based on the following information provided by students: parental occupational status, parental education, family wealth, availability of educational resources, and availability of possessions related to culture in the home (OECD, 2013b).

Expectancies for success. First defined by Atkinson (1957) as cognitive anticipations that performance will be followed by a consequence which in achievement settings is either success or failure. Expectancies for success can also be understood as beliefs and judgments about one's abilities to perform a task successfully (Schunk et al., 2008, p. 44).

***Self-efficacy*.** A construct which falls under theories that "focus on expectancy" (Wigfield & Eccles, 2002, p.110), self-efficacy refers to one's beliefs and judgments about their abilities to perform *specific* tasks (Bandura, 1997).

Latino high school students. For the purposes of this study, Latino high school students refers to U.S. 15-year-old high school students who participated in the 2012 U.S. PISA administration and who identified themselves as Hispanic or Latino (item: USA_ST116A01) on the student questionnaire form.

Locus of control. According to Rotter (1966), locus of control refers to the belief one has regarding the extent to which one's behaviors affect outcomes—in terms of success and failure. Locus of control has two dimensions, *external* control and *internal* control. External control refers to the perception that an outcome follows an action, but that outcome is not entirely contingent on that action. Internal control refers to the perception that an outcome is contingent upon an action (Rotter, 1966). For the purposes of this study, locus of control refers to *internal* control. It is believed that locus of control, particularly internal locus of control affects learning, motivation, and behavior (Schunk et al., 2008).

Mathematics performance. For the purposes of this study, mathematics performance refers to students' performance on the 2012 PISA mathematics examination.

Persistence. An index of motivation (generally speaking) (Schunk et al., 2008, p. 12) which is associated with time spent working on a task, particularly when one encounters obstacles in the pursuit of such task. Persistence is also considered to be a sustaining feature of motivation which refers to the continuation of a behavior until the task (or goal) is obtained.

Self-Sustained mathematics efforts. An index of motivation (generally speaking) (Schunk et al., 2008, p. 12) which is refers to students' determined attempt (effort). For the purposes of this study, self-sustained efforts refers to physical and cognitive effort (within the context of mathematics) which is sustained by the student. More specifically, self-sustained mathematics efforts refer to the completion of activities necessary in the acquisition of academic learning (i.e. completing homework assignments, studying for tests).

Socializers' beliefs—friends. An aspect of the social environment which can be described as a socialization influence (Wigfield & Eccles, 2000). For the purpose of this study, socializers' beliefs—friends refers to students' *perceptions* of their friends (within the context of mathematics), particularly in terms of friends: (a) doing well in mathematics; (b) working hard in mathematics; (c) enjoying taking mathematics tests.

Socializers' beliefs—parents. Another aspect of the social environment which can be described as a socialization influence (Wigfield & Eccles, 2000). For the purpose of this study, socializers' beliefs—parents refers to students' *perceptions* of their parents' beliefs (within the context of mathematics), particularly in terms of parents: (a) believing mathematics is important to study; (b) believing mathematics is important for students' career; and (c) parents liking mathematics.

Task value. Initially described by Atkinson (1957) as the relative appeal of succeeding on a particular achievement-related task. Overall, this construct can be understood as one’s perception of value for succeeding on a given achievement-related task (Wigfield, 1994), with Eccles et al. (1983) proposing multiple dimensions of value.

***Task interest value*.** Proposed by Eccles et al. (1983) as a dimension of the larger task value construct, task interest value refers to the “inherent, immediate enjoyment one gets from engaging in an activity (p. 89). For the purposes of this study, task interest value refers to the enjoyment and interest associated with mathematics tasks.

***Task utility value*.** Proposed by Eccles et al. (1983) as a dimension of the larger task value construct, task utility value refers to the “importance of the task for some future goal that might itself be somewhat unrelated to the process nature of the task at hand” (p. 89). For the purposes of this study, task utility value refers to the value students’ place on mathematics in relation to their future studies, career, and work.

Chapter Two

Literature Review

The study of achievement motivation has a long history within the field of psychology and educational psychology (Schunk et al., 2008). For over a century, theorists have sought to understand why individuals chose to engage in behaviors, with early views of motivation emphasizing the role of inner forces (e.g. volition, will, instincts, traits) and behavioral conditioning (e.g. connectionism, classical conditioning, operant conditioning), followed by more contemporary views which emphasize the role of cognitive processes (e.g. thoughts, beliefs, emotions) on individuals' motivation (Schunk et al.). Among the various theories of achievement motivation which emerged over this period of time, expectancy-value theory has been one of the most important and influential views on the nature of achievement motivation, with this theory serving as an active line of research from the late 1950's to the present day (Eccles, 2005; Eccles & Wigfield, 2002; Hulleman, Barron, Kosovich, & Lazowski, 2016; Schunk et al., 2008; Wigfield, 1994; Wigfield & Eccles, 2000, 2002).

As such, and in keeping with the purposes of this study, the following review of the literature will examine: (a) the origins of expectancy-value theory of achievement motivation, (b) Eccles' and colleagues' expectancy-value theory of achievement motivation (Eccles et al., 1983; Eccles & Wigfield, 2003; Wigfield & Eccles, 2000, 2002), (c) empirical research that has examined variables associated with Eccles' and colleagues' expectancy-value theory (i.e. interpretation socializers' beliefs, locus of control, task interest value, utility interest value, efficacy expectancies) as predictors of academic behaviors and performance, and (d) empirical research that has examined expectancy-value related variables with Latino students.

Origins of Expectancy-Value Theory

According to prominent achievement motivation theorists, the origins of expectancy-value theory can be largely traced back to the work of John Atkinson (Eccles et al., 1983; Eccles & Wigfield, 1995; Schunk et al., 2008; Schunk & Zimmerman, 2008; Wigfield, 1994; Wigfield & Eccles, 1992, 2000). Starting in 1957—and building on Lewin's (1938) work on valence and Tolman's (1932) work on expectancies for success—Atkinson developed the first formal expectancy-value model which posited that differences in achievement-related behaviors could be explained in terms of individuals': (a) achievement motives, (b) expectancies for success, and (c) incentives values (Wigfield, 1994; Wigfield & Eccles, 1992). Further, Atkinson (1957) argued that achievement motives, expectancies for success, and incentive values could help account for the selection of one path of action over alternative paths, account for the vigor of the action (once initiated), and account for the "tendency to persist for a time in a given direction" (p. 359).

In defining the key constructs of his theory, Atkinson described *achievement motive* as a mostly stable disposition to strive for success that is aroused when cues in the situation indicate that performance will be instrumental to achievement (Wigfield &

Eccles, 1992). Next, Atkinson defined both *expectancies for success* and *incentive values* as situational in nature in that they correspond to particular achievement tasks in which the individual is engaged in, with expectancies for success serving as a cognitive anticipator that action will be followed by a consequence (Wigfield & Eccles). Lastly, Atkinson broadly defined incentive values as the relative "attractiveness" of succeeding on a particular achievement-related task (Wigfield & Eccles). In conceptualizing incentive value in terms of affective "attractiveness" (i.e. pride in accomplishment), Atkinson further proposed that tasks that are too easy would not generate much pride, thus they would be perceived to have low incentive value, and vice-versa (Schunk et al., 2008).

As with other contemporaries of his time, Atkinson sought to establish his theory as a "grand formal theory" (Weiner, 1990) by proposing a mathematical equation of motivation: Motivation = *f* (Motive x Expectancy x Incentive) (Atkinson, 1957; Eccles & Wigfield, 1995; Wigfield & Eccles, 1992). In doing so, Atkinson established a number of algebraic manipulations to his formula, one of which proposed incentive value (i.e. task value) as equivalent to the inverse of expectancy for success (Eccles & Wigfield, 1995; Wigfield & Eccles, 1992). This decision to conceptualize incentive value as the inverse of the probability of success (e.g. easy tasks would not generate much incentive value since easy tasks do not generate much pride) would have a number of important ramifications for the development of expectancy-value theory and for the field of achievement motivation. By defining incentive value in this manner (Incentive Value = 1- Expectancies for Success), the incentive value term was effectively removed from the equation as it allowed researchers to not focus on incentive value as long as they were able to determine the probability of success (Eccles & Wigfield, 1995; Schunk et al., 2008; Wigfield & Eccles, 1992).

This practice influenced the trajectory of expectancy-value theory as expectancies for success took on greater importance and prominence in achievement motivation research, while at the same time, task values research took a back seat, and remained largely ignored, for a number of years (Eccles & Wigfield, 1995; Schunk et al., 2008; Wigfield & Eccles, 1992). Although this narrow understanding of the nature of incentive values stunted the growth of this line of research, it did provide an opening for future researchers to reconsider the nature and role of task (incentive) values within expectancy-value research (Eccles & Wigfield, 1995; Schunk et al., 2008; Wigfield & Eccles, 1992). Overall, Atkinson is credited with developing the first formal achievement motivation theory which incorporated both expectancies and value components into one model, though his definition of these constructs was limited, as was the notion that expectancies and values were inversely related (Wigfield & Eccles, 1992).

With time, questions arose regarding Atkinson's original conceptualization of expectancy-value theory as researchers who ascribed to this theory began to find that expectancies for success and incentive value weren't always inversely related (Wigfield & Eccles, 1992). For instance, Battle (1965) examined the relationship of middle school students' expectancies for success, attainment value, the minimal grade (in math) with which they would be satisfied, and performance on a math task (measured in terms of persistence) and found that students who persisted the longest had expectancies that were higher than their minimally acceptable grade as well as high attainment value for math. Battle (1966) also found expectancies for success and attainment value to be positively correlated among middle school students in both mathematics and English. Similarly, other researchers, such as Crandall, Katkosky, and Preston (1962), Feather (1982), and Rokeach (1980) began to question other aspects of Atkinson's model, with Feather calling for expectancy-value theorists to consider task value as a multidimensional construct (Wigfield & Eccles, 1992). Thus, the stage was set for a new generation of researchers to reconsider and expand Atkinson's conceptualization of expectancy-value theory of achievement motivation.

Eccles et al.'s Expectancy-Value Theory of Achievement Motivation

Eccles and her colleagues heeded the call to reconsider and expand Atkinson's framework by proposing an elaborate expectancy-value model which not only proposed multiple dimensions of value, but also included a number of social psychological factors believed to precede individuals' expectancy and value beliefs. Starting in 1983, Eccles et al. presented their model which combined cultural factors, historical events, expectancies for success, and task values as mediators and predictors of achievement behaviors, namely choice, persistence, and performance. More specifically, the model posited that students': (a) achievement performance, (b) persistence, (c) intentions to enroll in future courses, and (d) choice to engage in achievement-related behaviors are most directly influenced by their expectancies for success and perceptions of subjective value, which are in turn directly influenced by students' task specific beliefs (e.g. perceptions of competence, perceptions of difficulty, perceptions of goals). Further, the model proposed students’ task specific beliefs are influenced by students’ perceptions of socializers’ attitudes and beliefs (i.e. teachers, parents, peers), as well as by students’ interpretation of past achievement outcomes, while socializers’ (i.e. parents, teachers) beliefs and behaviors influence students’ perceptions of socializers’ beliefs and students’ interpretation of past performance. Lastly, the cultural milieu (i.e. gender roles, socioeconomic status) and unique historical events directly influence socializers’ behaviors and attitudes, and students’ beliefs (Eccles et al., 1983) (see Figure 3).

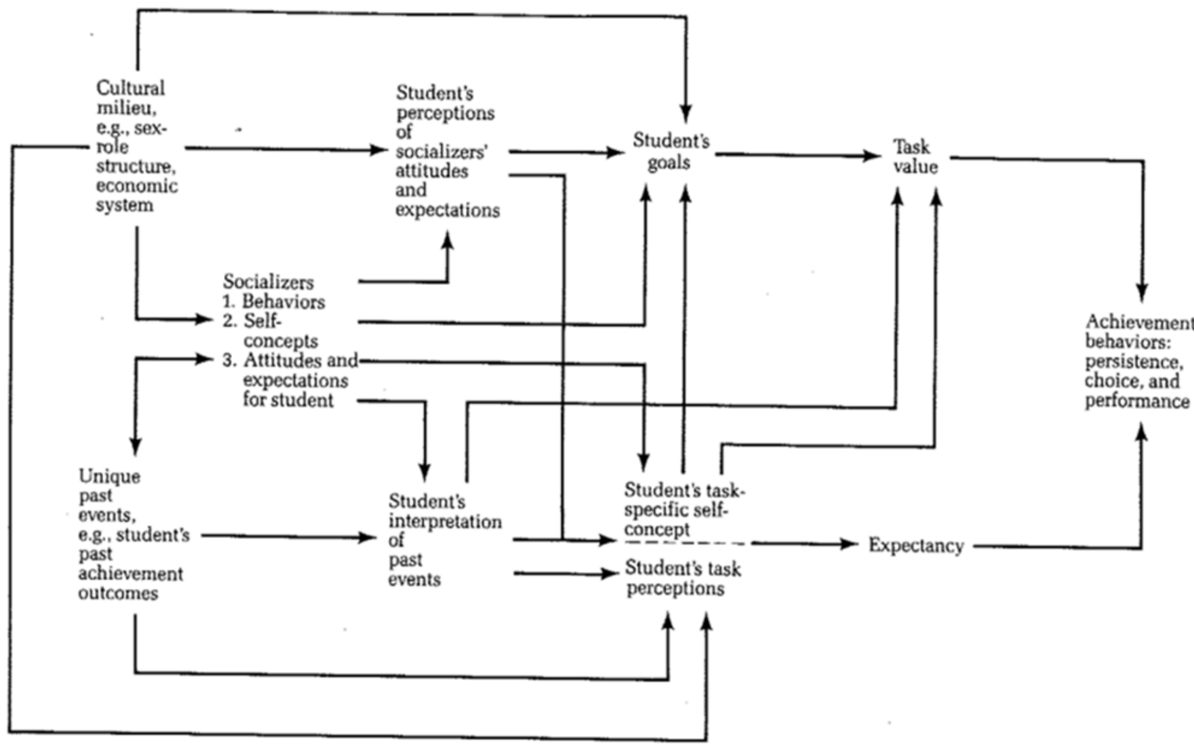

Figure 3. Eccles et al.'s (1983) general expectancy-value and developmental model of achievement behaviors. From Spence, J. T. (1983). *Achievement and Achievement Motives* W. H. Freeman, San Francisco, CA. Copyright 1983 by W. H. Freeman.

In conjunction with proposing an expanded expectancy-value model of achievement motivation, Eccles et al., (1983) also proposed task values to be a multidimensional construct made up of three main components: (a) the attainment value of the task, (b) the intrinsic/interest value of the task, and (c) the utility value of the task (as it relates to future goals). Eccles et al. also proposed a fourth “cost” component, though cost was not considered to be a task value dimension but rather an influence on the different dimensions of task value, with cost conceptualized as the perceived negative aspects associated with engaging in a task (e.g. amount of effort needed, what is given up in order to engage in the task, etc.) (Wigfield & Eccles, 1992).

Overall, Eccles et al. (1983) changed the direction of expectancy-value research by proposing an extensive expectancy-value model which highlighted numerous influences believed to affect students’ expectancies for success and task value beliefs. Further, the model expanded the understanding of students’ task value beliefs by proposing specific dimensions of task value beliefs, namely in terms of: attainment value, intrinsic/interest value, utility value, and cost. These dimensions will now be defined.

Attainment value. This dimension of task value is largely defined as the importance of doing well on the task (Eccles, et al., 1983; Eccles & Wigfield, 1995; Wigfield & Eccles, 1992). Although this definition of attainment value is rather broad, Eccles et al. described the “importance of doing well” to be related to individuals’ self-schema (e.g. masculinity, competence, etc.), as well as related to individuals’ needs and core personal values. Wigfield and Eccles (1992) further defined attainment value by stating that “tasks would have higher attainment value to the extent that they allow the individual to confirm salient aspects of [their] self-schemata” (p. 280).

Interest value. Next, Intrinsic value is defined as a dimension of value which is related to the enjoyment an individual gets while engaging in the task, or the subjective interest one has in the content of the task (Eccles et al., 1983; Eccles & Wigfield, 1995; Schunk et al., 2008; Wigfield & Eccles, 1992). This dimension is similar to Deci’s construct of intrinsic motivation (Eccles & Wigfield; Wigfield & Eccles) in that value is associated with the gratification that comes from engaging with the task instead of the outcome of the task.

Utility value. Utility value is defined as the value a task acquires in terms of its instrumentality (or usefulness) in reaching future goals (Eccles & Wigfield, 1995; Schunk et al., 2008). This dimension of task value is more extrinsic in nature in that the value is tied to some future outcome (Eccles & Wigfield, 1995; Schunk et al.).

Cost. Lastly, cost is defined as what is given up as a consequence of engaging in the task (Eccles & Wigfield, 1995). Cost value is also defined in terms of the perceived amount of effort that is required for the task, as well as the anticipated emotional states associated with the task (Schunk et al., 2008). Empirical support for Eccles et al.’s (1983) model will now be discussed.

Empirical support and progression of Eccles et al.’s expectancy-value model. As part of a larger longitudinal study which examined gender differences in decisions to enroll in advance mathematics courses, Eccles et al. (1983) tested two reduced components of their expectancy-value model: the psychological model of achievement attitudes and behaviors and the developmental component. The psychological model posited that students' interpretation of their external reality influenced the formation of their concepts of ability, which in turn influenced students' perceptions of value and expectancies for success. Using data collected from parents, teachers, and 286 (*N* = 286) high school students, a path analysis model examined the following variables (on the outcome variable of intentions to take more math): gender, past mathematics performance, stereotyping of mathematics as male dominant, perceptions of socializers' perception of task difficulty, perception of socializers' perception of task difficulty, perception of parents' aspirations, masculinity score on PAQ, perception of mathematics ability, perception of task difficulty, value of mathematics, and expectancies in mathematics.

It was found that mathematics value directly influenced intentions to take more mathematics while expectancies for mathematics success did not influence intentions. Next, it was found that perceptions of mathematics ability directly influenced both value and expectancies, while masculinity score on PAQ influenced expectancies but not value. Perceptions of parents' aspirations influenced both value and expectancies, while past performance influenced perceptions of math ability and expectancies. Overall, the model accounted for 36% (R^2 = .36) of the variance in students' intentions to take more mathematics courses (Eccles, et al., 1983, p. 112).

Next, the developmental model was tested (with a separate sample of high school students, *N* = 156) which examined a number of socializing effects (parents' perceptions of mathematics importance, father/mother's perceptions of task difficulty, teacher perceptions of students' ability) on students' interpretation of task difficulty, students' interpretation of mathematics ability, students' perceptions of parents' aspirations, students' self-concept of ability, students' perceptions of task difficulty, students' value of mathematics, and students' intentions to take more mathematics (outcome variables). It was found that parents' perception of importance of mathematics influenced students' perception of parents' aspirations, which in turn influenced students' value beliefs. Next, students' perception of socializers' perception of mathematics ability influenced students' value of mathematics, while parents' perception of importance of mathematics (through students' perception of parents' aspirations) also influenced students' value of mathematics. Further, teachers' perceptions of students mathematics ability influenced students' mathematics value beliefs, though this coefficient was negative. Lastly, students' self-concept of mathematics ability and students' value of mathematics directly influenced the intention to take more mathematics classes, accounting for 45% ($R^2 = .45$) of the variance in the outcome variable (Eccles, et al., 1983, p. 134). Overall, Eccles et al. provided initial support for their expectancy-value model, with the model receiving further support in subsequent studies. Some of these ensuing studies will now be reviewed.

In 1984, Eccles, Adler, and Meece continued to investigate gender differences in future course enrollment plans of high school students ($N = 200$), though this study did not consider the complete expectancy-value model. More specifically, this two-year study (made up of two parts) considered the role of value for mathematics, self-concept of ability, and perceptions of mathematics difficulty on students' plans to enroll in mathematics courses and on year 2 mathematics grades. Overall, it was found that value for mathematics most strongly predicted intentions to take future courses, however, value for mathematics did not predict actual mathematics performance. Although this study only considered aspects of the expectancy-value model, it did consider actual mathematics performance as an outcome variable, which was not considered in the Eccles et al.'s (1983) study.

Over the next few years, Eccles and colleagues continued to make the case for their expectancy-value model (Eccles, 1987) and used aspects of the model to consider how it applied to related areas, including mathematics anxiety and course enrollment intentions (Meece, Eccles, & Wigfield, 1990) and the development of task value beliefs and competence in children (Wigfield, 1994; Wigfield & Eccles, 1992), as well as applied reduced portions of the model to more unrelated areas such sports involvement (Eccles & Harold, 1991). In Meece et al.'s study, a structural equation model assessed the relation between perceptions of mathematics ability, performance expectancies, importance of mathematics (i.e. instrumental value), and mathematics anxiety among a sample of 250 (N = 250) middle school students. It was found that students' perception of ability (collected in year 1) influenced students' perceptions of expectancies and importance (collected in year 2) and expectancies and importance were negatively related to mathematics anxiety. Of interest, Eccles and Harold's (1991) study marked a shift in expectancy-value related research in that it incorporated two dimensions of task value (utility value and attainment value) in their model as previous works had considered task value as one construct (Eccles et al., 1983; Eccles et al., 1984) or had considered just one dimension of task value (Meece et al., 1990).

Along these lines, Eccles and Wigfield (1995) examined the factor structure of the proposed dimensionality of task values (attainment value, intrinsic value, utility value), among other aims, by conducting an exploratory and confirmatory factor analysis, over a two-year period, with N = 707 (year 1) and N = 545 (year 2) adolescent students. Using a total of 29 items from the Self and Task-Perception Questionnaire (previously developed by Eccles), the factor structure of items designed to measure task values (nine items), ability perceptions (10 items), and task difficulty perceptions (10 items) were examined. An initial exploratory factor analysis of the nine task value items suggested a two or three factor solution with eigenvalues of 3.58, 1.16, and .99. Two items were dropped as they did not load highly on either the two or three factor solution.

Confirmatory factor analysis was then used to test the remaining seven task value items in terms of a one-factor, two-factor, and three factor solution. A three-factor solution (GFI = .99, TLI = .99) was selected as significant increases in fit were observed over a one-factor (GFI = .94, TLI = .85) and two-factor solution (GFI = .93, TLI = .90). Overall, it was concluded that clear support for the three theoretical components of task values were observed. Lastly, attainment value, intrinsic value, and utility value were found to be positively correlated amongst each other and positively correlated with students' expectancy perceptions (as opposed to Atkinson's 1957 model).

More recently, Eccles and colleagues have continued to make the case for their expectancy-value model, though these efforts have largely been theoretical and explanatory in nature (as they have not further tested their model empirically) (Eccles, 2005; Wigfield & Eccles, 2000, 2002). For instance, Eccles and Wigfield (2002) considered how their theory fits within the larger field of achievement motivation by comparing and contrasting a number of related theories: expectancy related theories (e.g. self-efficacy theory, control theories), theories that focus on the reasons for engagement (e.g. self-determination theory, flow theory, interest theories, goal theories), theories which integrate expectancy and value theories (e.g. attribution theory, variations of expectancy-value theory, self-worth theory) and theories which combine motivation and cognition (e.g. social cognitive theories of self-regulation and motivation, theories linking motivation and cognition, theories of motivation and volition, theories which integrate self-regulation and expectancy-value). In doing so, Eccles and Wigfield (2002) highlight how these theories inform each other and how a need exists for theoretical integration as constructs such competence and ability beliefs are often indistinguishable from each other (in factor analysis), particularly in younger students.

Further, Wigfield and Eccles (2000, 2002) also reviewed a number of developmental aspects regarding students' expectancies and value beliefs by highlighting how expectancies and competence beliefs are distinguishable by domain (i.e. English, mathematics, etc.) by the early elementary school age years and by highlighting that value beliefs begin to decline in the late elementary school years all the way up to the late high school years (when they begin to rebound). Of interest, Eccles (2005) added an identity construct to the expectancy-value model (p. 8) which posited bidirectional paths between identity and task value and identity and expectancies for success, while also adding a direct path from identity to the outcome variables of achievement-related choices and performance—though the measurement or definition of identity was not discussed at length. Overall, Eccles et al.'s expectancy-value model has made a number of important contributions which have advanced the field of achievement motivation, spurring numerous studies across the years. A review of such studies will now be presented.

Expectancy-Value Empirical Research

Having presented a general outline of the origins and the progression of Eccles et al.'s expectancy-value theory, a review of the literature will now examine empirical studies which have considered various dimensions of expectancy-value theory within academic settings. More specifically, the literature review will focus on the following areas: (a) the role of task values beliefs in academic learning; (b) the role of expectancies for success in academic settings, (c) the role of socializers' beliefs in academic learning; and (d) the role of locus of control in academic settings. These areas of the literature will be reviewed as they constitute the independent variables which will be examined as part of the proposed study's hypothesized model (see figure 2).

Task value research. In general, task values have been hypothesized to influence a number of achievement-related behaviors by affecting individuals': (a) choice of activity, (b) intensity of effort expanded, (c) persistence, and (d) actual performance (indirectly) (Atkinson, 1957; Eccles et al., 1983; Eccles &Wigfield, 1995; Feather, 1992; Schunk et al., 2008; Wigfield & Eccles, 1992; Wigfield & Eccles, 2000). Empirical studies which have examined these hypothesized functions will now be reviewed.

Bong (2001) examined the role of task value beliefs and self-efficacy beliefs in predicting academic performance and future course enrollment intentions among a sample 168 (N = 168) Korean female undergraduate students enrolled in an instructional methods and technology class (within the college of education). Task value was measured as a single-factor construct (though not factor analyzed) consisting of three items that each measured attainment value, utility value, and interest value. Measured at two points during a semester, a path analysis model was tested which assessed the effects of self-efficacy beliefs and task value on midterm scores and intentions of future course enrollment (time 1) and the effects of self-efficacy and task value on final exam scores and intentions of future course enrollment (time 2). It was found that task value predicted both midterm performance (β = .27) and intentions (β = .42) at time 1, while task value only predicted intentions (β = .40) at time 2.

These mixed findings provide some theoretical support for function of task values in influencing future choice in activity (e.g. intentions to enroll in future course work) and in influencing academic performance. Of interest, task value was observed to predict midterm performance while self-efficacy (at time 1) did not—findings which are not generally supported by the literature (task values tend not to directly influence performance while self-efficacy does tend to predict performance). Lastly, this study provided further clues as to the predictive role of the different components of task values on academic performance as utility value (which combined both the instrumental value and the utility values items) better predicted performance than the interest value item—

though caution was urged with this finding given the small number of items used to define utility value (two items) and interest value (one item).

Next, Hong, Peng, and Rowell (2009) examined differences in perceptions of utility task value and intrinsic task value (alongside effort, persistence, planning, and self-checking) among 303 (n = 303) seventh grade and 407 (n = 407) eleventh grade Chinese students, within the context of homework completion in mathematics class. Using students' mathematics final exam scores to categorize students in terms of low, medium, and high achievers, differences in the above mentioned self-reported measures were examined in terms of achievement level, grade, and gender. Significant differences in utility value were observed among seventh grade students with higher achieving students reporting higher utility value in their homework completion. No significant differences were observed among levels of achievement and interest value among seventh grade students. No significant differences in utility or intrinsic value among the three levels of achievement were observed among older Chinese students. In terms of correlations, seventh grade students' utility value were strongly correlated with effort (r = .60) and persistence (r = .55), while seventh grade students' intrinsic value were moderately to strongly correlated with effort (r = .43) and persistence (r = .56). For eleventh grade students, utility value and effort (r = .43) and utility value and persistence (r = .36) were moderately correlated, while intrinsic value and effort (r = .33) and persistence (r = .41) were also moderately correlated. Although no causal relationships were tested, these results provide some evidence that students' task value beliefs are positively related to academic efforts and academic persistence. Further, students' (both 7th and 11th grade students) task value beliefs were significantly correlated to planning and self-checking, both dimensions of self-regulated learning. Of interest, utility value was more strongly correlated with effort, planning, and self-checking than interest value among Chinese students—a relationship that was also observed in Bong's (2001) study conducted with Korean students.

Overall, Hong et al.'s study provides insights to the proposed study (see figure 2) in two ways. First, the significant relationship between utility/interest value and planning and self-checking provides some support to the proposed study's hypothesized relationship between interest/utility value and attention focusing as attention focusing is also a dimension of self-regulated learning, along with planning and self-checking. Second, Hong et al.'s (2009) and Bong's (2001) findings that utility value is more strongly related with a number of achievement-related behaviors than interest value may highlight a cultural dimension to this observed relationship as both studies' samples (Chinese and Korean) can be described as interdependent in nature (Markus & Kitayama, 1991)—which has implications for the proposed study as Latino culture is also considered to be interdependent in nature (Delgado-Gaitan, 1993; Fuligni & Fuligni, 2007; Halgunseth, Ispa, & Rudy, 2006; Hurtado, 1995).

Similarly, Shechter, Durik, Miyamoto, and Harackiewicz (2011) further examined utility value and interest value by testing whether: (a) utility value (through a utility intervention) could promote subsequent interest (in mathematics); (b) whether initial interest value (prior to the intervention) moderated subsequent interest (after the utility intervention); and (c) whether these observed relationships varied by participants' culture—as previous research has suggested that utility value and interest value function differently in Western and East Asian cultures (with utility value mattering more for collectivist cultures while interest value mattering more for Western cultures). 210 (N = 210) Western European-American students and 72 (N = 72) East Asian undergraduate students (from the same U.S. university) participated in a laboratory utility enhancing intervention which measured students' initial levels of interest value (in mathematics), measured students' initial mathematics performance (number of correct multiplication problems solved in a two minute window), and introduced students to a new multiplication technique which aided the completion of two-digit multiplication problems (without the use of paper and pencil). Participants in the experimental condition had utility value messages (i.e. this technique can help you in future classes, graduate school admissions tests, and careers) embedded in the explanation of the multiplication technique. These variables were then regressed on students' effort (students had an open-ended period to practice their newly learned technique which was measured in terms of time spent practicing), performance on multiplication problems after learning the technique, and subsequent interest after learning the technique.

Overall, it was found that East-Asian students who displayed lower initial levels of interest in mathematics responded positively to the utility enhancing intervention as they exhibited significantly greater effort and perceived significantly greater interest after the intervention (compared to control students who received the technique training without the utility messages). These results were not found among Western students who also reported lower initial levels of interest in math and participated in the utility intervention. Next, a second intervention (with a new sample) was conducted where low interested students received interest value messages as part of the multiplication technique. This time, low interested Western students did benefit from the intervention, suggesting that culture has the ability to influence how students respond to perceptions of utility value and interest value (Shechter et al.)—a finding which also has possible ramifications for the proposed study in terms of possible cultural influences in the functioning of motivational constructs.

Furthermore, Chouinard, Karsenti, and Roy (2007) examined the predictive nature of utility task value on subsequent mathematics efforts (among other aims) in a sample of 759 (N = 759, 49% female) Canadian adolescent students (grades 7-11). As part of a larger model which considered the effects of social supports (parental and teacher support as exogenous variables), self-efficacy beliefs, utility value beliefs, and students' achievement goal orientation (mastery, performance, avoidance) on mathematics efforts—utility value was hypothesized to directly and indirectly (through efficacy and achievement goals) influence students' self-reported effort put forth in learning of math. Of interest, perceptions of utility value did not directly influence students' mathematics-related efforts. This finding is in contrast to previous findings that have shown task values to directly influence efforts (e.g. Hong et al., 2009; Shechter et al., 2011). Utility value was found to be a mediating variable as both teacher and parental support, through utility value and mastery goal orientation, predicted students' mathematics-related efforts. This finding was interpreted in terms of the importance of parents in influencing students' utility value beliefs, which provides some evidence that culture (in terms of parental and teacher influence) is capable of affecting students' task value beliefs. This study may also provide further evidence that components of task value may function differently as a result of culture as studies with East Asian students have found utility value to predict efforts (Shechter et al.), yet this direct relationship was not observed with Canadian students.

Likewise, Liem, Lau, and Nie (2008) examined two prominent conceptual frameworks in motivation research, expectancy-value theory and achievement goal theory, in terms of their relationship with academic behaviors and academic performance. Using a sample of 1475 (N = 1475) 9th grade Singaporean students, a structural equation model examined the effects of task value, self-efficacy, achievement goals, use of learning strategies, task engagement, and peer relationships on students' English achievement. Overall, it was found that task value (measured as a single-factor construct though the four items used measured different dimensions of task value), through students' mastery goal orientation, predicted students' use of deep learning strategies, surface learning strategies, engagement, and achievement. The effects of task value, (through students' mastery goal orientation) provides some support to the proposed function of task value beliefs in achievement-related choices as task value influenced students' use of learning strategies and student engagement. Of interest, task value was conceptualized as a one dimensional construct even though the items used to assess task value examined students' instrumental, utility, and interest values—a limitation which deserves further examination as valuable information may be lost by treating task value as a one-dimensional motivational construct (Eccles et al., 1983).

Further, Pintrich and De Groot (1990) also examined the effects of motivational components (task value beliefs, expectancy beliefs, affect) and self-regulatory components (metacognitive strategies, effort management, cognitive strategies) on students' academic performance. Using the MSLQ, 173 (N = 173) middle school students' self-efficacy beliefs, intrinsic value beliefs, test anxiety, cognitive strategy use (rehearsal, elaboration, organization), and self-regulation (metacognitive strategies, effort management) were measured. Through correlational and regression analysis, it was found that both self-efficacy beliefs and intrinsic value beliefs were positively related to students' strategy use and self-regulation. Of interest, intrinsic value (which combined students' utility and interest values) was more strongly correlated to strategy use (r = .63) and self-regulation (r = .73) than self-efficacy beliefs and strategy use (r = .33) and self-efficacy and self-regulation (r = .44). MANCOVA analysis was then used to examine the relationships between motivational and self-regulatory components by forming dichotomous high/low median splits for the motivational constructs. It was found that students high in intrinsic value were more likely (than low value students) to use cognitive strategies and to be self-regulating. Lastly, both self-efficacy and task value beliefs were positively associated with academic performance.

Overall, Pintrich and De Groot's (1990) study provides a number of insights in terms of the theoretical functions of task values. First, intrinsic value (which combined utility and interest task value) was found to be highly correlated to students' use of cognitive strategies (rehearsal, elaboration, organization) and students' self-regulation (effort management). Second, by organizing (and comparing) students in terms high/low “valuing” students, more evidence for the proposed relationship between task value and self-regulation was provided as high “valuing” students scored significantly higher on effort management and use of cognitive strategies than low “valuing” students. Third, task value was positively associated with self-efficacy. Lastly, although task value did not directly predict academic performance when included in a regression model alongside self-regulation and cognitive strategy use, the authors did make the case that task value is an important motivational construct to be considered in “models of how students come to use different cognitive strategies and become self-regulated learners” (Pintrich & De Groot, 1990, p. 37), which has some ramifications for the proposed study as the hypothesized model (see figure 2) posits that task value influences students self-sustained mathematics efforts—which is an outward manifestation of self-regulated learning.

Next, Wolters and Pintrich (1998) considered two aspects of academic self-regulation, cognitive strategy use and self-regulation strategy use (both measured by the MSLQ), along with three motivational constructs (task value, self-efficacy, and test anxiety), in examining how these constructs varied (in their association to academic achievement) as a result of variation in subject area (English, mathematics, social studies). 545 (N = 545) middle school students’ (51% female) teacher reported grades (in the three subjects: English, social studies, mathematics) were collected, along with their self-reported measures of the above mentioned constructs. Through correlational, multivariate analysis of variance, and multivariate regression analysis, it was found that task value, self-efficacy, test anxiety (reverse coded), cognitive and self-regulation strategy use, and performance were positively related across subjects. It was found that cognitive strategy use varied as result of subject area with students reporting greater strategy use in social studies than in English and mathematics. Further, the motivational constructs were then tested as predictors of both cognitive strategy use and self-regulation strategy use (within the three subjects), with task values emerging as the strongest predictor of self-regulation across all subjects. Lastly, it was found that self-efficacy and strategy use both directly predicted performance, while task value did not directly predict performance.

Overall, Wolters and Pintrich's (1998) study provides a number of important theoretical supports for the role of motivational and self-regulatory processes in learning as: (a) task values predicted self-regulatory behaviors and (b) students' strategy use (a dimension of self-regulation) and self-efficacy beliefs predicted students' performance. These findings also have implications for the proposed study (see figure 2) as task values (interest value and utility value) are posited to influence attention focusing (another dimension of academic self-regulation) and self-sustained mathematics efforts (an outward manifestation of self-regulated learning).

Likewise, Lee, Lee, and Bong (2014) also examined the role of self-regulation on subsequent academic achievement (among other goals) by testing a structural equation model that examined the relationships between self-efficacy, task interest value, grade goal (the grade a student expected to received), and self-regulation (measured with three MSLQ items) on students' achievement scores (final exam scores for four subjects, with each model tested separately for the four different exam scores). 500 (N = 500) Korean middle school students (51% female) completed self-reported measures with items altered to fit one of four school subjects: Korean, English, mathematics, and science. It was found that: (a) task interest value better predicted academic self-regulation than self-efficacy beliefs and grade goals; (b) task interest did not directly predict academic performance; (c) self-regulation fully mediated the relationship between task interest value and academic performance; and (d) self-regulation directly predicted achievement for three of the four subjects (this was not observed with science). Lastly, consistent results were observed across the four subject areas—which were interpreted as evidence that these constructs generally functioned the same across subjects. Overall, this study provides a number of theoretical insights. First, Lee et al.'s study (2014) provides evidence that task interest value can influence student self-regulation, which the proposed study also hypothesizes (in terms of attention focusing and self-sustained efforts). Second, Lee et al. provides evidence that self-efficacy (a type of expectancy) directly predicts students' achievement, which the hypothesized model also posits (see figure 2).

Next, Pintrich, Roeser, and De Groot (1994) replicated Pintrich and De Groot's (1990) study which examined the relationship between motivational constructs and self-regulatory behaviors (among other aims) among a sample of 100 (*N* = 100) seventh grade students. Using the MSLQ, Pintrich et al. (1994) measured aspects of students' motivation (task interest value, self-efficacy, test anxiety) and self-regulatory behaviors (cognitive strategy use, self-regulation) at two points during the school year (fall, spring). In measuring task interest value (nine items), the authors combined task interest value items (e.g. "I think what we are learning in this science class is interesting") and task attainment value items (e.g. "It is important for me to learn what is being taught in this social studies class"), which serves as a limitation given that there is evidence that interest value and attainment are two distinct components of task value beliefs (Eccles & Wigfield, 1995). The self-regulation scale was also made up of nine items which assessed the use of metacognitive strategies as well as strategies for managing effort and persistence. Through correlation analysis, it was found that results from this study paralleled the 1990 study as higher levels of task interest value (at time 1 and time 2) were significantly related to higher levels of cognitive strategy use (r = .66 time 1, r = .76 time 2) and higher levels of self-regulation (r = .69 time 1, r = .73 time 2). Higher levels of self-efficacy were also related to higher levels of cognitive strategy use (r = .41 time 1, r = .61 time 2) and higher levels of self-regulation (r = .50 time 1, r = .67 time 2).

In considering these correlations, it is interesting to note how task value beliefs were more strongly correlated with strategy use and self-regulation (both at time 1 and time 2) than efficacy beliefs. These relationships provide further insights into the relationship between expectancies and value and desired academic outcomes as the task value appears to matter more for the use of strategies, managing effort, and for persistence. The proposed model (see figure 2) will further examine these relationships as expectancies and value are hypothesized to influence effort, persistence, and attention focusing.

Summary of task value research. The literature reviewed in this section provides empirical support for a number of the purported theoretical functions of task value beliefs in academic settings including: (a) task value beliefs influence academic efforts (both directly and indirectly) (Chouinard et al., 2007; Hong et al., 2009; Pintrich et al., 1994;

Shechter et al., 2011); (b) task value beliefs influence performance (both directly and indirectly) (Bong, 2001; Lee et al., 2014; Pintrich & De Groot, 1990); (c) task value beliefs are positively related to self-regulatory behaviors (e.g. planning, self-checking, strategy use) and predict self-regulatory behaviors (Lee et al., 2014; Liem et al., 2008; Pintrich & De Groot, 1990; Pintrich et al., 1994; Wolters & Pintrich, 1998); (d) task value beliefs, self-regulatory behaviors, and efficacy expectancy beliefs are all positively related to each other (Lee, Lee, & Bong, 2014; Pintrich, Roeser, & De Groot, 1994; Wolters & Pintrich, 1998); (e) task value beliefs influence future course enrollment decisions (Bong, 2001; Eccles et al., 1983); and (f) task value beliefs influence persistence and engagement (Hong et al., 2009; Lee et al., 2014; Liem et al., 2008).

Overall, these studies provide a number of insights and possible directions for the proposed study. First, a number of the reviewed studies (including Eccles and colleagues' earlier works) treated task value beliefs as a single-factor construct made up of different dimensions (with each dimension typically assessed by one item/question). This serves as a limitation as more can be learned regarding the function of task value beliefs by considering its different dimensions separately. For instance, both Hong et al. (2009) and Shechter et al. (2001) considered two dimensions of task value beliefs (utility value and interest value) and found that these dimensions functioned differently in connection with academic-related behaviors. Further both Hong et al. and Shechter et al. attributed these observed differences in the functioning of utility and interest value to possible cultural differences in students—findings which the proposed study will further consider in terms of testing both utility value and interest value separately (in relation to achievement-related variables), as well as by comparing the functioning of these two dimensions of task value beliefs between Latino and Caucasian students. Second, a number of the reviewed studies considered the relationship between task value beliefs and self-regulatory behaviors. In general, these studies found positive relationships between students' value beliefs and academic self-regulation—a finding which the proposed study will attempt to replicate and expand. Lastly, some of the studies which examined the relationship between value beliefs and academic self-regulation also considered the role of efficacy beliefs. These studies generally found efficacy beliefs and value beliefs to be related, though value beliefs tended to be more related to self-regulatory behaviors than efficacy beliefs—a finding which the proposed study will further examine. Efficacy expectancies will now be reviewed.

Self-efficacy research. In general, expectancies (for success) can be understood as a broad motivational construct which refers to the beliefs and judgments one makes in regards to "their capabilities to perform a task successfully" (Schunk et al., 2008, p. 44). In other words, expectancies for success, along with similar terms such as outcome expectancies and efficacy expectancies, deal with the following question often asked by students in educational settings: "Can I do this task?" Although expectancy-value theorists tend to measure expectancies at the domain-level of specificity (i.e. expectancies for success, outcome expectations), there is precedence for measuring expectancies at a more granular level of specificity (Wigfield & Eccles, 2000, p. 70). Accordingly, the term *efficacy expectancies* was chosen (for this study) over more general terms as the items used to assess students' mathematics expectancies were very specific and referred to students' particular appraisals of conducting specific courses of action (within the context of mathematics) (see Appendix B for all items). Overall, it is believed that expectancy beliefs affect three general academic outcomes: (a) actual achievement or performance; (b) involvement in a given task, including cognitive engagement, effort, and persistence; and (c) academic-related choice (Schunk et al.). A review of the efficacy expectancies literature (including the self-efficacy literature) will now be presented.

Bong, Cho, Ahn, and Kim (2012) compared three self-belief constructs (self-concept, self-esteem, self-efficacy) as predictors of academic achievement (mathematics, language arts) among a sample of 234 (N = 234) elementary and 512 (N = 512) Korean middle school students. Task value and test anxiety were also considered as possible mediators between students' self-beliefs and academic achievement. Through structural equation modeling analysis, it was found that both self-concept and self-efficacy directly predicted student achievement in both mathematics and language arts, while self-esteem did not predict achievement. Of interest, the path between self-concept and achievement was much stronger than the path between efficacy and achievement, a finding which is not generally supported by the literature (Schunk et al., 2008). This unexpected finding was interpreted in terms of likely cultural differences as Korean students are evaluated against their peers when receiving grades, with such comparisons having a greater effect on the formation of self-concept beliefs than self-efficacy beliefs (Bong et al., 2012). Task value and test anxiety only mediated the relationship between self-efficacy and achievement. Overall, these findings lend support to the predictive nature of efficacy expectancy beliefs on student achievement, while at the same time, raised questions regarding the possible effects of culture on the function of self-beliefs and achievement—aspects which the proposed study will also consider.

Next, Pajares and Miller (1994) examined the predictive and mediational role of self-efficacy beliefs and self-concept beliefs on 350 (N = 350) undergraduate students' mathematics performance (measured by an 18-problem mathematics examination covering arithmetic, algebra, and geometry). After completion of the self-reported measures and the mathematics examination, a path analysis model was conducted which examined the effects of: (a) gender; (b) highest level of prior high school mathematics achievement; (c) number of college mathematics credits; (d) mathematics self-efficacy; (e) mathematics self-concept; and (f) perceived usefulness of mathematics on students' mathematics performance. The complete model accounted for 52% of the variance in mathematics performance with both self-concept and self-efficacy (along with level of prior high school achievement) significantly predicting performance. Of interest, the path from self-efficacy to performance (β = .55) was a much stronger path than the path from self-concept to performance (β = .16), which was not observed in Bong et al.'s (2012) study, and which further raises questions regarding culture and motivational beliefs. Further, efficacy beliefs were also observed to mediate the relationship between gender and mathematics performance, previous college experience and mathematics performance, as well as the relationship between prior high school mathematics achievement and mathematics performance. Overall, the authors concluded that their results supported Bandura's hypothesized role of self-efficacy in terms of predictive and mediational functions with academic performance.

Similarly, Zimmerman, Bandura, and Martinez-Pons (1992) examined the effects of students' grade goals, parental grade goals, students' self-regulated learning efficacy beliefs, and students' academic achievement efficacy beliefs on students' final grades in social studies class (while controlling for previous achievement). 102 (N = 102) high school students completed self-report measures of their efficacy beliefs and reported what grade they expected to receive and what their lowest acceptable grade would be for their social studies class, while their parents also reported their expected grades for their students and the lowest grade they considered acceptable. Through path analytic analysis, it was found that the complete model accounted for 31% (R^2 = .31) of the variance in students' final grades. More specifically, it was found that: students' efficacy beliefs for self-regulated learning directly influenced students' academic efficacy beliefs (β = .51); students' academic efficacy beliefs directly influenced final grades (β = .21); students' grade goals directly influenced their final grade in social studies (beta = .43); students' academic efficacy beliefs influenced students grade goal (β = .36); parental grade goals influenced students' grade goals (β = .36); and prior grades influenced parental grade goals (β = .26). Overall, this study added to the understanding of efficacy beliefs as a motivational construct as academic efficacy beliefs were influenced by self-regulated learning efficacy beliefs and as academic efficacy beliefs influenced students' grade goals—findings which highlight the functioning of academic efficacy beliefs as both predictor and mediator of desirable academic behaviors and outcomes.

Along these lines, Kitsantas, Cheema, and Ware (2011) examined students' self-efficacy beliefs, students' amount of time spent on mathematics homework, and homework support resources available to students in predicting students' mathematics achievement—as measured by the 2003 U.S. PISA administration. The sample consisted of 5,200 ($N = 5,200$) 15-year-old U.S. high school students. Students completed a set of self-reported measures along with a mathematics literacy examination. Through regression analysis, three regression models were tested. Model 1 only considering the effects of race and gender on students' mathematics achievement. Model 1 explained 17% of the variance in students' mathematics achievement. Next, model 2 added the variables of time spent on homework and homework support resources available to students. Model 2 accounted for 24% of the variance in mathematics. Model 3 then added self-efficacy as a predictor along with the above mentioned variables. Model 3 explained 44% of the variance in students' mathematics performance, with efficacy beliefs accounting for an additional 20% of the variance in mathematics. Overall, this study provided further evidence that students' efficacy beliefs are a significant and important predictor of students' mathematics achievement. Further, it was found that gaps in mathematics performance between minority and White students lessened when accounting for higher levels of student self-efficacy, highlighting the importance of students' efficacy beliefs (Kitsantas et al., 2011).

Moreover, Zimmerman and Kitsantas (2005) considered the effects of students' self-efficacy for learning beliefs, students' homework practices (time spent on homework, homework strategies used), and students' perceptions of responsibility (whether students or teachers are more responsible for various academic outcomes) on 179 ($N = 179$) female high school students' end of semester GPA scores (while controlling for prior achievement). Through path analysis, a number of significant direct and indirect paths were observed, with the complete model accounting for 78% ($R^2 = .78$) of the variance in students' GPA scores. More specifically, it was found that students' efficacy for learning beliefs ($\beta = .14$), prior achievement ($\beta = .18$), and perceived responsibility ($\beta = .67$) all directly influenced students' GPA scores. Further, students' efficacy beliefs were found to have a mediating role between prior achievement and GPA scores and to mediate between homework practices and GPA scores. Lastly, efficacy for learning beliefs (beta = .48) directly influenced students' perceived responsibility. The finding that students' quality of homework practices predicted students' efficacy beliefs was particularly interesting as efficacy beliefs are generally depicted in the literature as influencing students' choices in activity, persistence, etc., yet this study found that quality homework practices (e.g. organizing, memorizing, monitoring, etc.) predicted students' self-efficacy beliefs. Overall, this study provided further evidence of the importance of students' efficacy beliefs as they are related to a host of desired academic outcomes including perceptions of responsibility, quality of homework practices used, and end of semester GPA scores.

Similarly, Fast, Lewis, Bryant, Bocian, Cardullo, Rettig, and Hammond (2010) examined the effects of perceived classroom environment (challenge, caring, mastery) on upper elementary school students' self-efficacy beliefs and mathematics performance (measured through a state standardized mathematics examination). 1,163 students (N = 1,163) completed self-reported measures and completed the standard mathematics examination at two points in time over a two-year period. Through tests of mediation, it was found that students who perceived their classrooms as more mastery-oriented classrooms, more caring, and more challenging had significantly higher levels of mathematics efficacy beliefs. Students' mathematics efficacy beliefs directly influenced students' mathematics performance (year 2), while controlling for year 1 efficacy beliefs and year 1 mathematics performance. Of interest, perceptions of classroom environment (mastery, challenge, caring) did not directly influence students' mathematics performance. Overall, this study provided further clues for the functioning of students' efficacy expectancies as students who had higher levels of efficacy beliefs had higher scores on year-end mathematics scores. Further, efficacy beliefs were influenced by perceptions of classroom environment, which highlights the functioning of efficacy as both a predictor and mediator of mathematics performance—functions which the proposed model will also test (see Figure 3).

More recently, Simzar, Martinez, Rutherford, Domina, and Conley, (2015) examined students' efficacy beliefs, perceptions of task value (attainment, interest, utility, cost), and perceptions of goal orientation (mastery, performance approach, performance avoidance) in terms of their association with high stakes and low stakes mathematics exams. 720 (N = 720) 10^{th} and 11^{th} grade students' motivational beliefs were regressed on the two types of exams with differences emerging in the predictive nature of the motivational variables as related to high stakes and low stakes examinations. On average, students with higher efficacy beliefs and lower perceptions of performance avoidance goals scored higher on the high-stakes exam. Students with higher self-efficacy scores, higher mastery goals, and lower performance avoidance goals scored higher on the low-stakes exam. Further, students' efficacy beliefs were found to be a stronger predictor for exam performance than task value beliefs and achievement goals (mastery, performance approach, performance avoidance) for both types of exams. Of interest, the strength between the various motivational constructs and exam performance was greater for the low-stakes exam compared to the high-stakes exam. Overall, these findings provide further evidence for the functioning of students' efficacy expectancies as both direct and indirect predictor of high school students' mathematics performance.

Summary of efficacy expectancies research. Overall, the above reviewed studies lend support to the notion that students' efficacy beliefs are an important motivational construct in terms of its predictive and mediational functions in relation to academic performance. This is particularly the case as students' efficacy expectancies predicted students' academic performance on a number of different academic outcomes, including: (a) a researcher created mathematics exam, (b) end of semester mathematics GPA scores, (c) mathematics PISA scores, (d) end of semester social studies grade, and (e) high-stakes state standardized mathematics scores—findings which speak to the versatility of this important construct (Bong et al., 2012; Fast et al., 2010; Kitsantas et al., 2011; Pajares & Miller, 1994; Simzar et al., 2015; Zimmerman & Kitsantas, 2005). However, questions remain in terms of examining this construct with Latino student populations as possible cultural variations in the functioning of this motivational variable may exist, with Bong's et al. (2012) study exemplifying this as they observed self-efficacy to not function as expected (e.g. self-concept was a stronger predictor of performance than self-efficacy)—which was attributed to possible cultural differences as the students in her study were

Korean. The literature on socializers' beliefs, a socializing influence hypothesized by Eccles et al. to affect task value beliefs and expectancy beliefs will now be reviewed.

Socializers' beliefs research. A notable aspect of Eccles et al.'s expectancy-value model is the inclusion of variables that are associated with the social context (Eccles et al., 1983; Meece et al., 1984; Schunk et al., 2008; Wigfield, 1994; Wigfield & Eccles, 1992, 2002). Broadly speaking, Eccles and her colleagues posited four social factors believed to influence students' expectancy and value beliefs: (a) gender roles; (b) cultural stereotypes; (c) socializers' (i.e. parents, friends, teachers) beliefs and behaviors; and (d) students' interpretations of socializer's beliefs and behaviors (Eccles et al., 1983). In general, the social context has been recognized as an important influence on students' academic motivation and performance (Wentzel & Wigfield, 1998). Studies which have looked at the role of the social context on students' academic motivation and performance and have found that socialization experiences—particularly those with teachers, parents, and peers—can influence students' academic behaviors, motivation, and performance (Gonzalez-DeHass, et al., 2005; Ryan, 2000; Schunk et al., 2008; Wentzel & Wigfield, 1998).

Areas of research such as peer socialization, peer norms and values, peer modeling, parental involvement, and social motivation have all contributed to the understanding that the social environment matters in influencing academic behaviors (i.e. academic engagement) and performance (i.e. GPA) (Gonzalez-DeHass, et al., 2005; Schunk et al., 1998; Wentzel & Wigfield, 1998)—though less is known regarding how peer socialization can influence students' academic motivation (i.e. motivation as an outcome variable) (Ryan, 2000). This is an important distinction as Eccles' model posits that social variables (i.e. students' interpretation of socializer's beliefs) influence (and precede) students' value and expectancy beliefs (Eccles et al., 1983). A few studies which have considered the relationship between social influences (i.e. parental involvement) and motivation (as an outcome) have generally found that: (a) parental involvement can predict student engagement (longitudinally) among elementary school age students (Izzo, Weissberg, Kaspow, & Fendrich, 1999); (b) parenting practices predicted greater engagement among 6,400 high school students (Steinberg, Lamborn, Dornbusch, & Darling, 1992); (c) middle school students' motivation and competence were significantly related to parental value beliefs (Marchant, Paulson, & Rothlisberg, 2001); and (d) parental involvement has been predictive of high school students' mastery goal orientation (Gonzalez, Doan Holbein, & Quilter, 2002). Overall, these studies provide (some) context for the part of the hypothesized model (see figure 2) which examines the role of parental beliefs (e.g. SB-P) and peer actions (SB-F) on students' expectancies and value beliefs.

Locus of control research. Dating back to the mid 1950's, the concept of locus of control has been used to describe individuals' beliefs about the amount of control they exert over life events (Findley & Cooper, 1983). Considered to fall under the larger attribution theory umbrella (Schunk et al., 2008), locus of control is considered to be a cognitive construct which describes the tendency to attribute outcomes to either internal or external forces (Rotter, 1954). As the theory evolved over time, Weiner (1986) added that locus of control should also be considered in terms of two dimensions: stability (how stable the cause is over time) and controllability (how controllable the cause is). In general, locus of control beliefs are posited to affect learning, motivation, and behavior (Schunk et al.). Empirical studies which have examined the functioning of locus of control in academic settings will now be reviewed.

In a meta-analysis of the locus of control and academic achievement literature, Findley and Cooper (1983) reviewed 275 studies in order to determine the strength and general direction of the relationship between locus of control and academic achievement. After locating the studies of interest, the authors standardized the results in order to compute effect size estimations. Studies included samples made up college students, high school students, junior high students, and elementary age students. In general, it was found that greater internality was positively associated with greater achievement and greater externality was negatively associated with achievement. In terms of effect size, the mean effect size for was $r = .18$, considered to be a small to medium effect size (Findley & Cooper, 1983). Next, effect sizes were computed separately for subgroups. It was found that: (a) the effect size for male participants ($r = .20$) was higher than the effect size for female participants ($r = .11$); (b) effect size was strongest among junior high students ($r = .35$), followed by 4^{th}-6^{th} grade students ($r = .24$), with the lowest effect size observed among 1^{st} -3^{rd} grade student ($r = .04$); (c) Black students and White students had equal effect sizes ($r = .25$); and (d) lower socioeconomic class participants had a greater effect size ($r = .35$) than middle class participants ($r = .26$). Overall, this meta-analysis provides support for the general positive relationship between internal locus of control and academic achievement—a relationship that the proposed study will also consider.

Next, Wilhite (1990) examined the relationship between study behaviors, self-concept of ability, and locus of control as predictors of academic performance among a sample 184 (N = 184) undergraduate students. During the later part of the semester, students completed a number of self-report measures which assessed 11 cognitive activities (e.g. selective notetaking, pre-reading preparation), three self-management activities (e.g. cognitive monitoring, self-evaluation of cognitive ability), along with measures of self-concept and internal-external locus of control. Scores on these measures were then regressed on students' end of semester grades in their introductory psychology class. Overall, it was found that both self-concept of ability and locus of control predicted students' performance, along with two subscales of students' study activities: assiduous resource management and focus on test relevance.

Along these lines, Phillips and Gully (1997) constructed a structural equation model which proposed a number of motivational variables (ability, learning goal orientation, performance goal orientation, locus of control, self-efficacy) as possible antecedents of student goal setting and student academic performance. More specifically, the authors posited that ability, learning goal orientation, performance goal orientation, and locus of control would all influence students' self-efficacy beliefs, which in turn would influence students' personal goal setting (students' expected percentage of items correct on upcoming exam, students' grade goal for exam) and exam performance, while controlling for previous performance (ACT/SAT scores). 405 (n = 405) undergraduate students enrolled in an introductory management and/or psychology course completed self-reported measures (multiple administrations) which assessed the above mentioned variables. Exam performance was standardized given the different subject domains. Overall, it was found that students' locus of control beliefs (β = .21) significantly influenced students' self-efficacy beliefs. Further, ability beliefs (β = .27), learning goal orientation (β = .13), and performance goal orientation (β = -.14) also significantly contributed to students' efficacy beliefs. Of interest, only ability beliefs (β = .29) directly influenced students' performance. Next, self-efficacy beliefs (β = .51) predicted goal setting, while goal setting (β = .21) predicted students' exam performance, accounting for 30% (R^2 = .30) of the variance in performance (Phillips & Gully, 1997). In considering these results, the finding that internal locus of control beliefs influenced students' self-efficacy beliefs provides support for the proposed study as the hypothesized model posits that locus of control beliefs influences students' efficacy expectancies. Further, this finding also provides support for Eccles' and colleagues' assertion that cognitive processes (i.e. locus of control) influence motivational processes. Lastly, this study raises questions regarding the purported direct influence of locus of control beliefs on students' academic performance was this was not observed in this study—highlighting the need to further consider the role of locus of control beliefs in academic settings (i.e. direct predictor of performance or mediated predictor of performance).

Similarly, Ross and Broh (2000) compared and contrasted the effects of self-esteem and personal control (e.g. locus of control) on students' academic achievement as both of these constructs are believed to comprise the larger construct of self-concept and both have been shown to be highly correlated—yet may have different consequences for academic achievement. Using three waves of data collected by the National Educational

Longitudinal Study (NELS) in the years 1988,1990, and 1992, the authors constructed a structural equation model which examined students' 8^{th} grade academic achievement scores (a latent variable made up of mathematics grade, English grade, mathematics examination, and reading examination) as antecedents of 10^{th} grade self-esteem and locus of control. Next, 10^{th} grade students' self-esteem and locus of control beliefs were posited to predict 12^{th} grade academic achievement. In total, 8,802 (N = 8,802) high school students' data were analyzed. It was found that students' achievement scores from 8^{th} grade predicted both self-esteem ($\beta = .19$) and locus of control ($\beta = .23$) in the 10^{th} grade, while only 10^{th} grade locus of control predicted 12^{th} grade academic achievement ($\beta = .07$). Overall, the strongest path observed in the model was the path from 8^{th} grade achievement to 10^{th} grade locus of control, which highlights the cognitive nature of locus of control in that this sense of control is based on one's interpretation of past events (Ross & Broh, 2000). Further, this study provided evidence that students' locus of control beliefs can predict academic performance, though this path was rather weak ($\beta = .07$), suggesting that students' locus of control beliefs may best function through other variables—a relationship which the proposed study will examine.

Next, Suizzo and Soon (2006) examined the role of parental academic socialization (i.e. how parents communicate their educational beliefs and expectations to their children) on students' sense of internal locus of control. Further, the authors examined possible ethnic differences in the hypothesized relationship between parental academic socialization and locus of control as studies have shown that ethnic differences exist in the ways parents socialize their children (Suizzo & Soon, 2006). Using a sample of 249 (*n* = 249) college students, participants (*n* = 84 European-American, *n* = 74 Latino, *n* = 54 Asian, *n* = 37 African-American) completed measures of parental academic socialization (31 items) and locus of control (41 items). The parental academic socialization items were factor analyzed as this scale was modified and three factors emerged from that measure: emotional support, active involvement, and demandingness (i.e. control and demanding hard work). Next, the authors examined mean differences (by ethnicity) on the three parental factors and on locus of control. A number of differences emerged on the three parental factors with students' reporting that European-American parents provided the most emotional support and active involvement while Asian parents were the most demanding. No differences emerged in students' locus of control beliefs. Through regression analysis, it was found that parental socialization only predicted students' locus of control for Asian and European-American students. For Asian students, perceived parental emotional support accounted for 20% ($R^2 = .20$) of the variance in locus of control. For European-American students, perceived parental emotional support accounted for 24% ($R^2 = .24$) of the variance in locus of control.

Although Suizzo and Soon's (2006) study was different from the previous locus of control studies reviewed (locus of control was the outcome variable), it provides some insights for the proposed study as locus of control beliefs did not differ among students of different ethnicities, a comparison which the proposed study will also consider (in terms of Latino and European-American students). Further, the finding that parental academic emotional support only predicted locus of control for Asian and European-American students provides further support that ethnic differences should be considered in the study of academic motivation as culture likely influences the functioning of motivational constructs.

More recently, Joo, Lim, and Kim (2013) examined the role of students' task value beliefs, locus of control beliefs, and self-efficacy beliefs as predictors of students' course satisfaction, achievement, and persistence (within an online university setting). It was postulated that all three motivational constructs would influence students' satisfaction with their online course and performance on their online course (final grade)—both of which would then influence students' intentions to continue with their online university course work (e.g. persistence). 897 (*N* = 897) Korean undergraduate students completed locus of control and self-efficacy measures during the first week of the semester, while task value, learner satisfaction, and persistence were measured during the last two weeks of the semester. Through structural equation analysis, it was found that: (a) students' locus of control beliefs influenced perceptions of satisfaction; (b) self-efficacy beliefs influenced satisfaction and achievement; and (c) task value beliefs influenced achievement, persistence, and satisfaction. In terms of mediation, it was found that: (d) locus of control affected persistence through satisfaction; (e) self-efficacy affected persistence through satisfaction and achievement, and (f) task value affected persistence through both satisfaction and achievement.

In considering Joo et al.'s (2013) results, a few unexpected findings were observed. First, students' locus of control beliefs did not influence students' academic performance or persistence directly, a finding which is not typically supported by the locus of control literature (Findley & Cooper, 1983; Schunk et al., 2008). Second, students' task value beliefs directly influenced achievement, another finding which is generally not supported by the literature as task value tend affect performance indirectly (Schunk et al., 2008). Lastly, self-efficacy did not predict persistence, which is also generally not supported by the literature as efficacy beliefs have been shown to influence persistence (Hulleman et al., 2016). Overall, these findings provide further support for the need to consider culture in the study of motivation as these constructs may have functioned unexpectedly be due to students' culture (Korean students).

Summary of locus of control research. For a number of decades, locus of control beliefs have been studied in academic settings and have been postulated to affect a number of academic outcomes including performance and persistence. Overall, there is meta-analytic evidence that internal locus of control beliefs are associated with greater academic achievement, with effect sizes for this relationship ranging from small to medium (Findley & Cooper, 1983); locus of control beliefs can predict academic performance among undergraduate students (Wilhite, 1990); locus of control beliefs can predict undergraduate students' self-efficacy beliefs (Phillips & Gully, 1997); locus of control beliefs can predict academic achievement (in English and mathematics) longitudinally among U.S. high school students (Ross & Broh, 2000); locus of control beliefs can be influenced by parental academic emotional support (among U.S. Caucasian and Asian-American college students) (Suizzo & Soon, 2006); locus of control beliefs have been shown to not differ among U.S. Caucasian, African-American, Asian, and Hispanic college students (Suizzo & Soon, 2006); and locus of control beliefs can influence course satisfaction among Korean undergraduate students (Joo et al., 2013). In general, these findings provide a number of insights for the proposed study as locus of control will be examined as: (a) a predictor of students' efficacy expectancies, (b) as an indirect predictor of performance (through motivational variables), and (c) differences in students' locus of control will be considered in terms of race/ethnicity and gender. Studies which have examined expectancy-value related variables with Latino students will now be reviewed.

Expectancy-Value Related Research with Latino Students

In general, few empirical studies have examined the relational effects of academic motivational variables and Latino students' academic behaviors and performance (Riconscente, 2014; Stevens, Olivarez, Lan, & Tallent-Runnels, 2004; Trevino & DeFreitas, 2014). A broad search of the achievement motivation literature for studies conducted with Latino students (and largely Latino student samples) yielded a limited number of results. Selected studies considered the effects of motivational variables such as: efficacy beliefs, goal orientation, sense of belonging, intrinsic task value, and utility task value on students' educational outcomes such as intentions to complete high school, mathematics performance, NAEP assessments, student-reported end-of-semester grades, and examination performance. These studies will now be reviewed.

Mena (2011) examined the relationship between home-based parental school involvement (monitoring, social support, parental educational encouragement), students' school-related beliefs (perceptions of school responsiveness, academic attitudes, academic self-efficacy), and students' intention to complete high school. One hundred thirty-seven (*N* = 137) Latino 9th grade students responded to seven self-report measures which measured home-based parental involvement (encouragement, monitor, support) and student school beliefs (attitude, self-efficacy, responsiveness, school engagement-trouble), as well as their intention to complete their current ninth-grade school year and high school. Through structural equation modeling analysis, it was found that a direct effects model (a direct path from parental involvement to students' intention to complete ninth grade and high school) was a poor fit. Next, a mediating model (parental involvement through students' school-related beliefs) did fit the data well, suggesting that parental involvement can influence students' school-related beliefs, which in turn cab affect Latino high school students' intentions to complete their ninth grade year and high school.

In considering Mena's (2011) results, it is important to highlight that self-efficacy was one of four variables that comprised the larger latent "student school beliefs" construct—making it unclear to know whether self-efficacy on its own influenced students' intentions to complete their ninth grade school year/high school or not. Overall, results from this study were interpreted in terms of better understanding the role that parents play in influencing Latino students' academic-related beliefs, which in turn influenced students' self-reported intentions to persevere academically (Mena, 2011). This study also provides some support for the notion that a social influence (i.e. parental involvement) can affect students' motivational beliefs (i.e. self-efficacy)—a relationship which the hypothesized model will also consider (see figure 3).

Along these lines, Stevens, Olivarez, Lan, and Tallent-Runnels (2004) examined the relationship between: (a) students' mathematics efficacy beliefs, (b) students' motivation orientation (intrinsic, extrinsic), (c) students' mathematics performance (researcher created 20 problem mathematics exam) and (d) students' intentions to take additional math courses—while controlling for students' ability and prior math achievement. A total of 358 (N = 358) high school students (53% Latino) completed self-report measures as well as completed a research-created mathematics examination. Students' ability was assessed with the Cattell general mental ability test. Prior achievement data was collected through student self-report grade (e.g. last semester's grade). Using this data, a path analysis model was constructed which examined whether students' mathematics efficacy beliefs, through students' motivation orientation, would influence students' mathematics performance and intention to take additional mathematic courses (while controlling for ability and previous performance).

Results showed that students' mathematics efficacy beliefs predicted their intrinsic motivation orientation, their mathematics performance, and their intention to take additional math courses—among both Latino and Caucasian students (Stevens et al., 2004). When considering possible differences between path model results of Latino and Caucasian students, it was found that the path coefficient from prior achievement to self-efficacy was much stronger for Latino students ($\beta = .50$) compared to Caucasian students ($\beta = .25$), suggesting that Latino students' prior mathematics achievement was more important in influencing their self-efficacy beliefs when compared to Caucasian students. Differences in the strengths of the other path coefficients were also observed, though these differences were not significant. Overall, results from this study suggest that Latino students' self-efficacy beliefs directly influenced their mathematics performance, motivational orientation (intrinsic motivation) and intentions to take additional mathematics courses. This predictive relationship between Latino students' efficacy beliefs and their mathematics performance will be further tested by the hypothesized model which posits efficacy expectancies as predictor of students' mathematics performance.

Next, Byrnes (2003) examined potential ethnic differences in mathematics achievement by considering the role of various predictive factors (parental educational levels, differences in home environment, access to equitable educational opportunities, and motivation) in understanding differences among African-American (n = 1,615), Caucasian (n = 6,269), and Latino (n = 1,045) 12th grade students. Using the 1992 NAEP math assessment, Byrnes first conducted a factor analysis on the six items used by NAEP to measure students' motivation and found the items to load on two factors: ability beliefs (self-efficacy) and utility value beliefs. Through regression analyses, it was found that minority students' (African-American and Latino students were combined) ability beliefs significantly predicted their proficiency scores while utility value beliefs did not significantly predict proficiency scores. Although this study provides some clues in terms of Latino students' efficacy beliefs as possible predictor of academic achievement—questions remain as the author combined African-American and Latino students' scores—which raises question regarding whether this finding would hold true if African-American and Latino students' beliefs were analyzed separately.

Next, Chun and Dickson (2011) examined the effects of two ecological proximal processes factors: parental involvement and culturally responsive teaching; one psychological factor: sense of school belonging; on two academic outcomes: academic self-efficacy and academic performance (self-reported grade in English, mathematics, and science). 478 (N = 478) Latino middle school students answered self-report measures of parental involvement, perceptions of culturally responsive teaching, sense of school belonging, and academic self-efficacy. Through structural equation analysis, indirect effects were observed for parental involvement, culturally responsive teaching, and sense of school belonging on students' academic performance, while direct effects were observed for Latino students' self-efficacy beliefs on their academic performance (Chun & Dickson, 2011). Further, Chun and Dickson ran the structural equation model separately for the three different school subjects (English, mathematics, science) with students' efficacy beliefs predicting performance across all three subjects. Overall, this study provides further evidence that self-efficacy beliefs can predict academic performance for U.S. Latino middle school students. Findings from this study will be further examined by the proposed study as the hypothesized model will examine the direct effects of Latino students' efficacy beliefs on academic performance.

Lastly, Andersen and Ward (2014) examined the effects of high ability U.S. high school students' expectancies for success and subjective task value on students' plans to persist in STEM related coursework. Using the High School Longitudinal Study of 2009 (HSLS:09), the authors designated students who performed in the top 10% on the HSLS:09 as high ability students (N = 1,757). A secondary aim of the study was to consider possible differences in the constructs of interest among African-American students (n = 242), Caucasian students (n = 1,047), and Latino students (n = 469).

Participating students completed a number of self-report measures including: utility value, interest value, and attainment value in mathematics, science, and STEM; mathematics efficacy beliefs, and science efficacy beliefs (used to measure expectancies for success). The outcome variable of intentions to continue to take STEM-related courses was measured through a single dichotomous item. Through logistic regression analysis (which controlled for SES, gender, and achievement test score) a number of expected and unexpected results were observed. For all high achieving students, SES, gender, and achievement were not found to significantly predict persistence plans. Expectancies for success (math and science self-efficacy) also did not significantly predict students' persistence plans. Students' mathematics and science task value beliefs, (utility value, attainment value, and intrinsic value) did predicted students' persistence plans (Andersen & Ward, 2014). For Latino students, only science attainment value and STEM utility value predicted persistence plans. For Caucasian students, science self-efficacy, science intrinsic value, mathematics attainment value, and science attainment value predicted persistence plans. For African-American students, only science intrinsic value and science attainment value predicted persistence plans. Overall, this study suggests that high achieving Latino students' task value beliefs (particularly attainment value and utility value) can predict intentions to continue coursework in STEM-related studies—a desired academic outcome (Andersen & Ward, 2014). Further, this study provides support for the notion that motivational constructs can function differently across students of different ethnicities as differences were observed, including: efficacy beliefs predicted STEM persistence for Caucasian students; intrinsic value predicted

STEM persistence for Caucasian and African-American students but not for Latino students; lastly, utility value only predicted persistence for Latino students.

Summary of expectancy-value related research with Latino students. Overall, the studies reviewed in this section provide a number of insights that help better understand the relationship between expectancy-value related beliefs (i.e. efficacy beliefs, task value beliefs) and desired academic outcomes (i.e. intentions to complete high school, standardized test performance) among U.S. Latino students. More specifically, Latino students' efficacy related beliefs were found to: (a) influence intentions to graduate high school (Mena, 2011); (b) directly influence students' intentions to take additional math courses and mathematics performance (Stevens et al., 2004); and (c) predicted students' NAEP performance (Byrnes, 2003) and student-reported end of semester performance (Chun & Dickson, 2011). Further, high ability Latino high school students' task value beliefs (attainment and utility value) predicted their intentions to continue in their STEM-related studies (Andersen & Ward, 2014).

Although few, these studies provide empirical support for the direct and indirect relationship between Latino students' motivational beliefs (value beliefs and expectancy beliefs) and a number of desired academic outcomes among U.S. Latino students (Andersen & Ward, 2014; Byrnes, 2003; Chun & Dickson, 2011; Mena, 2011; Stevens et al., 2004). Accordingly, these studies lend support for the proposed study as the hypothesized model being tested (see Figure 3) will further examine the relationship between U.S. Latino high school students' (n = 781) task value beliefs (interest value, utility value), expectancy beliefs (mathematics efficacy expectancies), academic behaviors (attention focusing, self-sustained mathematics efforts) and academic performance. Further, the proposed study will also consider the role of social influences (parental beliefs, friends' actions) and locus of control beliefs on Latino students' motivational beliefs, academic behaviors, and academic performance—efforts which hope to contribute to the general understanding of Latino students' motivational beliefs and academic outcomes.

Chapter Three

Data Source

The data for this study comes from the 2012 administration of the Program for International Student Assessment (PISA), a system of international assessments which examine the performance of 15-year old students in mathematics, science, and reading literacy (OECD, 2013a). Overseen by the Organization for Economic Cooperation and Development (OECD) and administered by the national governments of participating countries, PISA has been administered every three years, starting in the year 2000. Each triennial administration focuses in-depth in one of three core subject areas (on a rotating basis) with the 2012 administration focusing on students' mathematics performance. In conjunction with the assessment of students' literacy skills, PISA also administered student background questionnaires which gathered information from students regarding their learning environments, educational experiences, and attitudes and beliefs towards education (OCED, 2013b). In 2012, over 500,000 students from 65 economies participated in the assessment (OECD, 2013a).

Participants

For the purposes of this study, participants were selected from the 2012 U.S. PISA dataset. The entire sample consists of 4,978 (N = 4,978) 15-year-old students, randomly selected from 162 public and private schools (Katsberg, Roey, Lemanski, Chan, & Murray, 2014). Students and schools were selected through multistage stratified random sampling, with schools randomly selected first and students randomly selected from within these schools. Participating schools were selected from the following U.S. Census regions: Northeast, Midwest, South, and West (Katsberg et al., 2014). Within the U.S. sample, two subsamples were selected for this study: students who identified themselves as Hispanic (*n* = 1,176, 49.6% female) and students who identified themselves as Caucasian (*n* = 2,553, 50% female). However, because not all students completed the same student questionnaires (see procedures below), the sample size for this study decreased in size as the variables of interest (for this study) were only measured in two of the three administered student questionnaries (random assignment). Thus, the final sample size for this study is as follows: Hispanic students (*n* = 781, 51% female); Caucasian students (*n* = 1,707, 49% female).

At the time of data collection, the majority of students were enrolled in the 10^{th} grade, although some students were enrolled in grades 8^{th} through 12^{th} (due to grade retention or acceleration). For Hispanic students, participants were enrolled in the following grades: 8^{th} (*n* = 4), 9^{th} (*n* = 166), 10^{th} (*n* = 782), 11^{th} (*n* = 223), and 12^{th} (*n* = 1). For Caucasian students, participants were enrolled in the following grades: 8^{th} (*N* = 1), 9^{th} (*n* = 187), 10^{th} (*n* = 2,021), 11^{th} (*n* = 333), and 12^{th} (*n* = 1). Lastly, three U.S. states (Connecticut, Florida, Massachusetts), also participated in the 2012 U.S. PISA administration, but they participated as separate educational systems with their results reported separately from the U.S. national findings (Katsberg et al., 2014).

Procedure

Participating students completed a two-hour paper-based or computer-based mathematics, reading, and science literacy examination, with mathematics serving as the main area of assessment (Katsberg et al., 2014). Students also completed one of three randomly assigned student background questionnaire forms (Form A, Form B, Form C). Background questionnaire forms asked students to provide information about themselves, their homes, and their attitudes and beliefs towards learning—though not all questionnaire forms contained the same items (OECD, 2013c). Background questionnaires required approximately 30 minutes to complete. Lastly, some students completed an optional financial literacy examination (Katsberg et al., 2014).

Instrumentation

Using items from the student background questionnaires (Forms A, B) (see Appendix B for all items and item stems), a total of nine variable composites were formed (six independent variables, three dependent variables) for inclusion in the hypothesized model. The six independent variable composites include: socializers' beliefs—parents (SB-P); socializers' beliefs—friends (SB-F); locus of control (LOC); task interest value (TIV); task utility value (TUV); and mathematics efficacy expectancies (MEE). The three dependent variable composites include: attention focusing (AF), self-sustained mathematics efforts (SSME), and persistence (PER). Gender and PISA's index of economic, social, and cultural status are also included in the model as independent variables though these variables are not composites. Lastly, mathematics performance (as measured by the mathematics examination) is also included in the model as a dependent variable (See Figure 2).

Construction of the composite variables was informed by Eccles' and colleagues' expectancy-value theory of achievement motivation (Eccles et al., 1983; Wigfield, 1994; Wigfield & Eccles, 2000). Items used to construct the composite variables were Likert-type items. All item scores were reverse coded to reflect stronger agreement with higher numerical values. For socializer's beliefs (parents and friends), task utility value, task interest value, locus of control, attention focusing, and self-sustained math efforts, item numerical ratings equaled: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. For efficacy expectancies, 1 = not at all confident, 2 = not very confident, 3 = confident, 4 = very confident. For persistence, 1 = not at all like me, 2 = not much like me, 3 = somewhat like me, 4 = mostly like me, 5 = very much like me.

Composite validity and reliability. Prior to constructing the composite variables (by averaging items together), the underlying factor structure of the proposed composite variables were assessed through exploratory factor analysis. This was done as not all variables used in the hypothesized model were originally constructed by PISA. Composite validity was assessed separately for both Hispanic and Caucasian students. After assessing the underlying structure of the composite variables (and forming the composites), composite reliability was examined through Cronbach's alpha analysis. This analysis was also done separately for each set of students. Reliability for the nine composite variables ranged between α = .68 and α = .91, considered to be acceptable levels of reliability (Warner, 2013). A description of the factor analytic processes conducted for each measure, as well as a brief description of each measure, will be presented below.

Measures

Socializers' beliefs-parents, socializers' beliefs—friends. The first set of items that were factor analyzed were the items used to comprise the measures of socializer's beliefs—parents (SB-P) and socializer's beliefs—friends (SB-F). These items came from a six-item scale (ST35) which PISA referred to as "subjective norms" (OECD, 2013b). These items were used by PISA to create a single index of subjective norms in mathematics, defined as "the extent to which a student's social environment promotes mathematics and the study of mathematics" (OECD, 2013b, p. 107). For Hispanic students, an assessment of the dimensionality of these six items, using Principal Axis Factor analysis (PAF) with Oblimin rotation, revealed a two factor solution (Eigenvalues 2.37, 1.55), accounting for 65% of the variance (a one factor solution accounted for 39% of the variance). Items ST35Q05, ST35Q04, and ST35Q06 formed one factor. This factor was named socializers' beliefs—parents (SB-P). Items ST35Q01, ST35Q02, and ST35Q03 formed a separate factor. This factor was named socializers' beliefs—friends (SB-F). See Table 1 for items, factor loadings, and communalities.

For Caucasian students, a two factor solution (Eigenvalues 2.47, 1.38) accounted for 64% of the variance (one factor solution accounted for 41% of the variance). The same items grouped together and formed SB—P and SB—F for Caucasian students. See Table 2 for items, factor loadings, and communalities. A further description of these two measures, including their reliabilities, is presented after the tables.

Table 1

Factor Loadings for PAF with Oblimin Rotation for ST35 Items (Hispanic Students)

Items	ST35 Items		Communality
	Factor 1: SB-P	Factor 2: SB-F	
▪ My parents believe that mathematics is important for my career (ST35Q05).	.93		.82
▪ My parents believe it's important for me to study mathematics (ST35Q04).	.79		.60
▪ My parents like mathematics (ST35Q06).	.37		.20
▪ Most of my friends do well in mathematics (ST35Q01).		.78	.61
▪ Most of my friends work hard at mathematics (ST35Q02).		.68	.49
▪ My friends enjoy taking mathematics (ST35Q03).		.60	.35

Note. Factor loadings < .30 are suppressed. SB-P = socializer's beliefs-parents; SB-F = socializer's beliefs-friends

Table 2

Factor Loadings for PAF with Oblimin Rotation for ST35 Items (Caucasian Students)

Items	ST35 Items		Communality
	Factor 1: SB-P	Factor 2: SB-F	
▪ My parents believe that mathematics is important for my career (ST35Q05).	.93		.82
▪ My parents believe it's important for me to study mathematics (ST35Q04).	.75		.53
▪ My parents like mathematics (ST35Q06).	.47		.31
▪ Most of my friends do well in mathematics (ST35Q01).		.73	.51
▪ Most of my friends work hard at mathematics (ST35Q02).		.72	.51
▪ My friends enjoy taking mathematics (ST35Q03).		.48	.25

Note: Factor loadings < .30 are suppressed. SB-P = socializer's beliefs-parents; SB-F = socializer's beliefs-friends.

Socializer's beliefs-parents (SB-P). Socializer's beliefs—parents (SB-P) was measured with three items (ST35Q05, ST35Q04, ST35Q06). These items assessed an aspect of students' social environment (i.e. parental beliefs) which are thought to promote the study of mathematics in students (Wigfield & Eccles, 2000). Items assessed students' perceptions of how their parents viewed mathematics in terms of: (a) mathematics as important for one's career, (b) mathematics as an important subject to study, and (c) mathematics as a subject that their parents like. For Hispanic students, these three items had a reliability score of .71 (α = .71), while these three items had a reliability score of .73 (α = .73) for Caucasian students.

Socializer's beliefs-friends (SB-F). Socializer's beliefs—friends (SB-F) was measured with three items (ST35Q01, ST35Q02, ST35Q03). These items assessed another aspect of students' social environment (i.e. friend beliefs) which are also thought to promote the study of mathematics in students (Wigfield & Eccles, 2000). Items considered students' perceptions of their friends, in terms of: (a) friends doing well in mathematics, (b) friends working hard in mathematics, and (c) friends enjoying mathematics. For Hispanic students, these three items had a reliability score of .71 (α = .71) while these items had a reliability score of .68 (α = .68) for Caucasian students.

Locus of control. Next, the items used to comprise locus of control (LOC) were derived from a six-item scale (ST43) which PISA referred to as "perceived control of mathematics performance" (OECD, 2013b). It is not clear if PISA intended for all six items to be indexed as a single construct. For Hispanic students, an assessment of the dimensionality of these six items, using Principal Axis Factor analysis (PAF) with

Oblimin rotation, revealed a two factor solution (Eigenvalues 2.12, 1.33), accounting for 58% of the variance (a one factor solution accounted for 35% of the variance). Items ST43Q05, ST43Q01, and ST43Q02 formed one factor and was named locus of control (LOC). Items ST43Q06 (which cross-loaded), ST43Q03, and ST43Q04 were discarded as these items did not measure students' perceived control of mathematics performance as these items placed the blame elsewhere (e.g. family, teachers) for not doing well. Further, items ST43Q06, ST43Q03, and ST43Q04 were reverse coded (in relation to items ST43Q05, ST43Q01, ST43Q02) to see if all six items would load on a single factor, but they did not load on a single factor.

For Caucasian students, a two factor solution (Eigenvalues 2.42, 1.31) accounted for 62% of the variance (one factor solution accounted for 41% of the variance). The same items (ST43Q05, ST43Q01, ST43Q02) were retained as locus of control (LOC) for this group of students while the remaining items loaded on a second factor (which were also discarded). See Tables 3 and 4 for items, factor loadings, and communalities. A further description of this measure is presented after the tables.

Table 3

Factor Loadings for PAF with Oblimin Rotation for ST43 Items (Hispanic Students)

Items	ST43 Items		Communality
	Factor 1: LOC	Factor 2	
▪ If I wanted to, I could do well in mathematics (ST43Q05).	.75		.55
▪ If I put in enough effort I can succeed in mathematics (ST43Q01).	.64		.41
▪ Whether or not I do well in mathematics is completely up to me (ST43Q02).	.62		.38
▪ I do badly in mathematics whether or not I study for my exams (ST43Q06).	-.37	.32	.28
▪ Family demands or other problems prevent me from putting a lot of time into my mathematics work (ST43Q03).		.56	.31
▪ If I had different teachers, I would try harder in mathematics (ST43Q04).		.49	.25

Note. Factor loadings < .30 are suppressed. LOC = Locus of control

Table 4

Factor Loadings for PAF with Oblimin Rotation for ST43 Items (Caucasian Students)

Items	ST43 Items		Communality
	Factor 1: LOC	Factor 2	
▪ If I wanted to, I could do well in mathematics (ST43Q05).	.77		.59
▪ If I put in enough effort I can succeed in mathematics (ST43Q01).	.74		.57
▪ Whether or not I do well in mathematics is completely up to me (ST43Q02).	.62		.46
▪ If I had different teachers, I would try harder in mathematics (ST43Q04).		.63	.39
▪ Family demands or other problems prevent me from putting a lot of time into my mathematics work (ST43Q03).		.51	.25
▪ I do badly in mathematics whether or not I study for my exams (ST43Q06).		.43	.33

Note: Factor loadings < .30 are suppressed. LOC = Locus of control.

Locus of control (LOC). Locus of control (LOC) was measured with three items (ST43Q05, ST43Q01, ST43Q02). These items assessed students' perceptions of their control of doing well in mathematics, a factor which is believed to contribute to one's academic efforts (Schunk et al., 2008). Items considered students' perceptions of control in terms of: (a) doing well in mathematics if students wanted to; (b) succeeding in mathematics as a result of one's own effort; and (c) doing well in mathematics as something that is completely up to the student. For Hispanic students, these items had a reliability score of .68 (α = .68) while these items had a reliability score of .77 (α = .77) for Caucasian students.

Task interest value, task utility value. Next, the items used to comprise task interest value (TIV) and task utility value (TUV) came from an eight-item scale (ST29) which PISA called "intrinsic and instrumental motivation" (OECD, 2013b). PISA defined intrinsic motivation in terms of students learning mathematics because they enjoy and find it interesting. PISA defined instrumental motivation in terms of students learning mathematics because they perceive mathematics as useful (OECD, 2013b). Although PISA distinguished between these two types of motivation, an exploratory factor analysis was still conducted in order to assess possible differences between Hispanic and Caucasian students.

For Hispanic students, a Principal Axis Factor analysis (PAF) with Oblimin rotation revealed a two factor solution (Eigenvalues 5.13, 1.07), accounting for 77% of the variance (a one factor solution accounted for 64% of the variance). Items ST29Q05, ST29Q08, ST29Q07, and ST29Q02 formed one factor and was named task utility value

(TUV). Items ST29Q04, ST29Q01, ST29Q06, and ST29Q03 formed a separate factor. This factor was named task interest value (TIV). These items formed the same factors for both sets of students. For Caucasian students, a two factor solution (Eigenvalues 5.09, 1.28) accounted for 80% of the variance (one factor solution accounted for 63% of the variance). See Tables 5 and 6 for items, factor loadings, and communalities. A further description of these measure is presented after the tables.

Table 5

Factor Loadings for PAF with Oblimin Rotation for ST29 Items (Hispanic Students)

Items	ST29 Items		Communality
	Factor 1: TUV	Factor 2: TIV	
▪ Learning mathematics is worthwhile for me because it will improve my career chances (ST29Q05).	.84		.71
▪ I will learn many things in mathematics that will help me get a job (ST29Q08).	.81		.62
▪ Mathematics is an important subject for me because I need it for what I want to study later on (ST29Q07).	.80		.69
▪ Making an effort in mathematics is worth it because it will help me in the work that I want to do later on (ST29Q02).	.78		.65
▪ I do mathematics because I enjoy it (ST29Q04).		-1.01	.86
▪ I enjoy reading about mathematics (ST29Q01).		-.77	.58
▪ I am interested in the things I learn in mathematics (ST29Q06).		-76	.76
▪ I look forward to my mathematics lessons (ST29Q03)		-74	.73

Note: Factor loadings < .30 are suppressed. TUV = Task utility value; TIV = Task interest value.

Table 6

Factor Loadings for PAF with Oblimin Rotation for ST29 Items (Caucasian Students)

Items	ST29 Items		Communality
	Factor 1: TUV	Factor 2: TIV	
▪ Mathematics is an important subject for me because I need it for what I want to study later on (ST29Q07).	.90		.77
▪ I will learn many things in mathematics that will help me get a job (ST29Q08).	.84		.71
▪ Learning mathematics is worthwhile for me because it will improve my career chances (ST29Q05).	.83		.70
▪ Making an effort in mathematics is worth it because it will help me in the work that I want to do later on (ST29Q02).	.78		.66
▪ I do mathematics because I enjoy it (ST29Q04).		-.95	.83
▪ I look forward to my mathematics lessons (ST29Q03).		-.85	.77
▪ I enjoy reading about mathematics (ST29Q01).		-.82	.62
▪ I am interested in the things I learn in mathematics (ST29Q06)		-.75	.78

Note: Factor loadings < .30 are suppressed. TUV = Task utility value; TIV = Task interest value.

Task interest value (TIV). Task interest value was measured with four items (ST29Q04, ST29Q03, ST29Q01, ST29Q06). These items assessed students' perceptions regarding their level of interest and enjoyment in mathematics. Items assessed interest value in terms of: (a) doing mathematics because they enjoy it, (b) looking forward to mathematics lessons, (c) enjoyment of reading about mathematics, and (d) being interested in the things they learn in mathematics class. These items are consistent with Eccles' and colleagues' understanding of interest/intrinsic value in that they assess students' level of enjoyment in engaging in the task and the level of interest students have for the task (Eccles et al., 1983; Wigfield & Eccles, 2000). For Hispanic students, these items had a reliability score of .90 ($\alpha = .90$) while these items had a reliability score of .91 ($\alpha = .91$) for Caucasian students.

Task utility value (TUV). Task utility value was measured with four items (ST29Q05, ST29Q08, ST29Q07, ST29Q02). These items assessed students' perceptions of value in mathematics in terms of its utility in reaching future goals. Items assessed utility value in terms of: (a) mathematics as an important subject in relation to students' future studies, (b) mathematics as helpful in obtaining future employment, (c) mathematics as worthwhile in improving employment chances, and (d) making efforts in mathematics is worthwhile as it relates to students' future work. These items are consistent with Eccles' and colleagues' understanding of utility value in that they assess the usefulness of mathematics in relation to some future goal (Eccles et al., 1983; Wigfield & Eccles, 2000). For Hispanic students, these items had a reliability score of .88 ($\alpha = .88$) while these items had a reliability score of .91 ($\alpha = .91$) for Caucasian students.

Mathematics self-efficacy. The next set of items that were factor analyzed were the set of items used to comprise mathematics efficacy expectancies. These items came from an eight-item scale (ST37) which PISA called mathematics self-efficacy (OECD, 2013b). PISA constructed a single index of all eight items which assessed students' "perceived ability to solve a range of pure and applied mathematics problems" (OECD, 2013b, p.88). For Hispanic students, a Principle Axis Factor analysis with Oblimin rotation revealed a two factor solution (Eigenvalues 4.13, 1.06) which accounted for 65% of the variance (one factor solution accounted 52% of the variance). Items ST37Q03, ST37Q08, ST37Q02, ST3706, ST37Q01, and ST37Q04 formed one factor and was named mathematics efficacy expectancies as these items assessed students' efficacy expectancies in completing a number of applied mathematical tasks. Two items, ST37Q05 and ST37Q07 formed their own factor. These items were different than the other items in that they did not assess students' expectancies to complete applied mathematical tasks but rather assessed students' expectancies in completing specific algebraic problems. These items were not retained in order to maintain a single-factor composite.

For Caucasian students, a two factor solution was also observed (Eigenvalues 3.91, 1.11), accounting for 63% of the variance (one factor solution accounted for 49%). Similarly, the same two algebra items (ST37Q05, ST37Q07) formed their own factor for Caucasian students and were also dropped to ensure a single factor composite. See Tables 7 and 8 for items, factor loadings, and communalities. A further description of this measure is provided after the tables.

Table 7

Factor Loadings for PAF with Oblimin Rotation for ST37 Items (Hispanic Students)

Items	ST37 Items		Communality
	Factor 1: MSE	Factor 2	
▪ Calculating how many square feet of tiles you need to cover a floor (ST37Q03).	.82		.64
▪ Calculating the petrol consumption rate of a car (ST37Q08).	.74		.58
▪ Calculating how much cheaper a TV would be after a 30% discount (ST37Q02).	.73		.56
▪ Finding the actual distance between two places on a map with a 1:10,000 scale (ST37Q06).	.78		.49
▪ Using a train timetable to work out how long it would take to get from one place to another (ST37Q01).	.64		.46
▪ Understanding graphs presented in newspapers (ST37Q04).	.57		.48
▪ Solving an equation like 3x + 5 = 17 (ST37Q05).		.97	.90
▪ Solving an equation like 2(x + 3) = (x + 3) (x – 3) (ST37Q07)	.32	.40	.58

Note: Factor loadings < .30 are suppressed. MSE = Mathematics self-efficacy.

Table 8

Factor Loadings for PAF with Oblimin Rotation for ST37 Items (Caucasian Students)

Items	ST37 Items		Communality
	Factor 1: MSE	Factor 2	
▪ Calculating how many square feet of tiles you need to cover a floor (ST37Q03).	.74		.58
▪ Finding the actual distance between two places on a map with a 1:10,000 scale (ST37Q08).	.73		.49
▪ Calculating how much cheaper a TV would be after a 30% discount (ST37Q02).	.69		.53
▪ Calculating the petrol consumption rate of a car (ST37Q08).	.68		.42
▪ Using a train timetable to work out how long it would take to get from one place to another (ST37Q01).	.64		.42
▪ Understanding graphs presented in newspapers (ST37Q04).	.50		.46
▪ Solving an equation like 3x + 5 = 17 (ST37Q05).		.96	.85
▪ Solving an equation like 2(x + 3) = (x + 3) (x – 3) (ST37Q07)		.57	.46

Note: Factor loadings < .30 are suppressed. MSE = Mathematics self-efficacy.

Mathematics self-efficacy (MSE). Mathematics efficacy expectancies was measured with six items (ST37Q03, ST37Q08, ST37Q02, ST3706, ST37Q01, ST37Q04). These items assessed students' expectancies in completing various applied mathematical tasks, including: (a) calculating ratio distances on a map; (b) calculating percent discounts; (c) calculating consumption rates; (d) calculating distance times from a timetable; and (e) understanding graphs. Although these items can also be understood in terms of self-efficacy beliefs, Wigfield and Eccles (2002) and Schunk et al., (2008) have acknowledged that expectancies for success and self-efficacy share much common ground, with the main difference between the two being in the level of specificity (with greater specificity associated with self-efficacy beliefs). Accordingly, a limitation of using this measure is that it is more closely aligned with self-efficacy beliefs, though this study will use this measure in terms of efficacy expectancies as efficacy and expectancies share common ground. For Hispanic students, these items had a reliability score of .83 ($\alpha = .83$) while these items had a reliability score of .85 ($\alpha = .85$) for Caucasian students.

Attention focusing, self-sustained mathematics efforts. Next, the items used to comprise attention focusing and self-sustained mathematics efforts were derived from a nine-item scale (ST46) which PISA called "mathematics work ethic" (OECD, 2013b). PISA used these nine items to form a single index of students' work ethic within the context of mathematics (OECD, 2013b). For Hispanic students, an assessment of the dimensionality of these nine items, using Principal Axis Factor analysis with Oblimin rotation, revealed a two-factor solution (Eigenvalues 4.77, 1.07), accounting for 65% of the variance (a one factor solution accounted for 53% of the variance). Items ST46Q05, ST46Q04, ST46Q02, ST46Q03, and ST46Q01 formed one factor. This factor was named self-sustained mathematics efforts (SSME). Items ST46Q07, ST46Q06, and ST46Q08 formed a second factor. This factor was named attention focusing (AF). Item ST46Q09 loaded on both attention focusing and self-sustained mathematics efforts and was dropped as it loaded on both factors. See Table 9 for items, factor loadings, and communalities.

For Caucasian students, a Principal Axis Factor analysis with Oblimin rotation revealed a two-factor solution (Eigenvalues 4.63, 1.14) accounting for 64% of the variance (one factor solution accounted for 51% of the variance). The same items loaded on each factor. Similarly, item ST46Q09 also cross loaded on the two factors and was dropped. See Table 10 for items, factor loadings, and communalities. A further description of the measures is presented below.

Table 9

Factor Loadings for PAF with Oblimin Rotation for ST46 Items (Hispanic Students)

Items	ST46 Items		Communality
	Factor 1: SSME	Factor 2: AF	
▪ I keep studying until I understand mathematics material (ST46Q05).	.81		.55
▪ I study hard for mathematics quizzes (ST46Q04).	.79		.58
▪ I work hard on my mathematics homework (ST37Q02).	.73		.64
▪ I am prepared for my mathematics exams (ST46Q03).	.67		.48
▪ I finish my homework in time for mathematics class (ST46Q01).	.61		.45
▪ I keep my mathematics work well organized (ST46Q09).	.40	-.36	.47
▪ I listen in mathematics class (ST46Q07).		-.95	.84
▪ I pay attention in mathematics class (ST46Q06).		-.84	.72
▪ I avoid distractions when I am studying mathematics (ST46Q08).		-.37	.37

Note. Factor loadings < .30 are suppressed. SSME = Self-sustained mathematics efforts; AF = Attention focusing

Table 10

Factor Loadings for PAF with Oblimin Rotation for ST46 Items (Caucasian Students)

Items	ST46 Items		Communality
	Factor 1: SSME	Factor 2: AF	
▪ I keep studying until I understand mathematics material (ST46Q05).	.86		.63
▪ I study hard for mathematics quizzes (ST46Q04).	.84		.61
▪ I work hard on my mathematics homework (ST37Q02).	.62		.58
▪ I am prepared for my mathematics exams (ST46Q03).	.54		.40
▪ I finish my homework in time for mathematics class (ST46Q01).	.49		.42
▪ I keep my mathematics work well organized (ST46Q09).	.38	-.32	.38
▪ I listen in mathematics class (ST46Q07).		-.92	.82
▪ I pay attention in mathematics class (ST46Q06).		-.91	.83
▪ I avoid distractions when I am studying mathematics (ST46Q08).		-.38	.39

Note. Factor loadings < .30 are suppressed. SSME = Self-sustained mathematics efforts; AF = Attention focusing

Attention focusing (AF). Attention focusing was measured with three items (ST46Q07, ST46Q06, ST46Q08). These items assessed students' ability to focus their attention while in their mathematics class or while studying mathematics. More specifically, these items considered attention focusing in terms of: (a) students listening while in their mathematics class, (b) students paying attention while in their mathematics class, and (c) students avoiding distractions while studying mathematics. This outcome variable is consistent with expectancy-value theory as attention focusing can be understood in terms of an achievement-related behavior (Eccles et al., 1983; Wigfield & Eccles, 2000). For Hispanic students, these items had a reliability score of .80 (α = .80) while these items had a reliability score of .82 (α = .82) for Caucasian students.

Self-sustained mathematics efforts (SSME). Self-sustained mathematics efforts were measured with five items (ST46Q05, ST46Q04, ST46Q02, ST46Q03, ST46Q01). Items assessed students' self-sustained mathematics efforts in areas such as classwork, homework, and exams/quizzes. Items considered students efforts in terms of: (a) studying mathematics until it is understood, (b) studying for mathematics quizzes, (c) working on mathematics homework, (d) preparing for mathematics exams, and (e) finishing mathematics homework in time. Similarly, this outcome variable is also consistent with expectancy-value theory as self-sustained efforts can be understood in terms of an achievement-related behavior (Eccles et al., 1983; Wigfield & Eccles, 2000). For Hispanic students, these items had a reliability score of .84 (α = .84) while these items had a reliability score of .84 (α = .84) for Caucasian students.

Persistence. The items used to comprise the persistence composite were derived from a five-item scale (ST93) which PISA called "perseverance". These items were used by PISA to create a single index of perseverance which examined students' willingness to work on problems that are difficult, even after students encounter problems (OECD, 2013b). For Hispanic students, an assessment of the dimensionality of these five items was conducted using Principal Axis Factor analysis with Oblimin rotation. This analysis revealed a two factor solution (Eigenvalues 2.37, 1.29), accounting for 73% of the variance (a one factor solution accounted for 47% of the variance). Items ST93Q04, ST93Q03, and ST93Q05 formed a single factor. This factor was named persistence (PERS). Items ST93Q02 and ST93Q01formed their own factor and were not retained as these items did not reflect persistence (e.g. putting off difficult problems, giving up easily when confronted with a problem). Further, items ST93Q02 and ST93Q01 were reverse coded to see is they would load on a single factor (with the other items) but these items continued to form their own factor and were thus discarded. See Table 11 for items, factor loadings, and communalities.

For Caucasian students, a Principal Axis Factor analysis with Oblimin rotation revealed a two-factor solution (Eigenvalues 2.63, 1.16) accounting for 76% of the variance (a one factor solution accounted for 53% of the variance). The same items loaded on the two factors for this group of students. Similarly, items ST93Q02 and ST93Q01 were reverse coded to see if they loaded on the persistence factor. These items continued to form their own factor and were not retained. See Table 12 for items, factor loadings, and communalities.

Table 11

Factor Loadings for PAF with Oblimin Rotation for ST93 Items (Hispanic Students)

Items	ST93 Items		Communality
	Factor 1: PER	Factor 2	
▪ I continue working on tasks until everything is perfect (ST93Q04).	.82		.65
▪ I remain interested in the tasks that I start (ST93Q03).	.70		.51
▪ When confronted with a problem, I do more than what is expected of me (ST93Q05).	.68		.47
▪ I put off difficult problems (ST93Q02).		.77	.58
▪ When confronted with a problem, I give up easily (ST93Q01).		.76	.59

Note. Factor loadings < .30 are suppressed. PER = Persistence.

Table 12

Factor Loadings for PAF with Oblimin Rotation for ST93 Items (Caucasian Students)

Items	ST93 Items		Communality
	Factor 1: PER	Factor 2	
▪ I continue working on tasks until everything is perfect (ST93Q04).	.89		.74
▪ I remain interested in the tasks that I start (ST93Q03).	.70		.50
▪ When confronted with a problem, I do more than what is expected of me (ST93Q05).	.66		.51
▪ When confronted with a problem, I give up easily (ST93Q01).		.83	.70
▪ I put off difficult problems (ST93Q02).		.78	.60

Note. Factor loadings < .30 are suppressed. PER = Persistence.

Persistence (PER). Persistence was measured with three items (ST93Q04, ST93Q03, ST93Q05). Items assessed students' perceptions of their persistence in terms of: (a) continuing to work until everything is perfect, (b) remaining interested in tasks that are started, and (c) doing more than expected when confronted with a problem. This outcome variable is consistent with expectancy-value theory as Eccles et al., (1983) lists persistence as an outcome variable. For Hispanic students, these items had a reliability score of .78 (α = .78) while these items had a reliability score of .79 (α = .79) for Caucasian students.

Index of economic, social, and cultural status (ESCS). An index of economic, social, and cultural status (ESCS) was created by PISA and was formed based on the following variables: (a) the international socio-economic index of occupational status; (b) highest level of education of students' parents (years of schooling); (c) PISA's index of family wealth; (d) PISA's index of home educational resources; and (e) PISA's index of possessions related to culture in the home (OECD, 2013b). ESCS index scores have an average score of zero and a standard deviation of one (OECD, 2013b). Higher scores denote greater economic, social, and cultural status. For Hispanic students, ESCS index scores ranged from -3.80 to 2.30, with an average index score of -.46 (1.01 standard deviation). For Caucasian students, ESCS index scores ranged from -2.94 to 2.60 with an average index score of .48 (.84 standard deviation).

Mathematics performance. Lastly, students' mathematics performance was assessed through an 84-item mathematics examination. The examination was designed to assess students' ability to formulate, employ, and interpret mathematics in a variety of settings (OECD, 2013d). Further, exam items were designed to measure mathematics reasoning and the use of mathematical concepts, procedures, facts, and tools to “describe, explain, and predict phenomena” (OECD, 2013d, p. 24). A set of five plausible values were reported for all students. One random plausible value was chosen for inclusion in the model.

Chapter Four

Data Cleaning and Assumption Testing

Variables of interest were screened for minimum and maximum values, normality, linearity, multicollinearity, and for univariate and multivariate outliers. All items used to form the composite variables had values between 1 and 4 and between 1 and 5, with no impossible values observed. Next, normality was assessed through histograms and through the evaluation of skewness and kurtosis. All variables approached normality. Linearity was assessed through normal probability plots. All variables approached linearity. Variables were examined for multicollinearity. Multicollinearity was not observed as correlations among all variables did not exceed .63 ($r = .63$) for either groups of students. Univariate outliers were screened by transforming composite scores into z-scores. Z-scores above 3.29 were observed, however, items were not deemed to be outliers as a steady pattern of values were observed for all variables (no extreme jumps in z-score values among participants). Lastly, multivariate outliers were screened using Mahalanobis distance. Values above the cut score were observed but no extreme jumps in values were observed. All cases were retained for analyses.

Missing Data

For the 2012 PISA administration, students were randomly assigned to complete one of three student background questionnaire forms (Form A, B, C) (OECD, 2013c).

Questionnaire Form C did not include any of the survey scales which were used to comprise the variables of interest for this study (e.g. ST29, ST37, ST46, etc.). As a result, students who completed Form C (Hispanic: *n* = 395; Caucasian: *n* = 846) were not included in the analysis. Missing rates ranged between .2% and 3.5% for the ten variables of interest (see Tables 13, 14). No initial action was taken to address missingness as data was missing randomly and by design (OECD, 2013c).

Table 13

Missing Data for Study Variables (Hispanic Students)

Variables	Valid Cases		Missing Cases	
	N	Percent	*N*	Percent
ESCS	774	99.8%	7	.2%
Interpretation of Socializer's beliefs—Parents	775	99.2%	6	.8%
Interpretation of Socializer's beliefs—Friends	775	99.2%	6	.8%
Locus of Control	761	97.4%	20	2.6%
Task Interest Value	774	99.1%	7	.9%
Task Utility Value	772	98.2%	9	1.2%
Math Self-Efficacy	771	98.7%	10	1.3%
Attention Focusing	754	96.5%	27	3.5%
Self-Sustained Mathematics Efforts	759	97.2%	22	2.8%
Persistence	759	97.2%	22	2.8%
Mathematics Performance	781	100%	-	-

Table 14

Missing Data for Study Variables (Caucasian Students)

Variables	Valid Cases		Missing Cases	
	N	Percent	*N*	Percent
ESCS	1,704	99.1%	3	.9%
Interpretation of Socializer's beliefs—Parents	1,698	99.5%	9	.5%
Interpretation of Socializer's beliefs—Friends	1,696	99.4%	11	.6%
Locus of Control	1,689	98.9%	18	1.1%
Task Interest Value	1,697	99.4%	10	.6%
Task Utility Value	1,697	99.4%	10	.6%
Math Self-Efficacy	1,696	99.4%	11	.6%
Attention Focusing	1,677	98.2%	30	1.8%
Self-Sustained Mathematics Efforts	1,682	98.5%	25	1.5%
Persistence	1,669	65.4%	38	2.2%
Mathematics Performance	1,707	100%	-	-

Descriptive Statistics

Descriptive statistics (means, standard deviations) were computed for all study variables. Descriptive statistics were computed separately for both groups of students, as well as by group gender (i.e. Latino males, Latina females, Caucasian males, Caucasian females).

Index of economic, social and cultural status (ESCS). This index (standardized to have a mean of zero and a standard deviation of one) was created based on the following information provided by students: (a) parental occupational status, (b) parental education, (c) family wealth, (d) availability of educational resources, and (e) availability of possessions related to culture in the home (OECD, 2013b). For Latino students, the average score on this index was -.46, with a standard deviation of 1.01. For Latino male students, the average score on this index was –.40, with a standard deviation of 1.02. For Latina female students, the average score was -.52, with a standard deviation of 1.00. For Caucasian students, the average score on this index was .48, with a standard deviation of .84. For Caucasian male students, the average score was .46, with a standard deviation of .83. For Caucasian female students, the average score was .51, with a standard deviation of .85.

Interpretation of socializers' beliefs—parents (SB-P). Students' interpretations of socializers' beliefs—parents were measured with three Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average for score for this composite variable was 3.09, with a standard deviation of .56. For Caucasian students, the average score was 3.00, with a standard deviation of .57. For Latino males the average score was 3.10, with a standard deviation of .54. For Latina females the average score was 3.08, with a standard deviation of .57. For Caucasian males the average score on this composite variable was 3.02, with a standard deviation of .56. For Caucasian females, the average score was 2.97, with a standard deviation of .59.

Interpretation of socializers' beliefs—friends (SB-F). Students' interpretations of socializers' (friends) beliefs and behaviors were measured with three Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 2.46, with a standard deviation of .52. For Caucasian students, the average score was 2.50, with a standard deviation of .50. For Latino males the average score was 2.47, with a standard deviation of .53. For Latina females the average score was 2.46, with a standard deviation of .53. For Caucasian males the average score was 2.52, with a standard deviation of .52. For Caucasian females the average score was 2.50, with a standard deviation of .48.

Internal locus of control (LOC). Students' internal locus of control beliefs were measured with three Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 3.30, with a standard deviation of .52. For Caucasian students, the average score was 3.30, with a standard deviation of .58. For Latino males the average score was 3.31, with a standard deviation of .51. For Latina females the average score was 3.29, with a standard deviation of .52. For Caucasian males the average score was 3.34, with a standard deviation of .55. For Caucasian females the average score was 3.25, with a standard deviation of .59.

Task interest value (TIV). Students' task interest value beliefs were measured with four Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 2.45, with a standard deviation of .76. For Caucasian students, the average score was 2.24, with a standard deviation of .77. For Latino males the average score was 2.50, with a standard deviation of .74. For Latina females the average score was 2.41, with a standard deviation of .77. For Caucasian males the average score was 2.30, with a standard deviation of .77. For Caucasian females the average score was 2.19, with a standard deviation of .77.

Task utility value (TUV). Students' task utility value beliefs were measured with four Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 3.02, with a standard deviation of .65. For Caucasian students, the average score was 2.97, with a standard deviation of .76. For

Latino males the average score was 3.03, with a standard deviation of .67. For Latina females the average score was 3.01, with a standard deviation of .64. For Caucasian males the average score was 3.00, with a standard deviation of .76. For Caucasian females the average score was 2.95, with a standard deviation of .77.

Mathematics self-efficacy (MSE). Students' mathematics efficacy beliefs were measured with six Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 2.90, with a standard deviation of .60. For Caucasian students, the average score was 3.05, with a standard deviation of .62. For Latino males the average score was 3.03, with a standard deviation of .58. For Latina females the average score was 2.77, with a standard deviation of .59. For Caucasian males the average score was 3.18, with a standard deviation of .60. For Caucasian females the average score was 2.93, with a standard deviation of .61.

Attention focusing (AF). Students' attention focusing (in mathematics) was measured with three Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 3.07, with a standard deviation of .58. For Caucasian students, the average score was 3.04, with a standard deviation of .60. For Latino males the average score was 3.06, with a standard deviation of .56. For Latina females the average score was 3.08, with a standard deviation of .59. For Caucasian males the average score was 3.01, with a standard deviation of .60. For Caucasian females the average score was 3.07, with a standard deviation of .60.

Self-sustained mathematics efforts (SSME). Students' self-sustained mathematics efforts were measured with four Likert-type items, with items ranging in value between 1 and 4. For Latino students, the average score for this composite variable was 2.79, with a standard deviation of .59. For Caucasian students, the average score was 2.86, with a standard deviation of .61. For Latino males the average score was 2.77, with a standard deviation of .60. For Latina females the average score was 2.80, with a standard deviation of .59. For Caucasian males the average score was 2.81, with a standard deviation of .62. For Caucasian females the average score was 2.91, with a standard deviation of .59.

Persistence (PER). Students' academic persistence beliefs were measured with three Likert-type items, with items ranging in value between 1 and 5. For Latino students, the average score for this composite variable was 3.48, with a standard deviation of .87. For Caucasian students, the average score was 3.53, with a standard deviation of .89. For Latino males the average score was 3.45, with a standard deviation of .84. For Latina females the average score was 3.51, with a standard deviation of .89. For Caucasian males the average score was 3.51, with a standard deviation of .89. For Caucasian females the average score was 3.55, with a standard deviation of .89.

Mathematics performance (MATH). Students' mathematics performance was measured through an 84-item mathematics literacy examination. However, as part of the PISA administration, students did not complete all 84 items with students only completing a subset of the problems. As a result, a total of five plausible values were created (through Rasch analysis) for all students (OECD, 2013b). Possible scores on the exam ranged from 0-1000. Plausible values were standardized to have a mean of 500 and a standard deviation of 100. For Latino students, scores on all five plausible values ranged from 183.21 to 745. 61. For Latino male students, scores ranged from 248.33 to 723.72. For Latina female students, scores ranged from 183.21 to 745.61. For Caucasian students, scores ranged from 230.88 to 784.24. For Caucasian male students, scores ranged from 262.12 to 778.63. For Caucasian female students, scores ranged from 230.88 to 784.24. All five plausible mean values (and standard deviations) are listed below (Table 15).

Table 15

Mathematics Performance Plausible Values

	PV1	PV2	PV3	PV4	PV5
Latino Students (*n* = 791)	456.04 (81.60)	455.45 (82.72)	454.55 (82.48)	456.28 (80.71)	456.75 (81.55)
Latino Males (*n* = 382)	463.70 (82.93)	462.49 (84.34)	462.17 (83.87)	461.55 (81.65)	461.13 (85.14)
Latina Females (*n* = 399)	448.70 (79.72)	448.71 (80.67)	447.25 (80.55)	451.23 (78.69)	450.71 (77.34)
Caucasian Students (*n* = 1,707)	504.57 (82.55)	505.11 (82.08)	505.31 (83.10)	506.91 (82.49)	505.74 (82.22)
Caucasian Males (*n* = 865)	514.08 (84.56)	513.29 (83.77)	514.43 (85.50)	515.35 (84.21)	515.33 (84.21)
Caucasian Females (*n* = 842)	494.81 (79.31)	496.70 (79.48)	495.94 (79.54)	498.25 (79.81)	495.88 (78.98)

Note. Standard deviations in parenthesis.

Correlations among Study Variables

Correlations between all study variables are presented in Tables 16-21. Correlations were calculated separately for both groups of students, as well as by gender. Significant (at the .01 and .05 level) and non-significant correlations were observed, though the majority of the correlations were significant. The strongest correlation occurred between Caucasian male students' self-sustained mathematics efforts and attention focusing (r = .65), followed by the relationship between Hispanic male students' task interest value and task utility value (r = .64). In general, the relationship between self-sustained mathematics efforts and attention focusing and the relationship between task interest value and task utility value were the strongest correlation for both groups of students and by gender. Six negative relationships emerged for both groups of students, with most negative relationships occurring between interpretation of socializers' beliefs—friends and mathematics performance. Of interest, no negative relationships between study variables were observed for Caucasian female students (only group not to have a negative relationship between variables). Overall, similarities and differences in the relationship between study variables were observed between groups of students and by gender. A more detailed discussion regarding the various observed relationships will be provided in Chapter Five. Inferential statistics will now be discussed.

Table 16

U.S. Hispanic Students: Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. ESCS											
2. Socializer's Beliefs - Parents	.05										
3. Socializer's Beliefs - Friends	.07	.23**									
4. Locus of Control	.18**	.25**	.08*								
5. Task Interest Value	.04	.35**	.21**	.37**							
6. Task Utility Value	.07	.53**	.21**	.35**	.63**						
7. Math Self-Efficacy	.29**	.26**	.12**	.34**	.42**	.33**					
8. Attention Focusing	.14**	.23**	.05	.27**	.33**	.32**	.26**				
9. Self-Sustained Math Efforts	.19**	.23**	.18**	.33**	.43**	.35**	.33**	.61**			
10. Persistence	.15**	.24**	.11**	.25**	.33**	.28**	.33**	.38**	.42**		
11. Math Performance (PV4)	.34**	.05	-.09*	.24**	.17**	.11**	.48**	.15**	.16**	.12**	
Mean	-.46	3.09	2.46	3.30	2.45	3.02	2.90	3.07	2.79	3.48	456.28
Std. deviation	1.01	.56	.52	.52	.76	.65	.60	.58	.59	.87	80.71

Note: **Correlation is significant at the .01 level. *Correlation is significant at the .05 level. N = 781.

Table 17

U.S. Caucasian Students: Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. ESCS											
2. Socializer's Beliefs - Parents	.24**										
3. Socializer's Beliefs - Friends	.08**	.33**									
4. Locus of Control	.12**	.40**	.23**								
5. Task Interest Value	.10**	.44**	.33**	.43**							
6. Task Utility Value	.13**	.58**	.27**	.49**	.63**						
7. Math Self-Efficacy	.25**	.31**	.17**	.42**	.42**	.36**					
8. Attention Focusing	.08**	.27**	.24**	.32**	.33**	.38**	.21**				
9. Self-Sustained Math Efforts	.16**	.34**	.28**	.38**	.43**	.46**	.29**	.62**			
10. Persistence	.15**	.27**	.21**	.25**	.31**	.31**	.34**	.32**	.39**		
11. Math Performance (PV4)	.35**	.19**	-.01	.24**	.27**	.21**	.55**	.08**	.08**	.21**	
Mean	.48	3.00	2.51	3.30	2.24	2.97	3.05	3.04	2.86	3.52	506.91
Std. deviation	.84	.57	.50	.58	.77	.76	.62	.60	.61	.89	82.49

Note: **Correlation is significant at the .01 level. *Correlation is significant at the .05 level. *N* = 1,707.

Table 18

U.S. Hispanic Male Students: Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. ESCS											
2. Socializer's Beliefs - Parents	.08										
3. Socializer's Beliefs - Friends	.04	.21**									
4. Locus of Control	.19**	.30**	.06								
5. Task Interest Value	.07	.35**	.28**	.36**							
6. Task Utility Value	.04	.57**	.22**	.40**	.64**						
7. Math Self-Efficacy	.27**	.22**	.06	.37**	.38**	.30**					
8. Attention Focusing	.13*	.19**	-.05	.27**	.38**	.37**	.22**				
9. Self-Sustained Math Efforts	.19**	.17**	.12*	.29**	.39**	.31**	.25**	.64**			
10. Persistence	.13*	.25**	.07	.18**	.36**	.31**	.36**	.39**	.44**		
11. Math Performance (PV4)	.33**	.01	-.12*	.25**	.14**	.08	.52**	.10	.09	.12	
Mean	-.41	3.10	2.47	3.31	2.50	3.03	3.03	3.06	2.77	3.45	461.55
Std. deviation	1.03	.54	.53	.51	.74	.67	.58	.56	.60	.84	81.65

Note: **Correlation is significant at the .01 level. *Correlation is significant at the .05 level. N = 382.

Table 19

U.S. Hispanic Female Students: Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. ESCS											
2. Socializer's Beliefs - Parents	.02										
3. Socializer's Beliefs - Friends	.10*	.24**									
4. Locus of Control	.17**	.20**	.08								
5. Task Interest Value	-.01	.34**	.16**	.37**							
6. Task Utility Value	.09	.50**	.20**	.31**	.62**						
7. Math Self-Efficacy	.30**	.30**	.17**	.32**	.45**	.38**					
8. Attention Focusing	.14**	.26**	.13*	.26**	.29**	.27**	.32**				
9. Self-Sustained Math Efforts	.20**	.29**	.24**	.36**	.47**	.40**	.43**	.60**			
10. Persistence	.18**	.22**	.15**	.32**	.30**	.26**	.33**	.38**	.40**		
11. Math Performance (PV4)	.35**	.08	-.06	.23**	.19**	.14**	.44**	.19**	.24**	.13**	
Mean	-.54	3.08	2.46	3.29	2.41	3.01	2.77	3.08	2.80	3.51	451.23
Std. deviation	1.01	.57	.52	.52	.77	.64	.59	.59	.59	.89	79.58

Note: **Correlation is significant at the .01 level. *Correlation is significant at the .05 level. N = 399.

Table 20

U.S. Caucasian Male Students: Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. ESCS											
2. Socializer's Beliefs - Parents	.22**										
3. Socializer's Beliefs - Friends	.05	.35**									
4. Locus of Control	.14**	.42**	.23**								
5. Task Interest Value	.10**	.48**	.38**	.39**							
6. Task Utility Value	.14**	.60**	.29**	.47**	.61**						
7. Math Self-Efficacy	.24**	.31**	.17**	.43**	.36**	.36**					
8. Attention Focusing	.10**	.31**	.29**	.30**	.41**	.35**	.23**				
9. Self-Sustained Math Efforts	.16**	.35**	.31**	.34**	.46**	.42**	.28**	.65**			
10. Persistence	.15**	.28**	.24**	.33**	.34**	.32**	.38**	.35**	.39**		
11. Math Performance (PV4)	34**	.15**	-.02	.28**	.25**	.22**	.54**	.10**	.05	.20**	
Mean	.44	3.02	2.52	3.34	2.30	3.00	3.18	3.01	2.81	3.51	515.35
Std. deviation	.84	.56	.52	.55	.77	.76	.60	.60	.62	.89	84.21

Note: **Correlation is significant at the .01 level. *Correlation is significant at the .05 level. *N* = 865.

Table 21

U.S. Caucasian Female Students: Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. ESCS											
2. Socializer's Beliefs - Parents	$.27^{**}$										
3. Socializer's Beliefs - Friends	$.13^{**}$	$.30^{**}$									
4. Locus of Control	$.12^{**}$	$.38^{**}$	$.23^{**}$								
5. Task Interest Value	$.10^{**}$	$.40^{**}$	$.28^{**}$	$.47^{**}$							
6. Task Utility Value	$.13^{**}$	$.55^{**}$	$.25^{**}$	$.51^{**}$	$.59^{**}$						
7. Math Self-Efficacy	$.28^{**}$	$.31^{**}$	$.16^{**}$	$.40^{**}$	$.44^{**}$	$.38^{**}$					
8. Attention Focusing	.06	$.24^{**}$	$.20^{**}$	$.35^{**}$	$.36^{**}$	$.40^{**}$	$.21^{**}$				
9. Self-Sustained Math Efforts	$.15^{**}$	$.34^{**}$	$.24^{**}$	$.43^{**}$	$.49^{**}$	$.50^{**}$	$.35^{**}$	$.58^{**}$			
10. Persistence	$.15^{**}$	$.25^{**}$	$.17^{**}$	$.29^{**}$	$.35^{**}$	$.31^{**}$	$.32^{**}$	$.30^{**}$	$.40^{**}$		
11. Math Performance (PV4)	$.38^{**}$	$.22^{**}$	.01	$.26^{**}$	$.24^{**}$	$.20^{**}$	$.56^{**}$	$.07^{*}$	$.14^{**}$	$.23^{**}$	
Mean	.51	2.97	2.50	3.25	2.19	2.95	2.93	3.07	2.91	3.54	498.25
Std. deviation	.84	.59	.48	.59	.77	.77	.61	.60	.59	.89	79.81

Note: **Correlation is significant at the .01 level. *Correlation is significant at the .05 level. N = 842.

Inferential Statistics

Independent sample *t*-tests were conducted to further examine study variables in terms of potential mean differences as a result of group membership (i.e. ethnic, gender differences). In particular, variable means were compared as follows: (a) Latino students and Caucasian students, (b) Latino male students and Latina female students, (c) Latino male students and Caucasian male students, and (d) Latina female students and Caucasian female students. A comparison between Caucasian male and female students was not conducted as the examination of potential gender differences among Caucasian students is beyond the scope of this study.

Independent samples *t*-tests. Mean comparisons for study variables are reported individually. Effect sizes for mean differences are calculated using Cohen's *d* effect size formula. Assumptions for conducting independent samples *t*-tests were met as variables approached normality, homogeneity of variance was checked through Levene's test, observations were independent of each other, and sample sizes were of adequate size.

Index of economic, social, and cultural status (ESCS). For this index variable, Latino students (M = -.47) reported significantly lower economic, social, and cultural status compared to Caucasian students (M = .47), $t(1275.84) = -24.30$, $p < .001$. The effect size for this comparison is 1.01 (d = 1.01), considered to be a large effect (all effect sizes are reported in terms of Cohen's *d*). A comparison of this variable between Latino male students (M = -.41) and Latina female students (M = -.54) showed no significant differences, $t(767.6) = 1.77$, $p = .96$. A comparison of this variable between Latino male students (M = -.41) and Caucasian male students (M = .44) showed a significant difference favoring Caucasian male students, $t(608.00) = -14.18$, $p < .001$. The effect size for this comparison is .90 ($d = 0.90$), considered to be a large effect. Lastly, a comparison of this variable between Latina female students ($M = -.54$) and Caucasian female students ($M = .51$) showed a significant difference favoring Caucasian female students, $t(668.03) = -17.92$, $p < .001$. The effect size for this comparison is 1.13 ($d = 1.13$), considered to be a large effect.

Interpretation of socializers' beliefs—parents. For this variable, Latino students ($M = 3.09$) reported significantly higher scores than Caucasian students ($M = 3.00$), $t(2471) = 3.80$, $p < .001$. The effect size for this comparison was .27 ($d = 0.27$), considered to be a medium effect. When comparing Latino male students ($M = 3.10$) and Latina female students ($M = 3.08$), no significant differences were observed on this variable, $t(773) = .52$, $p = .60$. A comparison between Latino male students ($M = 3.10$) and Caucasian male students ($M = 3.02$) revealed significant differences, $t(1236) = 2.29$, $p = .02$. The effect size for this comparison was .15 ($d = 0.15$), considered to be a small effect. Lastly, a comparison between Latina female students ($M = 3.08$) and Caucasian female students ($M = 2.97$) on this variable also revealed significant differences, $t(1233) = 3.12$, $p = .002$. The effect size for this comparison was .19 ($d = 0.19$), considered to be a small effect. Overall, Latino students perceived their parents to have greater mathematics value beliefs (utility value, attainment value) and mathematics interest compared to Caucasian students' perceptions.

Interpretation of socializers' beliefs—friends. For this variable, Latino students ($M = 2.46$) reported significantly lower scores than Caucasian students ($M = 2.51$), *t*(2469) = -2.00, *p* = .05. The effect size for this comparison was .10 (*d* = 0.10), considered to be a small effect. When comparing Latino male students (*M* = 2.47) and Latina female students (*M* = 2.46), no significant differences were observed, *t*(773) = .23, *p* = .82. A comparison between Latino male students (*M* = 2.47) and Caucasian male students (*M* = 2.52) did not reveal significant differences, *t*(1232) = -1.48, *p* = .14. Lastly, a comparison between Latina female students (*M* = 2.46) and Caucasian female students (*M* = 2.50) did not reveal significant differences, *t*(1235) = -1.32, *p* = .19. Overall, interpretations of friends' mathematics beliefs and behaviors did not differ much between groups of students with only one significant difference observed (small effect).

Locus of control. For this variable, Latino students (*M* = 3.30) and Caucasian students (*M* = 3.30) did not differ on locus of control beliefs, *t*(1620.26) = .02, *p* = .98. When comparing Latino male students (*M* = 3.30) and Latina female students (*M* = 3.29), no significant differences were observed, *t*(759) = .46, *p* = .64. A comparison between Latino male students (*M* = 3.30) and Caucasian male students (*M* = 3.34) revealed no significant differences, *t*(1218) = -1.07, *p* = .29. Lastly, a comparison between Latina female students (*M* = 3.29) and Caucasian female students (*M* = 3.25) revealed no significant differences, *t*(866.38) = 1.15, *p* = .25. Overall, no significant differences were observed between students' locus of control beliefs.

Task interest value. For this variable, Latino students (*M* = 2.45) reported significantly higher scores than Caucasian students (*M* = 2.24), *t*(2469) = 6.30, *p* < .001. The effect size for this comparison was .27 (*d* = 0.27), considered to be a medium effect. When comparing Latino male students (*M* = 2.50) and Latina female students (*M* = 2.41), no significant differences were observed, $t(772) = .52$, $p = .08$. A comparison between Latino male students ($M = 2.50$) and Caucasian male students ($M = 2.30$) on this variable revealed significant differences favoring Latino male students, $t(1233) = 4.32$, $p < .001$. The effect size for this comparison was .26 ($d = 0.26$), considered to be a medium effect. Lastly, a comparison between Latina female students ($M = 2.41$) and Caucasian female students ($M = 2.19$) on this variable revealed significant differences favoring Latina female students, $t(1234) = 4.68$, $p < .001$. The effect size for this comparison was .29 ($d = 0.29$), considered to be a medium effect. Overall, Latino students reported significantly higher perceptions of mathematics task interest value than Caucasian students, with all differences being of medium effect size.

Task utility value. For this variable, no differences were observed between Latino students ($M = 3.02$) and Caucasian students ($M = 2.97$), $t(1721.54) = 1.65$, $p = .10$. When comparing Latino male students ($M = 3.03$) and Latina female students ($M = 3.01$), no significant differences were observed, $t(770) = .37$, $p = .71$. A comparison between Latino male students ($M = 3.03$) and Caucasian male students ($M = 3.00$) revealed no significant differences, $t(1229) = .79$, $p = .43$. Lastly, a comparison between Latina female students ($M = 3.01$) and Caucasian female students ($M = 2.95$) revealed no significant differences, $t(925.33) = 1.55$, $p = .12$. Overall, no significant differences were found between students on their perceptions of mathematics utility value.

Mathematics self-efficacy. For this variable, Latino students ($M = 2.90$) reported significantly lower mathematics efficacy beliefs than Caucasian students ($M = 3.05$), $t(2465) = -5.76$, $p < .001$. The effect size for this comparison was .25 ($d = 0.25$), considered to be a medium effect. When comparing Latino male students (*M* = 3.03) and Latina female students (*M* = 2.77), significant differences were observed favoring Latino male students, $t(769) = 6.06$, $p < .001$. The effect size for this comparison was .44 ($d = 0.44$), considered to be a large effect. A comparison between Latino male students (*M* = 3.03) and Caucasian male students (*M* = 3.18) on this variable revealed significant differences with Caucasian males reporting higher efficacy beliefs, $t(1232) = -3.90$, $p < .001$. The effect size for this comparison was .24 ($d = 0.24$), considered to be a medium effect. Lastly, a comparison between Latina female students (*M* = 2.77) and Caucasian female students (*M* = 2.93) revealed significant differences favoring Caucasian female students, $t(1231) = -4.14$, $p < .001$. The effect size for this comparison was .27 ($d = 0.27$), considered to be a medium effect. Overall, there were consistent differences in students' mathematics efficacy beliefs with Caucasian students having significantly higher efficacy beliefs—with all differences being of medium effect size. Further, efficacy beliefs differences were also found between Latino male and Latina female students.

Attention focusing. For this variable, no significant difference were observed between Latino students (*M* = 3.07) and Caucasian students (*M* = 3.04), $t(2429) = 1.22$, $p = .22$. When comparing Latino male students (*M* = 3.06) and Latina female students (*M* = 3.08), no significant differences were observed, $t(752) = -.40$, $p = .69$. A comparison between Latino male students (*M* = 3.06) and Caucasian male students (*M* = 3.01) revealed no significant differences, $t(1207) = 1.47$, $p = .14$. Lastly, a comparison between Latina female students (*M* = 3.07) and Caucasian female students (*M* = 3.07) revealed no significant differences, $t(1220) = .21$, $p = .83$. Overall, no differences were observed in students' mathematics attention focusing behaviors.

Self-sustained mathematics efforts. For this variable, Latino students ($M = 2.79$) reported significantly lower scores than Caucasian students ($M = 2.86$), $t(2439) = -2.85$, $p = .004$. The effect size for this comparison was .14 ($d = 0.14$), considered to be a small effect. When comparing Latino male students ($M = 2.77$) and Latina female students ($M = 2.80$), no significant differences were observed, $t(757) = -.66$, $p = .51$. A comparison between Latino male students ($M = 2.77$) and Caucasian male students ($M = 2.81$) did not reveal significant differences, $t(1214) = -.97$, $p = .33$. Lastly, a comparison between Latina female students ($M = 2.80$) and Caucasian female students ($M = 2.91$) revealed significant differences favoring Caucasian females, $t(1223) = -3.18$, $p = .002$. The effect size for this comparison was .19 ($d = 0.19$), considered to be a small effect. Overall, Caucasian students (both male and female) tended to report significantly higher self-sustained mathematics efforts compared to Latino students, though this difference did not emerge between male students.

Persistence. For this variable, no significant differences were found between Latino students ($M = 3.48$) and Caucasian students ($M = 3.52$), $t(2426) = -1.15$, $p = .25$. When comparing Latino male students ($M = 3.45$) and Latina female students ($M = 3.51$), no significant differences were observed, $t(757) = -.90$, $p = .37$. A comparison between Latino male students ($M = 3.45$) and Caucasian male students ($M = 3.51$) revealed no significant differences, $t(1206) = -1.02$, $p = .31$. Lastly, a comparison between Latina female students ($M = 3.51$) and Caucasian female students ($M = 3.54$) revealed no significant differences, $t(1218) = -.64$, $p = .52$. Overall, there were no significant differences in students' persistence beliefs.

Mathematics performance (plausible value 4). For this mathematics performance plausible value, Latino students ($M = 456.28$) performed significantly lower than Caucasian students ($M = 506.91$), $t(2486) = -14.31$, $p < .001$. The effect size for this comparison was .62 ($d = 0.62$), considered to be a large effect size. When comparing Latino male students ($M = 460.42$) and Latina female students ($M = 449.84$), a significant difference was observed favoring Latino males, $t(1172.71) = 2.25$, $p = .03$. The effect size for this comparison was .13 ($d = 0.13$), considered to be a small effect. A comparison between Latino male students ($M = 461.55$) and Caucasian male students ($M = 515.35$) revealed significant differences favoring Caucasian male students, $t(1245) = -10.50$, $p < .001$. The effect size for this comparison was .65 ($d = 0.65$), considered to be a large effect. Lastly, a comparison between Latina female students ($M = 451.23$) and Caucasian female students ($M = 498.25$) on this variable revealed significant differences favoring Caucasian female students, $t(1239) = -9.70$, $p < .001$. The effect size for this comparison was .59 ($d = 0.59$), considered to be a large effect. Overall, Caucasian students significantly outperformed Latino students, with all differences having a large effect size. Further, Latino males significantly outperformed Latina female students, though the effect size for this comparison was considered to be small.

Summary. Independent samples *t*-tests revealed a number of significant and non-significant differences between groups of students. For four variables (locus of control, task utility value, attention focusing, persistence) there were no differences found across the groups. Small differences were found in: (a) perceptions socializers' beliefs-parents; (b) interpretation of socializers' beliefs-friends; and (c) self-sustained mathematics efforts. Lastly, medium and large differences were observed in: (a) students' task interest value; (b) mathematics self-efficacy; (c) mathematics performance; and (d) economic, social, and cultural status (see Table 22).

Table 22

Descriptive Statistics and t-Tests for all Study Variables

Variables	Hispanic Students (*n* = 781)		Caucasian Students (*n* = 1,707)			
	M	*SD*	*M*	*SD*	*t*	*d*
ESCS	-.47	1.02	.47	0.84	-24.30**	1.01
SB-P	3.09	0.56	3.00	0.57	3.80**	0.27
SB-F	2.46	0.52	2.51	0.50	-2.00*	0.10
LOC	3.30	0.52	3.30	0.58	.02	-
TIV	2.45	0.76	2.24	0.77	6.30**	0.27
TUV	3.02	0.65	2.97	0.76	1.65	-
MSE	2.90	0.60	3.05	0.62	-5.76**	0.25
AF	3.07	0.58	3.04	0.60	1.22	-
SSME	2.79	0.59	2.86	0.61	-2.85**	0.14
PER	3.48	0.87	3.52	0.89	-1.15	-
MATH (PV4)	456.28	80.71	506.91	82.49	-14.31**	0.62

Note. $^{*}p < .05$. $^{**}p < .001$. *d* = Cohen's d. ESCS = PISA index of economic, social, and cultural Status; SB-P = Socializer's beliefs–Parents; SB-F = Socializer's beliefs–Friends; LOC = Locus of control; TIV = Task interest value; TUV = Task utility value; MSE = Math self-efficacy; AF = Attention focusing; SSME = Self-Sustained math efforts; PER = Persistence; Math = Math Performance Mean Score (PV4).

Path Analysis

The hypothesized model was assessed using path analysis procedures. This method of analysis was used as it allows for the simultaneous estimation of the relationship and directionality between various variables of interest (Kline, 2011). The fit of hypothesized model (see Figure 2) was assessed using AMOS statistical software (Version 22). As a regression-based statistical procedure, a number of assumptions were examined prior to running the path analysis (e.g. linearity, normality, multicollinearity). Assumptions were examined through the use of histograms, q-q plots, scatterplots, and through bivariate correlational analysis.

Path analysis assumptions. More specifically, normality was assessed through the visual examination of histograms and through the evaluation of skewness and kurtosis. All variables were inspected individually (for both groups of students) with all variables approaching normality. Next, linearity was assessed through the visual examination of normal probability plots. All variables were inspected individually with all variables approaching linearity. Lastly, variables were examined for multicollinearity. Multicollinearity was not observed as correlations among all study variables did not exceed .64 (r =. 64) for either groups of students (see Tables 16-19). Overall, path analysis assumptions were adequately met.

Model fit analysis. Next, fit of the hypothesized model was assessed through CFI, TLI, and RMSEA fit statistics. The following recommended cut scores were used in determining adequate model fit: CFI $\geq$ .95; TLI $\geq$ .90; RMSEA $\leq$ .06 (Hu & Bentler, 1999; Schreiber et al., 2006). Chi-square fit statistics are also reported though this fit statistic is sensitive to large sample sizes (N > 200) (Bearden, Sharma, & Teel, 1982).

Model fit results. The hypothesized model was tested with the combined sample of Latino students (n = 781) and Caucasian students (n = 1,707) for a total sample size of

2,488 (n = 2,488) U.S. high school students. Fit of the hypothesized model (see Figure 3) did not meet the recommended cut scores listed above as the following fit scores were observed: CFI = .852, TLI = .456, RMSEA = .114 [.108, .119], $\chi^2(36) = 1195.19$, $p < .001$, suggesting that the data did not fit the model (Hu & Bentler, 1999; Schreiber et al., 2006). Although the hypothesized model was not up to the standards of fit, a closer look at the hypothesized model revealed some interesting findings.

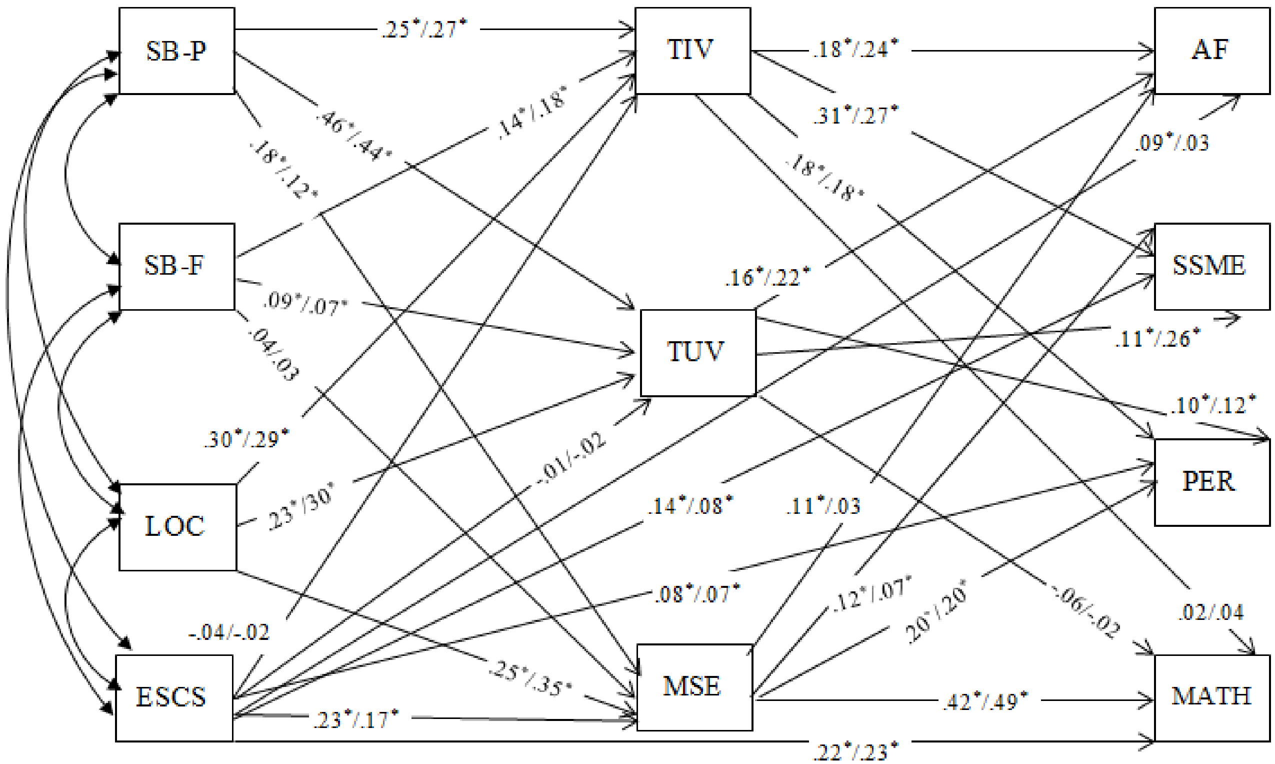

Figure 4. Multiple-group (Hispanic/Caucasian) estimation of hypothesized model (non-fitting). ESCS = PISA index of economic, social, and cultural Status (standardized); SB-P = Socializer's Beliefs–Parents; SB-F = Socializer's Beliefs–Friends; LOC = Locus of Control; TIV = Task Interest Value; TUV = Task Utility Value; MEE = Math Efficacy Expectancies; AF = Attention Focusing; SSME = Self-Sustained Math Efforts; PERS = Persistence; Performance = 2012 PISA Math Performance Mean Score (plausible value 4). *p < .05.

In terms of model parameters, a number of significant and non-significant path coefficients were observed among the study variables. In total, 23 significant paths emerged for Latino students and 21 significant paths emerged for Caucasian students (see Table 23). When comparing the various path coefficients for both groups of students, two differences emerged in terms of a path being significant for one group of students but not the other: (a) the path from ESCS to attention focusing (AF) was significant for Latino students (β = .09) and not for Caucasian students (β = .03) and (b) the path from mathematics self-efficacy (MSE) to attention focusing (AF) was significant for Latino students (β = .11) and not for Caucasian students (β = .03).

Table 23

Standardized Path Coefficients for Hypothesized Model

Variables	Hispanic Students (*n* = 781)		Caucasian Students (*n* = 1,707)	
	β	*p*	β	*p*
SB-P → TIV	.25	< .001	.27	< .001
SB-P → TUV	.46	< .001	.44	< .001
SB-P → MSE	.18	< .001	.12	< .001
SB-F → TIV	.14	< .001	.18	< .001
SB-F → TUV	.09	.002	.07	.001
SB-F → MSE	.04	.20	.03	.16
LOC → TIV	.30	< .001	.29	< .001
LOC → TUV	.23	< .001	.30	< .001
LOC → MSE	.25	< .001	.35	< .001
ESCS → TIV	-.04	.17	-.02	.36
ESCS → TUV	-.01	.84	-.02	.35

ESCS → MSE	.23	< .001	.17	< .001
ESCS → AF	.09	.01	.03	.28
ESCS → SSME	.14	< .001	.08	< .001
ESCS → PER	.08	.02	.07	.004
ESCS → MATH	.22	< .001	.23	< .001
TIV → AF	.18	< .001	.24	< .001
TIV → SSME	.31	< .001	.27	< .001
TIV → PER	.18	< .001	.18	< .001
TIV → MATH	.02	.58	.04	.09
TUV → AF	.16	< .001	.22	< .001
TUV → SSME	.11	.01	.26	< .001
TUV → PER	.10	.02	.12	< .001
TUV → MATH	-.06	.11	-.02	.39
MSE → AF	.11	.01	.03	.28
MSE → SSME	.12	< .001	.07	.003
MSE → PER	.20	< .001	.20	< .001
MSE → MATH	.42	< .001	.49	< .001

In general, the directionality of the hypothesized relationships between study variables tended to hold true (in accordance to Eccles et al., 1983) in that: (a) cognitive processes (i.e. interpretation of socializers' beliefs, locus of control) positively influenced motivational beliefs (i.e. task value beliefs, self-efficacy beliefs); (b) which in turn positively influenced students' mathematics-related behaviors, perseverance, and mathematics performance. One exception to the expected directionality occurred between task utility value (TUV) and mathematics performance as this path coefficient was negative for both sets of students and nonsignificant. A few other negative path coefficients were observed between the standardized control variable (ESCS) and task value beliefs (both utility and interest value)—though these coefficients were not significant for both groups of students, nor did the study hypothesize the directionality between ESCS and task value beliefs. A closer look at the path coefficients, in terms of the exogenous variables, mediating variables, and outcome variables will now be provided.

Exogenous variables. An examination of the various path coefficients emerging from the exogenous variables revealed a number of differences (in terms of coefficient strength)—a finding which provides possible insights regarding the relationship between the exogenous variables and the mediating variables. For example, when considering the path coefficients coming out of socializers' beliefs—parents (SB-P) and locus of control (LOC), the paths that emerged from these two variables where much stronger than the path coefficients coming out of socializers' beliefs—friends (SB-F)—suggesting that students' interpretation of their parents' beliefs (regarding the importance of mathematics and their interest in mathematics) and students' interpretation of their internal locus of control had a greater influence on students' motivational beliefs (i.e. TIV, TIV, MSE) than students' interpretation of their friends' mathematics beliefs and behaviors. This finding held true for both groups. Further, the strongest path coefficients to emerge out of the four exogenous variables was observed between SB-P and TUV, suggesting that parents play an important role in shaping students' task utility value beliefs. This finding held true for both groups of students with this path being slightly stronger for Latino students ($\beta = .46$) than for Caucasian students ($\beta = .44$). Next, the path from SB-P to TIV was similar for both sets of students with this path being slightly stronger for Caucasian students ($\beta = .27$) than Latino students ($\beta = .25$), suggesting that parents can also influence students' task interest value beliefs—though not as strongly as they can influence students' utility value beliefs. Lastly, the path coefficients from SB-P to MSE showed some difference between the groups of students as this path was somewhat stronger for Latino students ($\beta = .18$) compared to Caucasian students ($\beta = .12$), suggesting that Latino parents may have more of an influence on their students' efficacy beliefs that Caucasian parents. This finding may be of interest in terms of better understanding Latino students' efficacy beliefs as Latino students reported significantly lower efficacy beliefs than Caucasian students.

Next, when looking at the path coefficients to emerge from SB-F, a couple of interesting findings arose. First, the path from SB-F to MSE was non-significant for both groups of students, suggesting that having friends who value math and do well in math does not necessarily influence one's own efficacy beliefs. This finding may be of interest (in terms of the sources of efficacy) as Bandura (1997) has proposed that vicarious experiences (i.e., people who you perceive to be similar to you) to be the second strongest source of one's efficacy beliefs. Second, the paths from SB-F to TIV and TUV were fairly similar for both groups of students, though the paths from SB-F to TIV were somewhat stronger than the paths from SB-F to TUV, suggesting that friends may have a slightly stronger influence on students' interest value than on students' utility value.

Next, the paths from internal locus of control (LOC) to the mediating motivational variables also revealed some interesting findings. For instance, students' interpretation of their internal locus of control had roughly the same influence on students' interest value, though a slightly larger difference was observed between LOC and utility value with this path being stronger for Caucasian students (β = .30) than for Latino students (β = .23). Further, the paths from LOC to MSE were somewhat different for both groups of students as this path was stronger for Caucasian students (β = .35) than for Latino students (β = .25). Overall, the path coefficients that emerged from LOC to the motivational variables suggest that students' internal locus of control beliefs play a somewhat important role (in terms of the coefficient strengths) in influencing students' value and efficacy beliefs—a finding which may warrant further investigation.

Lastly, when considering the control variable of ESCS, a number of significant and non-significant paths emerged, between both ESCS and the mediating variables and ESCS and the outcome variables. When considering ESCS and the mediating variables, students' economic, social, and cultural status did not influence students' interest value beliefs or their utility value beliefs. This finding held true for both sets of students. Of interest, ESCS did influence students' value beliefs, which raises questions regarding why ESCS would influence efficacy but not task value beliefs. Further, when considering the path from ESCS to MSE, a slight difference was observed as this path was stronger for Latino students (β = .23) than for Caucasian students (β = .17). Lastly, when considering the paths from ESCS to the four outcome variables, the paths were mostly the same for both groups of students. The one exception was found between ESCS and AF (attention focusing) with this path being significant for Latino students (β = .09) but not for Caucasian students (β = .03).

Mediating variables. The paths from the mediating variables to the outcome variables also revealed a number of interesting insights. For example, the strongest paths from interest value (TIV) to the outcome variables was observed between TIV and SSME (self-sustained mathematics efforts) for both set of students, with this path being slightly stronger for Latino students ($\beta = .31$) than Caucasian students ($\beta = .27$). Further, the paths from interest value to attention focusing and perseverance were mostly the same for both groups of students, though smaller in strength when compared to the paths from TIV to SSME—highlighting the importance of interest value in influencing students' self-sustained efforts. Lastly, the paths from interest value to mathematics performance were non-significant for both groups of students.

Next, the paths emerging from task utility value (TUV) also revealed some potentially interesting findings as these paths were stronger/somewhat stronger for Caucasian students than for Latino students. The biggest difference was observed on the path from TUV to SSME as this path coefficient was more than twice as large for Caucasian students ($\beta = .26$) than for Latino students ($\beta = .11$). Further, similar to TIV, the paths from TUV to mathematics performance were not significant for either group of students, suggesting that task value beliefs can directly influence academic behaviors such as attention focusing, self-sustained efforts, and persistence, but cannot directly influence academic performance—a finding which raises questions regarding Eccles' and colleagues' initial assertion that task value beliefs directly influence academic performance (Eccles et al., 1983).

Lastly, the path coefficients that emerged from mathematics self-efficacy (MSE) also revealed some interesting findings. As expected, students' efficacy beliefs played an important in influencing students' mathematics performance as this path was (relatively) strong for both groups of students, with this path being slightly stronger for Caucasian students (β = .49) than for Latino students (β = .43). Of interest, this path coefficient for Caucasian students was the strongest observed path coefficient out of all the paths in the model. The next strongest paths from MSE were to persistence (PER) for both groups of students, with this path being of equal strength for both Latino and Caucasian students (β = .20). Next, the paths from MSE to students' self-sustained mathematics efforts (SSME) were relatively low for both groups of students, though slightly lower in strength for Caucasian students (β = .07) than for Latino students (β = .12). Lastly, the paths from MSE to attention focusing (AF) (as discussed earlier) provided one of the few differences—in terms of path being significant for one group and not the other—as this path was only significant for Latino students (β = .11).

Outcome variables. Overall, the hypothesized model explained the following variance in the outcome variables: (a) 15% of the variance ($R^2 = .15$) in attention focusing for Latino students; 18% of the variance ($R^2 = .18$) in attention focusing for Caucasian students; (b) 24% of the variance ($R^2 = .25$) in self-sustained mathematics efforts for Latino students; 27% of the variance ($R^2 = .27$) in self-sustained mathematics efforts for Caucasian students; (c) 16% of the variance ($R^2 = .16$) in persistence for Latino students; 18% of the variance ($R^2 = .18$) in persistence for Caucasian students; and (d) 27% of the variance ($R^2 = .27$) in mathematics performance for Latino students; 36% of the variance ($R^2 = .36$) in mathematics performance for Caucasian students.

Hypothesized model summary. In summary, the hypothesized model (though not up to the standards of model fit) provided some general insights regarding the hypothesized relationships between the various variables of interest, as well as provided insights in terms of how these variables functioned for Latino and Caucasian students. In general, results from the hypothesized model suggest that the variables of interest functioned mostly the same for Latino students and Caucasian students. Further, a closer look at the various path coefficients suggests that: (a) perceptions of parental beliefs (SB-P) have a greater influence on students' perceptions of task utility value (when compared to task interest value and mathematics self-efficacy); (b) perceptions of friend beliefs and actions (SB-F) have somewhat greater influence on students' perceptions of task interest value (when compared to task utility value and mathematics self-efficacy); (c) students' interpretation of their internal locus of control influenced the three motivational variables at roughly the same strength; (d) ESCS influenced students' efficacy beliefs but not their task value beliefs; (e) utility value had a weaker influence on Latino students' mathematics efforts compared to interest value; (f) interest value and utility value had nearly the same influence on Caucasian students' mathematics efforts; (g) value beliefs were a stronger influence on students' efforts when compared to students' efficacy beliefs; (h) interest and utility value beliefs influenced attention focusing at roughly the rate; (i) efficacy beliefs influenced attention focusing only for Latino students; (j) interest value beliefs influenced persistence slightly more than utility value beliefs; (k) value beliefs did not influence mathematics performance; and (l) some of the largest path coefficients were observed between efficacy beliefs and mathematics performance.

Model Re-Specification

According to Kline (2011), the re-specification of non-fitting models is part of the path analysis process. As a result, certain aspects of the hypothesized model were revisited in order to seek a better fitting model. The adjustments to the re-specified model, Model 2, are discussed below.

Model 2 specification. The first step to re-specify the model was to drop the paths between task utility value (TUV) and mathematics performance and task interest value (TIV) and mathematics performance as these coefficients were not significant for either group of students. In doing this, there is support from the expectancy-value literature as the direct relationship between task values and academic performance is mixed as some publications have noted that task values do not directly influence performance (Lee, Lee, & Bong, 2014; Pintrich & De Groot, 1990; Pintrich et al., 1994), while a smaller number of publications have found a direct relationship between task value and performance (Bong, 2001). Second, the paths between the control variable (ESCS) and task values (TIV, TUV) were dropped as they were non-significant for both groups of students. Third, having four outcome variables (AF, SSME, PER, MATH) (as prescribed by Eccles et al., 1983) was reconsidered as: (a) a case can be made that academic performance is the ultimate outcome variable of interest within educational research; (b) the Latino achievement gap (which is generally measured in terms of academic performance) was the main motivator for this study, thus it makes sense to have academic performance as the ultimate outcome variable; and (c) there is support from the motivational and self-regulatory literature that students' academic behaviors (attention focusing, self-sustained efforts) and persistence directly influence students' academic performance (Schunk et al., 2008).

Changes in model structure. In making these adjustments to the hypothesized non-fitting model (see Figure 4 for Model 2), the structure of the model changed as: (a) three former outcome variables (AF, SSME, PER) became mediating variables between the expectancy-value variables (TIV, TUV, MSE) and mathematics performance; and (b) task values, whose direct paths to mathematics performance were removed for Model 2, are now reconnected (indirectly) to mathematics performance through AF, SSME, and PER. The direct path from MSE to mathematics performance was retained given the support in the literature for this direct path (Schunk et al., 2008; Schunk & Zimmerman, 2008).

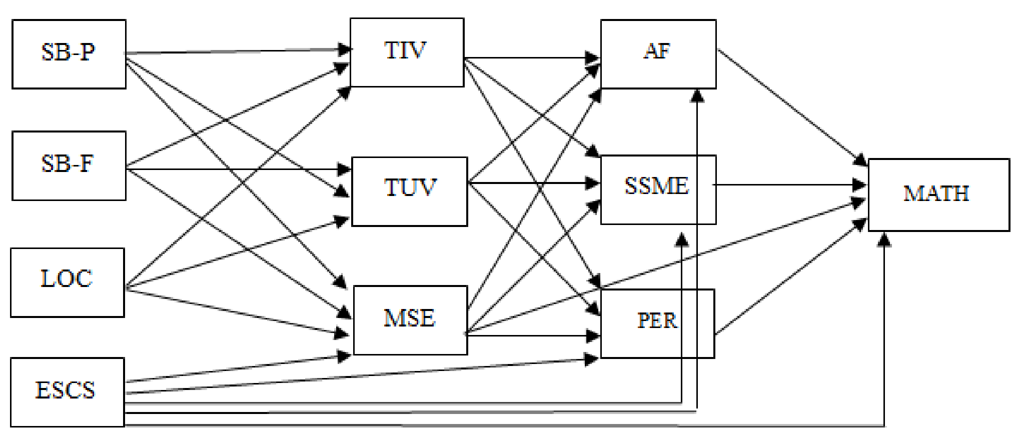

Figure 5. Model 2. ESCS = PISA index (standardized) of economic, social, and cultural Status (control variable); SB-P = Socializer's beliefs–parents; SB-F = Socializer's

beliefs–friends; LOC = Locus of control; TIV = Task interest value; TUV = Task utility value; MSE = Math self-efficacy; AF = Attention focusing; SSME = Self-sustained mathematics efforts; PER = Persistence; MATH = Mathematics performance (plausible value

Model 2 fit analysis. Model 2 was tested with the same combined subsample of U.S. high school students (n = 2,488). Fit statistics suggest that this model did fit the data: CFI = .976, TLI = .903, RMSE = .048 [.042, .054], $\chi^2(32) = 216.48$, $p < .001$ (Hu & Bentler, 1999; Schreiber et al., 2006). A chi-square difference test of the hypothesized model and Model 2 suggests that Model 2 is a better fitting model. A closer look at the various path coefficients is presented below.

Model 2 results. Overall, a total of 27 path parameters were tested for Model 2 (see Figure 5). Of these, 23 parameters were significant for both Caucasian and Latino students. A closer look at the various path coefficients reveals that most of the path coefficients tended to stay the same when compared to the initial hypothesized model (see Table 24, parameter changes in bold). All changes in the path coefficients were within ± 1 point of the original coefficient—with the exception of the path between MSE and MATH (for Caucasian students) which increased by three points.

Next, when considering differences in path coefficients (in terms of significant/non-significant paths) by group membership, a few more differences arose as the paths from SSME to MATH and the path from PER to MATH were significant for Caucasian students but not for Latino students. In general, Model 2 maintained the directionality of the hypothesized model, though some unexpected changes (in terms of directionality) occurred between the new set of mediating variables (AF, SSME, PER) and the outcome variable of mathematics performance. A more detailed discussing of the results of Model 2 is presented below.

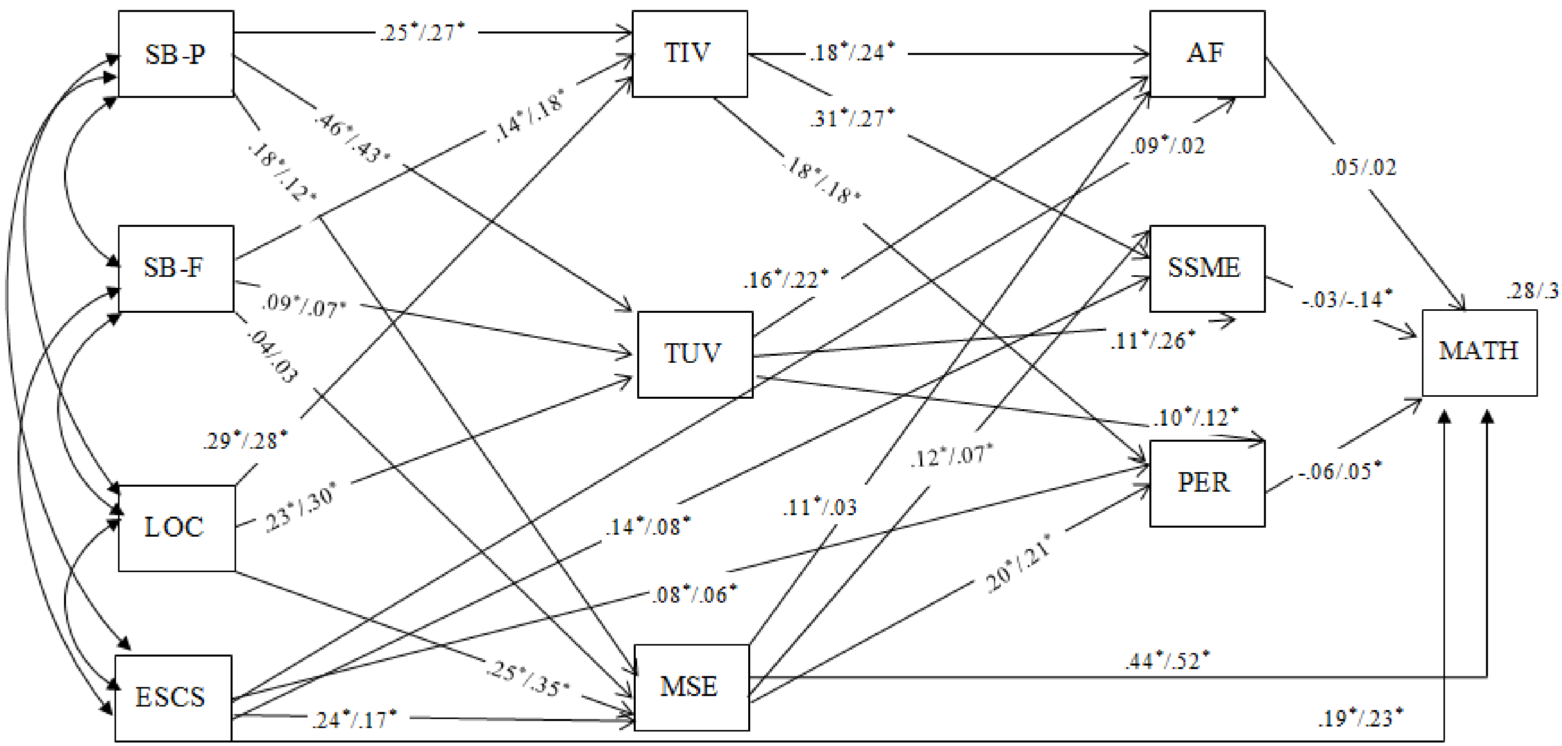

Figure 6. Multiple-group (Hispanic/Caucasian) estimation of Model 2. ESCS = PISA index of economic, social, and cultural Status (standardized); SB-P = Socializer's Beliefs–Parents; SB-F = Socializer's Beliefs–Friends; LOC = Locus of Control; TIV = Task Interest Value; TUV = Task Utility Value; MEE = Math Efficacy Expectancies; AF = Attention Focusing; SSME = Self-Sustained Math Efforts; PERS = Persistence; Performance = 2012 PISA Math Performance Mean Score (plausible value 4). *$p < .05$

Table 24

Standardized Path Coefficients for Model 2

Variables	Hispanic Students (n = 781)		Caucasian Students (n = 1,707)	
	β	p	β	p
SB-P → TIV	.25	< .001	.27	< .001
SB-P → TUV	.46	< .001	.43	< .001
SB-P → MSE	.18	< .001	.12	< .001
SB-F → TIV	.14	< .001	.18	< .001
SB-F → TUV	.09	.002	.07	.001
SB-F → MSE	.04	.20	.03	.16
LOC → TIV	.29	< .001	.28	< .001
LOC → TUV	.23	< .001	.30	< .001
LOC → MSE	.25	< .001	.35	< .001
ESCS → MSE	.24	< .001	.17	< .001
ESCS → AF	.09	.01	.02	.28
ESCS → SSME	.14	< .001	.08	< .001
ESCS → PER	.08	.02	.06	.004
ESCS → MATH	.19	< .001	.23	< .001
TIV → AF	.18	< .001	.24	< .001
TIV → SSME	.31	< .001	.27	< .001
TIV → PER	.18	< .001	.18	< .001
TUV → AF	.16	< .001	.22	< .001
TUV → SSME	.11	.01	.26	< .001
TUV → PER	.10	.02	.12	< .001
MSE → AF	.11	.01	.03	.28
MSE → SSME	.12	< .001	.07	.003
MSE → PER	.20	< .001	.21	< .001
MSE → MATH	.44	< .001	.52	< .001
AF → MATH	.05	.26	.02	.38
SSME → MATH	-.03	.42	-.14	< .001
PER → MATH	-.06	.10	.05	.02

Exogenous variables. In general, not much changed in terms of the relationship between the exogenous variables and the mediating variables for Model 2. A few minor changes in coefficient strengths were observed as: (a) the path from SB-P to TUV decreased from .44 (β = .44) to .43 (β = .43) for Caucasian students; (b) the path from LOC to TIV decreased from .30 (β = .30) to .29 (β = .29) for Latino students and decreased from .29 (β = .29) to .28 (β = .28) for Caucasian students; and (c) the path from ESCS to MSE increased from .23 (β = .23) to .24 (β = .24) for Caucasian students. Overall, the results (as reported in the hypothesized model) remain largely the same as: (a) SB-P and LOC had a stronger influence on motivational variables compared to SB-F; (b) the strongest paths were from SB-P to TUV for both groups of students; (c) the paths from SB-F to MSE remained non-significant for both groups of students; (d) the path from LOC to MSE remained stronger for Caucasian students .35 (β = .35) than for Latino students .25 (β = .25); and (e) the paths from the control variable (ESCS) to MSE, AF, SSME, PER, and MATH remained largely the same with the exception of the path from ESCS to MSE which increased by one point for Caucasian students.

Mediating variables. Similar to the exogenous variables, the paths from the mediating expectancy-value variables (TIV, TUV, MSE) to the new mediating variables (AF, SSME, PER) remained largely the same for both groups of students. A few exceptions were observed as: (a) the path from MSE to PER increased from .20 (β = .20) to .21 (β = .21) for Latino students and (b) the paths from MSE to MATH increased from .43 (β = .43) to .44 (β = .44) for Latino students and increased from .49 (β = .49) to .52 (β = .52) for Caucasian students. Overall, results (as reported in the hypothesized model) remained largely the same as: (a) the paths from TIV to AF were slightly stronger (for both groups of students) compared to the paths from TUV to AF, suggesting that interest value may be a somewhat stronger influencer of attention focusing; (b) TIV was a stronger predictor (β = .31) of SSME than TUV (β = .11) for Latino students, while the paths from TIV and TUV to SSME were roughly the same for Caucasian students; (c) TIV was a stronger influencer of PER than TUV for both groups of students; (d) MSE is a weaker influencer of AF and SSME compared to task values for both groups of students; and (e) MSE was a somewhat stronger influencer of PER compared to TIV and TUV for both groups of students.

Next, the paths from the former outcome variables (now mediating variables: AF, SSME, PER) to the outcome variable revealed some interesting—and—unexpected findings. First, the path from AF to MATH was non-significant for both groups of students. The directionality of this path (positive) was as expected as the ability focus one's attention (academically) ought to positively influence academic performance (Zimmerman, 2000). Second, the path from SSME to MATH was significant for only Caucasian students -.14 (β = -.14), though this path was negative for both sets of students—an unexpected finding given the positive relationship that is usually observed been student effort and academic performance (Schunk et al., 2008). Possible explanations regarding this unexpected finding will be discussed in more detail in Chapter Five. Lastly, results from the path between PER and MATH was also mixed as this path was only significant for Caucasian students (β = .05), while this path was negative for Latino students (β = -.06). This negative path was also unexpected as persistence is also generally believed to positively influence students' academic performance (Schunk et al., 2008). This unexpected will also be further discussed in Chapter Five.

Outcome variable. Overall, Model 2 explained 28% (R^2 = .28) of the variance in Latino students' mathematics performance, a slight increase in the amount of variance explained by the hypothesized model (R^2 = .27). For Caucasian students, Model 2 explained 37% (R^2 = .37) of the variance in mathematics performance, a slight increase over the hypothesized model (R^2 = .36).

Model 2 summary. In general, Model 2 improved on the hypothesized model. Not only did the Model 2 fit the data, the strong fit statistics (CFI = .977, TLI = .904, RMSE = .039 [.034, .044]) suggests that Model 2 is a well-fitting model. Further, Model 2 increased the amount of variance explained in students' mathematics performance, another indicator that Model 2 was improvement over the hypothesized. However, although well fitting, the unexpected negative path coefficients from SSME to MATH (for both groups of students), the negative path coefficient from PER to MATH (for Latino students), and the relatively low path coefficients to emerge from AF, SSME, and PER to MATH raises questions regarding AF, SSME, and PER as direct predictors of mathematics performance. A further discussion of Model 2 weaknesses will be further discussed in Chapter Five.

Model 3

According to Kline (2011), another step of the testing of path analysis models is to consider alternative paths between variables of interest. As such, a number of unaccounted alternative paths (from Model 2) were considered in Model 3. More specifically, direct paths from the exogenous variables (SB-P, SB-F, LOC) to AF, SSME, and PER were tested. In testing these paths, there is evidence that social influences (e.g., parents, friends) and locus of control can directly influence variables such as attention focusing, self-sustained efforts, and persistence (Schunk et al., 2008). In testing these alternative paths, it is important to point out that the Eccles et al. (1983) model did not posit direct paths from socializers' beliefs nor from locus of control to academic behaviors and academic performance. Accordingly, the testing of these additional paths was exploratory in nature, though there is literature to support the exploration of these alternative paths (Schunk et al.).

Model 3 re-specification. For Model 3, three additional direct paths were tested from each of the exogenous variable (SB-P, SB-F, LOC) to AF, SSME, and PER, for a total of nine additional paths (see Figure 6 below for model parameters). In doing so, Model 3 tested a partially mediated model. The nine additional paths were all tested at the same time.

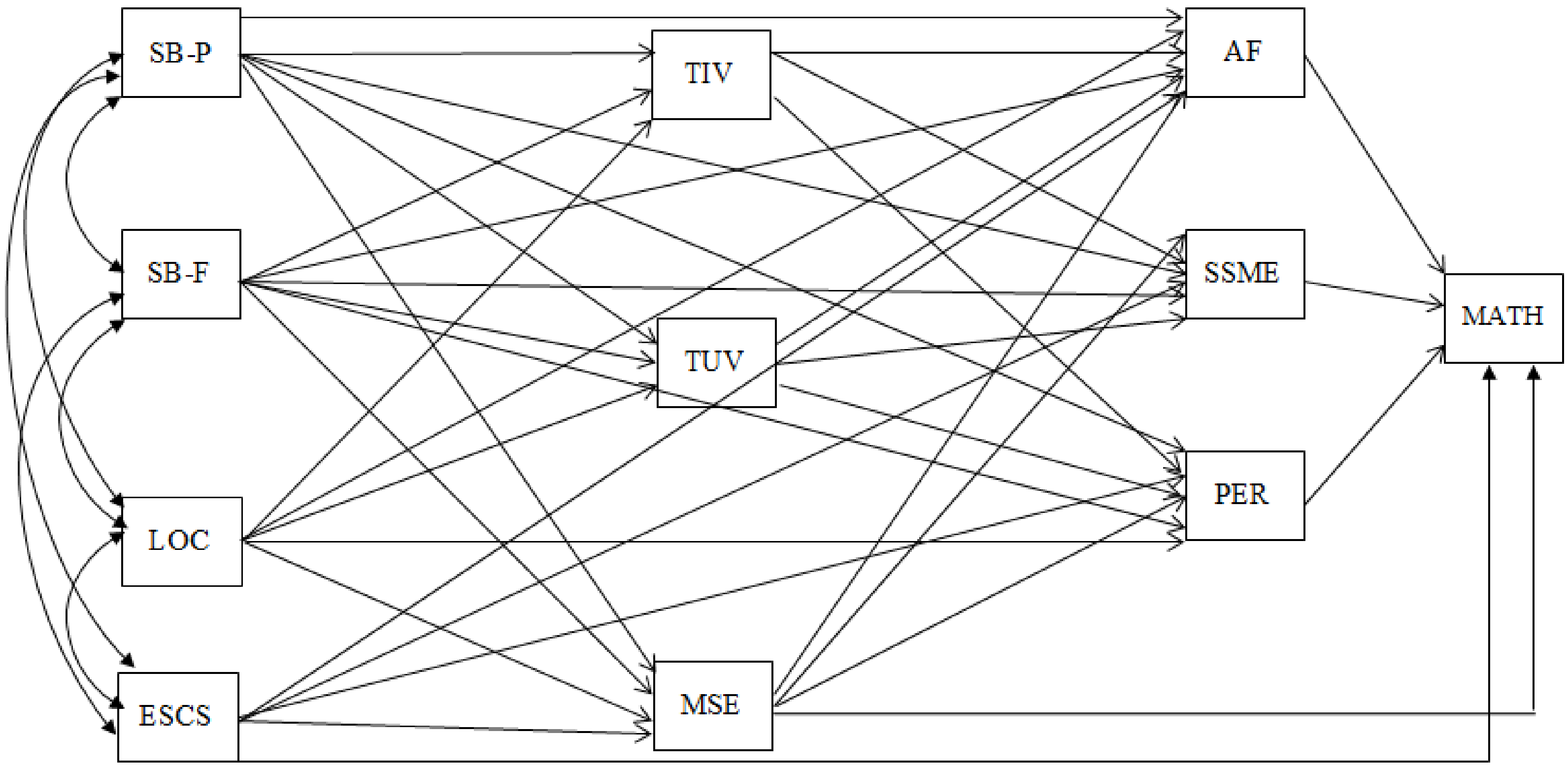

Figure 7. Model 3 parameters. ESCS = PISA index of economic, social, and cultural Status (standardized); SB-P = Socializer's Beliefs–Parents; SB-F = Socializer's Beliefs–Friends; LOC = Locus of Control; TIV = Task Interest Value; TUV = Task Utility Value; MEE = Math Efficacy Expectancies; AF = Attention Focusing; SSME = Self-Sustained Math Efforts; PERS = Persistence; Performance = 2012 PISA Math Performance Mean Score (plausible value 4).

Model 3 fit analysis. In terms of model fit, Model 3 was similar to Model 2 as the following fit statistics were obtained: CFI = .989, TLI = .901, and RMSEA = .049 [.040, .058], $\chi^2(14) = 96.28$, $p < .001$. Although similar, a chi square difference test showed that Model 3 was significantly different than Model 2 (see Table 27). Results from these additional paths are presented below. See Table 25 (below) for multi-group path coefficient results.

Table 25

Standardized Path Coefficients for Model 3

Variables	Hispanic Students (*n* = 781)		Caucasian Students (*n* = 1,707)	
	β	*p*	β	*p*
SB-P → TIV	.25	< .001	.27	< .001
SB-P → TUV	.46	< .001	.43	< .001
SB-P → MSE	.18	< .001	.12	< .001
SB-P → AF	.07	.09	.002	.94
SB-P → SSME	.02	.68	.01	.63
SB-P → PER	.08	.03	.03	.24
SB-F → TIV	.14	< .001	.18	< .001
SB-F → TUV	.09	.002	.07	.001
SB-F → MSE	.04	.20	.03	.16
SB-F → AF	-.05	.14	.10	< .001
SB-F → SSME	.07	.02	.10	< .001
SB-F → PER	.01	.71	.07	.004
LOC → TIV	.30	< .001	.28	< .001
LOC → TUV	.23	< .001	.30	< .001
LOC → MSE	.25	< .001	.35	< .001
LOC → AF	.11	.004	.13	< .001
LOC → SSME	.14	< .001	.13	< .001
LOC → PER	.09	.02	.10	< .001

ESCS → MSE	.25	< .001	.17	< .001
ESCS → AF	.09	.01	.02	.28
ESCS → SSME	.12	< .001	.08	< .001
ESCS → PER	.08	.02	.06	.004
ESCS → MATH	.23	< .001	.23	< .001
TIV → AF	.17	< .001	.19	< .001
TIV → SSME	.27	< .001	.22	< .001
TIV → PER	.16	< .001	.14	< .001
TUV → AF	.11	.02	.17	< .001
TUV → SSME	.07	.14	.20	< .001
TUV → PER	.04	.39	.06	.06
MSE → AF	.08	.01	-.001	.79
MSE → SSME	.10	< .001	.04	.15
MSE → PER	.17	< .001	.18	< .001
MSE → MATH	.43	< .001	.51	< .001
AF → MATH	.04	.27	.02	.38
SSME → MATH	-.03	.44	-.14	< .001
PER → MATH	-.06	.11	.05	.02

Model 3 results. Model 3 tested a total of 36 parameters. 27 of these parameters were significant for Caucasian students while 26 parameters were significant for Latino students (see Table 25). Although Model 3 was similar to Model 2 (in terms of model fit), the introduction of direct effects (partial mediation) between the exogenous variables (SB-P, SB-F, LOC) and the behavior variables (AF, SSME, PER) changed the relationships between the expectancy-value variables (TIV, TUV, MSE) and the behavior variables (AF, SSME, PER). In general, two main findings arose from Model 3: (a) the addition of the nine direct paths from the exogenous variables to behavior variables (AF, SSME, PER) lessened the effects of the expectancy-value variables (TIV, TUV, MSE) on the behavior variables and (b) the remaining paths stayed largely the same.

When considering the first general finding, all of the paths from TIV to the behavior variables decreased in strength (for both groups of students), with decreases ranging between one point and five points. Similarly, all the paths from TUV to the behavior variables also decreased in strength (for both group of students), with coefficients decreasing between four and six points (more pronounced drop in coefficient strengths). Lastly, the paths from MSE to the behavior variables also decreased in strength (for both groups of students), with coefficients decreasing between two and three points. A closer look at the effects of the added paths is presented below.

Paths from SB-P. The addition of the direct paths from SB-P to AF, SSME, and PER did not add much to the model. For Latino students, the path from SB-P to PER was significant ($\beta = .08$), though the other two paths (SB-P to AF, SB-P to SSME) were not significant. Further, none of the above mentioned paths were significant for Caucasian students. In general, results suggest that students' interpretation of their parents' mathematics value beliefs did not seem to influence students' mathematics related behaviors, with the exception of the path from SB-P to PER for Latino students (which was small in effect size).

Paths from SB-F. The addition of the direct paths from SB-F to the behavior variables yielded some interesting results as difference arose in terms of group membership. For example, for Caucasian students, all three additional paths were significant (SB-F to AF: $\beta = .08$; SB-F to SSME: $\beta = .10$; SB-F to PER: $\beta = .07$), while only one path was significant (SB-F to SSME: β = .07) for Latino students. In general, it appears that Caucasian students' interpretation of their friends doing well in math/liking math/working hard at math had more of an influence on their own behaviors when compared to Latino students. This finding may warrant further attention as it is not clear why peer influences would vary as a result of group membership.

Paths from LOC. Lastly, the addition of the three direct paths from LOC to the behavior variables proved beneficial as all three of paths were significant for both groups of students. In general, the strengths of these paths were similar for both groups of students (Latino students: LOC to AF: β = .11; LOC to SSME: β = .14; LOC to PER: β = .09) (Caucasian students: LOC to AF: β = .13; LOC to SSME: β = .13; SB-F to PER: β = .10), suggesting that internal locus of control function similarly for both groups (in terms of its effect on academic behaviors).

Model 3 summary. As an alternative model, Model 3 helped shed light on the relationship between students' cognitive interpretations, their expectancy-value beliefs, and their academic behaviors. Seeing how the direct effects lessened from the expectancy-value beliefs to the behavior variables (all the paths, no exceptions) as a result of including the additional direct paths may have theoretical implications. For example, given that the paths from SB-P were mostly non-significant, either the influence of friends or the influence of locus of control beliefs helped account for the changes between the expectancy-value beliefs and behaviors. Further, as all the paths from LOC to the behavior variables were significant, it appears that locus of control beliefs play a noticeable role in influencing students' academic behaviors.

Lastly, when considering the outcome variable of mathematics performance, Model 3 did not explain any additional variance in performance for either group of students as both Models 2 and 3 explained 37% (R^2 = .37) of the variance in Caucasian students' mathematics performance and 28% (R^2 = .28) of the variance in Latino students' mathematics performance

Model 4

Lastly, and following the same rationale established for assessing Model 3, Model 4 also considered a set of alternative (unaccounted for) direct paths. For Model 4, direct paths were tested from the exogenous variables (SB-P, SB-F, LOC) to the outcome variable of mathematics performance (MATH). These set of alternative paths were tested separately from Model 3 in an effort not saturate the model. In doing so, there is theoretical support for examining the effects of social influences (e.g., parents, friends) and locus of control on mathematics performance as there is evidence that these variables can directly influence academic performance (Schunk et al., 2008). Further, and similar to Model 3, the Eccles et al. (1983) model did not posit direct paths from socializers' beliefs nor from locus of control to academic performance. Accordingly, the testing of these additional paths was exploratory in nature, though there is theoretical support for the exploration of these alternative paths (Schunk et al.).

Model 4 re-specification. For Model 4, three additional direct paths were tested from each of the exogenous variable (SB-P, SB-F, LOC) to the outcome variable of mathematics performance (MATH). A total of three additional paths were tested: SB-P to MATH, SB-F to MATH, and LOC to MATH. In doing so, Model 4 also tested for a partially mediated model. The three additional paths were all tested at the same time (see Figure 7 below for model parameters).

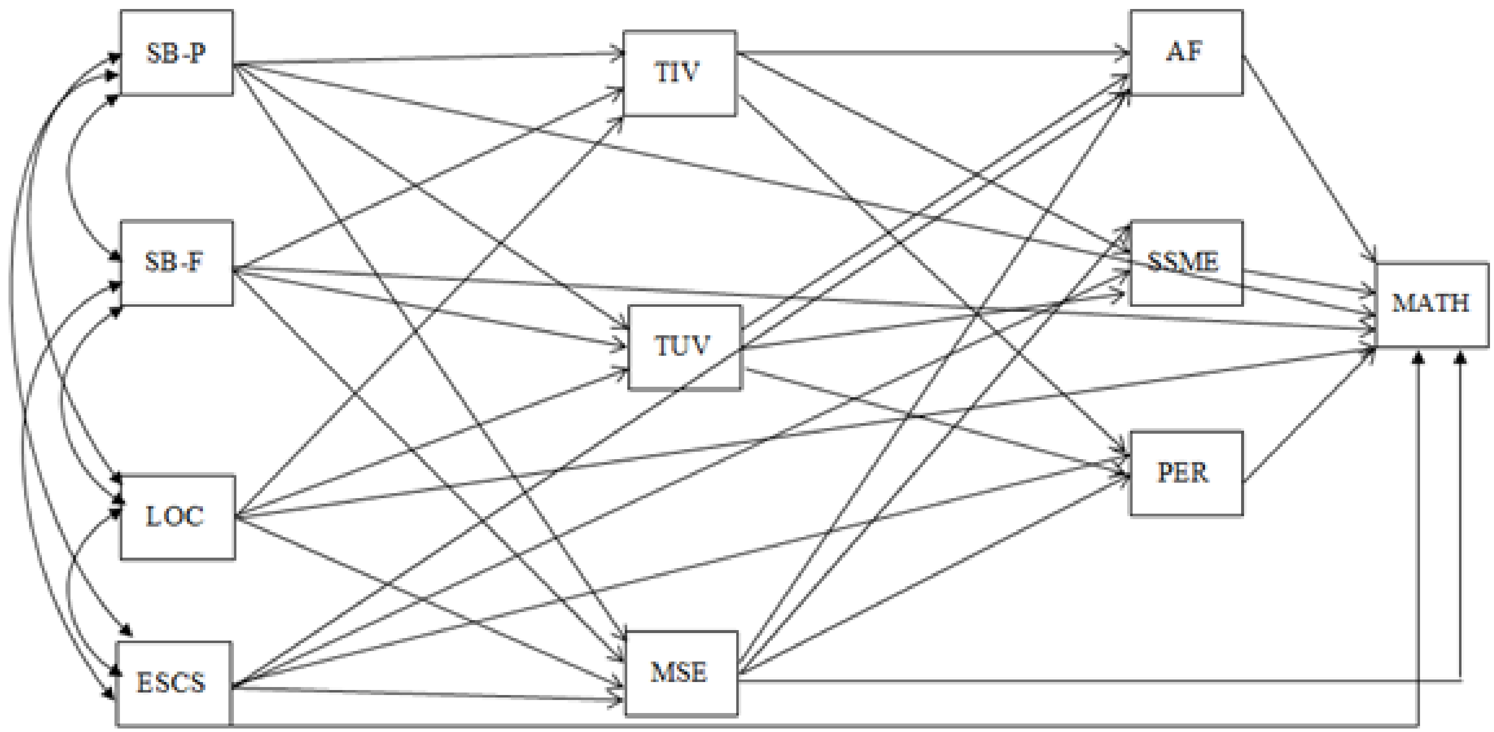

Figure 8. Model 4 parameters. ESCS = PISA index of economic, social, and cultural Status (standardized); SB-P = Socializer's Beliefs–Parents; SB-F = Socializer's Beliefs–Friends; LOC = Locus of Control; TIV = Task Interest Value; TUV = Task Utility Value; MEE = Math Efficacy Expectancies; AF = Attention Focusing; SSME = Self-Sustained Math Efforts; PERS = Persistence; Performance = 2012 PISA Math Performance Mean Score (plausible value 4)

Model 4 fit analysis. In terms of model fit, Model 4 was similar to Models 2 and 3 as the following fit statistics were obtained: CFI = .985, TLI = .925, and RMSEA = .042 [.036, .049], $\chi^2(26) = 142.07$, $p < .001$. A chi-square difference test suggests that Model 4 is significantly different from Models 2 and 3 (see Table 27). Results from these additional paths are presented below. See Table 26 (below) for multi-group path coefficient results.

Table 26

Standardized Path Coefficients for Model 4

Variables	Hispanic Students (n = 781)		Caucasian Students (n = 1,707)	
	β	*p*	β	*p*
SB-P → TIV	.25	< .001	.27	< .001
SB-P → TUV	.46	< .001	.43	< .001
SB-P → MSE	.18	< .001	.12	< .001
SB-P → MATH	-.06	.07	.001	.97
SB-F → TIV	.14	< .001	.18	< .001
SB-F → TUV	.09	.003	.07	.001
SB-F → MSE	.04	.21	.03	.16
SB-F → MATH	-.14	< .001	-.11	< .001
LOC → TIV	.30	< .001	.28	< .001
LOC → TUV	.23	< .001	.30	< .001
LOC → MSE	.25	< .001	.35	< .001
LOC → MATH	.09	.007	.09	< .001
ESCS → MSE	.25	< .001	.18	< .001
ESCS → AF	.09	.01	.02	.29
ESCS → SSME	.14	< .001	.08	< .001
ESCS → PER	.08	.02	.06	.004

ESCS → MATH	.22	< .001	.23	< .001
TIV → AF	.18	< .001	.23	< .001
TIV → SSME	.31	< .001	.27	< .001
TIV → PER	.18	< .001	.18	< .001
TUV → AF	.16	.02	.22	< .001
TUV → SSME	.11	.008	.26	< .001
TUV → PER	.10	.02	.12	< .001
MSE → AF	.11	.006	.03	.27
MSE → SSME	.12	< .001	.07	.15
MSE → PER	.20	< .001	.21	< .001
MSE → MATH	.43	< .001	.49	< .001
AF → MATH	.03	.47	.02	.35
SSME → MATH	-.01	.74	-.14	< .001
PER → MATH	-.05	.14	.05	.02

Model 4 results. Model 4 tested a total of 30 parameters. 24 of these parameters were significant for Caucasian students while 25 parameters were significant for Latino students (see Table 26). The addition of the three direct paths from the exogenous variables (SB-P, SB-F, LOC) to the outcome variable (MATH) provided some insights regarding the relationship between students' cognitive processes and students' mathematics performance. First, the path from SB-P to MATH was not significant for either group of students (Latino students: $\beta = -.06$; Caucasian students: $\beta = .001$). Next, the path from SB-F to MATH was significant for both groups of students (Latino students: $\beta = -.14$; Caucasian students: $\beta = -.11$)—however both of these paths were negative in directionality. This was an unexpected finding as common sense would suggest that having friends who: (a) work hard in mathematics, (b) do well in mathematics, and (c) enjoy mathematics would have a positive influence on one's own performance. Not only that, there is evidence that positive peer groups (particularly friends) have a positive effect on one's performance (Schunk et al., 2008)—however this was not the case. Lastly, the path from LOC to MATH was significant for both groups of students (Latino students: $\beta = .09$; Caucasian students: $\beta = .09$)—a finding which further highlights the importance of students' internal locus of control beliefs. Further, this finding adds to the larger purpose of this study in that it provides (some) evidence that internal locus of control beliefs function as expected (Schunk et al., 2008; Weiner, 1986; 1990) with U.S. Latino students.

Model 4 summary. In general, Model 4 provided some limited findings. Model 4 was able to account for slightly more variance in the outcome variable. For Latino students, Model 4 accounted for 31% ($R^2 = .31$) in students' mathematics performance, a three point increase over Models 2 and 3. However, given that the significant path from SB-F to MATH was negative (and stronger than the path from LOC), it is unclear how much of the extra explained variance is supported by theory. For Caucasian students, Model 4 accounted for 38% of the variance in MATH, a one-point increase over Models 2 and 3—though the same limitation listed above for Latino students also applies to Caucasian students.

Comparison of Models

Lastly, a comparison of the four models was conducted in order to assess if the models significantly varied from each other. Using the chi-square difference test, the four models were compared. Overall, the four models were found to be significantly different from each other.

Table 27

Comparison of the Four Models

Model	χ^2	*df*	CFI	TLI	RMSEA	$\Delta\chi^2$	AIC	BCC
Model 1	1195.19	36	.852	.456	.114		1431.19	1433.90
Model 2	216.48	32	.976	.903	.048	978.71**	460.48	463.28
Model 4	142.07	26	.985	.925	.042	74.41**	398.07	401.02
Model 3	96.28	14	.989	.901	.049	45.79**	376.28	379.50

Note. ** $p < .01$.

Research Question Results

Having completed the model building process, the research questions first posited in Chapter One are now addressed. In doing so, results from Model 2 are used to answer the research questions as Models 3 and 4 were assessed in terms of alternative models.

RQ1: Do U.S. Latino high school students' expectancy and task value beliefs (e.g. interest value and utility value) predict students' attention focusing, self-sustained mathematics efforts, persistence, and mathematics performance? Results from Model 2 suggest mixed findings to RQ1. For example, Latino students' task value beliefs (TIV, TUV) predicted: (a) attention focusing (TIV: $\beta = .18$; TUV: $\beta = .16$), (b) self-sustained mathematics efforts (TIV: $\beta = .31$; TUV: $\beta = .11$), and (c) persistence (TIV: $\beta = .18$; TUV: $\beta = .10$)—but failed to predict mathematics performance (both TIV and TUV). Next, self-efficacy beliefs predicted Latino students': (a) attention focusing (β

= .11), (b) self-sustained mathematics efforts (β = .12); (c) persistence (β = .20), and (d) mathematics performance (β = .44). Overall, these findings suggest that task value beliefs directly influence Latino students' academic behaviors (AF, SSME, PER) but not their mathematics performance, while efficacy beliefs predicted both academic behaviors and mathematics performance.

RQ2: Of the two dimensions of task value beliefs (interest value, utility value) being considered, which is a stronger predictor of Latino students' academic behaviors (e.g. attention focusing, self-sustained efforts, persistence) and mathematics performance? Results from Model 2 suggest that task interest value is a stronger predictor of Latino students' academic behaviors than task utility value as the three paths from task interest value to AF (β = .18), SSME (β = .31), PER (β = .18) were all stronger when compared to the paths that emerged from task utility value to AF (β = .16), SSME (β = .11), and PER (β = .10). Of interest, the most pronounced difference occurred with students' self-sustained mathematics efforts as the path from task interest value (β = .31) was almost three times as strong as the path from utility value to SSME (β = .11). For attention focusing, interest value (β = .18) was only marginally stronger than utility value (β = .16), suggesting that interest value and utility value function similarly in predicting Latino students' attention focusing behaviors. Next, when considering persistence, interest value was a somewhat stronger predictor (β = .18) compared to utility value (β = .10), suggesting that Latino students' perceptions of interest tends to matter more in influencing their academic behaviors. Lastly, as mentioned under RQ1, neither task utility value nor task interest value predicted students' mathematics performance—suggesting that task values on their own do not directly influence academic performance—a contrast from Eccles' and colleagues' initial assertion that task values directly influence performance (Eccles et al., 1983).

RQ3: What are the direct effects of Latino students' interpretations of socializers' beliefs (SB-P, SB-F) and locus of control (LOC) beliefs on students' expectancy and value beliefs (TIV, TUV, MSE)? Results from Model 2 provide a number of insights regarding the relationships between the cognitive processes variables (SB-P, SB-F, LOC) and the expectancy-value variables (TIV, TUV, MSE). As described earlier in this chapter, differences emerged in terms of how the cognitive processes affected the expectancy-value variables. For instance, Latino students' interpretation of their parental beliefs and interests (regarding mathematics) had a strong influence ($\beta = .46$) on their perceptions of task utility value. The path from SB-P to TUV was nearly twice as strong as the path from SB-P to TIV ($\beta = .25$), suggesting that Latino parents can more strongly influence perceptions of utility value than influence perceptions of interest value. Of interest, the path from SB-P to students' mathematics self-efficacy beliefs ($\beta = .18$) was somewhat weak (compared to the other paths), suggesting that parental value beliefs may be limited in influencing efficacy beliefs.

Next, the paths that emerged from Latino students' interpretation of their friends' mathematics beliefs and actions (SB-F) to their expectancy-value beliefs were fairly weak (when compared to the paths that emerged from SB-P), suggesting that parents may have a stronger influence on expectancy-value beliefs than friends among Latino students. Of interest, the path from SB-F to MSE was non-significant—a surprising finding as a theoretical argument can be made that having friends who "do well in math" and "work hard in mathematics" should influence one's efficacy beliefs in terms of vicarious learning—which is believed to be the second strongest source of one's efficacy beliefs (Bandura, 1997). Lastly, Latino students' interpretation of their internal locus of control (LOC) beliefs influenced the expectancy-value variables at roughly the same the rate—a finding which suggests that locus of control beliefs may be an avenue from which to influence to students' efficacy and task value beliefs.

RQ4: What are the indirect effects of Latino students' interpretations of socializers' beliefs (SB-P, SB-F) and locus of control beliefs (LOC) on students' academic behaviors (AF, SSME, PER) and mathematics performance? In answering RQ4, a couple of unexpected findings made answering this question a bit difficult. First, this question is framed in terms of the original hypothesized model which posited both academic behaviors and performance as outcome variables (a model which did not fit the data). Second, when adjusting the structure of the non-fitting hypothesized model (see Figure 5), two of the paths coefficients from the new mediating variables (SSME, PER) were negative, an unexpected finding which complicates the calculation of the indirect effects (that go through SSME and PER to MATH) as these effects are negative—a directionality which is not supported by academic motivation literature (Schunk et al., 2008). Third, the path from AF to MATH was non-significant, which further complicates the calculation of total indirect effects. Accordingly, indirect effects were only calculated from the exogenous variables (SB-P, SB-F, LOC) to the newly mediating variables of

Model 2 (AF, SSME, PER) (see Figure 5 for Model 2 parameters). Table 28 lists the indirect effect results.

Table 28

Indirect Effects

Total Indirect Effects	Latino Students	Caucasian students
SB-P → TIV → AF	.25 x .18 = .045	.27 x .24 = .065
SB-P → TUV → AF	.46 x .16 = .074	.43 x .22 = .095
SB-P → MSE → AF	.18 x .11 = .019	.12 x .03 = .004
SB-F → TIV → AF	.14 x .18 = .025	.18 x .24 = .043
SB-F → TUV → AF	.09 x .16 = .014	.07 x .22 = .015
SB-F → MSE → AF	.04 x .11 = .004	.03 x .03 = .001
LOC → TIV → AF	.29 x .18 = .052	.28 x .24 = .067
LOC → TUV → AF	.23 x .16 = .037	.30 x .22 = .066
LOC → MSE → AF	.25 x .11 = .028	.35 x .03 = .011
SB-P → TIV → SSME	.25 x .31 = .078	.27 x .27 = .073
SB-P → TUV → SSME	.46 x .11 = .051	.43 x .26 = .112
SB-P → MSE → SSME	.18 x .12 = .022	.12 x .07 = .008
SB-F → TIV → SSME	.14 x .31 = .043	.18 x .27 = .049
SB-F → TUV → SSME	.09 x .11 = .010	.07 x .26 = .018
SB-F → MSE → SSME	.04 x .12 = .005	.03 x .07 = .002
LOC → TIV → SSME	.29 x .31 = .090	.28 x .27 = .076
LOC → TUV → SSME	.23 x .11 = .025	.30 x .22 = .067
LOC → MSE → SSME	.25 x .12 = .030	.35 x .07 = .025
SB-P → TIV → PER	.25 x .18 = .045	.27 x .18 = .049
SB-P → TUV → PER	.46 x .10 = .046	.43 x .12 = .052
SB-P → MSE → PER	.18 x .20 = .036	.12 x .21 = .025
SB-F → TIV → PER	.14 x .18 = .025	.18 x .18 = .032
SB-F → TUV → PER	.09 x .10 = .009	.07 x .12 = .008
SB-F → MSE → PER	.04 x .20 = .008	.04 x .21 = .008
LOC → TIV → PER	.29 x .18 = .052	.28 x .18 = .050
LOC → TUV → PER	.23 x .10 = .023	.30 x .12 =.036
LOC → MSE → PER	.25 x .20 = .050	.35 x .21 = .074

SB-P → MSE → MATH	.18 x .44 = .08	.12 x .52 = .06
LOC → MSE → MATH	.25 x .44 = .11	.35 x .52 = .18

Note. SB-P = Socializer's beliefs-parents; SB-F = Socializer's beliefs-friends; LOC = Locus of control; AF = Attention focusing; SSME = Self-sustained mathematics efforts; PER = Persistence.

Overall, a total of nine indirect effects were calculated between the exogenous variables of SB-P, SB-F, and LOC and the mediating variables of AF, SSME, and PER. When considering Latino students' attention focusing (AF), the strongest indirect effect was observed from SB-P through TUV (*ab* = .07), suggesting that students' interpretation of their parents' mathematics value beliefs (SB-P), through students' task utility value beliefs more strongly influenced attention focusing than the other indirect effects calculated. Next, when considering Latino students' self-sustained mathematics efforts (SSME), the strongest indirect effect was observed from locus of control, through task interest value (*ab* = .09), suggesting that perceptions of internal locus of control can operate through students' interest value in influencing students' effort. The path from SB-P through TIV (*ab* = .08) was a close second, suggesting that parental influences, through Latino students' interest value, can influence their self-sustained mathematics efforts. Lastly, when considering Latino students' persistence, three indirect paths emerged as nearly identical in strength: LOC through TIV (*ab* = .052), SB-P through TUV (*ab* = .046), and SB-P through TIV (*ab* = .045), suggesting that there are various through which to indirectly influence students' persistence beliefs.

RQ5: Are there significant differences in the relationships established by RQs 1-4 between Latino and Caucasian students? In terms of RQ1, the mixed findings that: (a) task values predicted mathematics behaviors, but not mathematics performance and (b) expectancy beliefs predicted mathematics behaviors and performance held true for Latino students and Caucasian students. Further, the path coefficients from the expectancy value beliefs to the mathematics behaviors were mostly similar (not significantly different) for Latino and Caucasian students, though a few differences were observed. For instance, for Caucasian students, task utility value was more than twice as strong of a predictor of SSME ($\beta = .26$) compared to Latino students ($\beta = .11$), a significant difference ($p < .01$) which suggests that utility value may function differently for Latino students, within the context of influencing mathematics effort. Another difference was observed between Latino students' self-efficacy beliefs (MSE) and attention focusing (AF) as efficacy beliefs only predicted attention focusing for Latino students (this path was not significant for Caucasian students). This finding could have educational implications as increasing efficacy beliefs may be a way to increase Latino students' attention focusing behaviors—a necessary behavior in order to achieve academically (Schunk et al., 2008).

Next, for RQ2, it was hypothesized that differences would emerge in terms of task interest value and task utility value as it was expected that task interest value would be a stronger predictor for academic behaviors and performance for Caucasian students than for Latino students. However, findings from Model 2 suggest that this was not necessarily the case. For instance, when comparing the path from TIV to SSME, this path was slightly stronger for Latino students ($\beta = .31$) than for Caucasian ($\beta = .27$), though this path was significantly stronger for Latino students. In general: (a) task interest value was a slightly stronger predictor of attention focusing than utility value for both groups of students, (b) interest value (β = .27) and utility (β = .26) predicted Caucasian students' mathematics efforts are roughly the same the rate—something that was not observed with Latino students as TIV to SSME was almost three times as strong than the path from TUV to SSME, (c) interest value was a somewhat stronger predictor of persistence for both groups of students, and (d) Caucasian students' efficacy beliefs (β = .52) were a significantly stronger predictor ($p < .05$) of mathematics performance when compared to Latino students (β = .44).

In terms of RQ3, the exogenous variables (SB-P, SB-F, LOC) tended to predict the expectancy-value variables at roughly the same rate for both Latino students and Caucasian students. For example, the path coefficient from SB-P to TIV were mostly the same for Latino students (β = .25) and Caucasian students (β = .27) (non-significant difference) while the path from SB-P to TUV were also similar for Latino students (β = .46) and Caucasian students (β = .43) (non-significant difference). The path from locus of control to mathematics self-efficacy showed the greatest disparity among the groups of students as this path was stronger for Caucasian students (β = .35) than for Latino students (β = .25), a significant difference ($p < .05$). The next largest difference was observed between locus of control and task utility value as this path was also stronger for Caucasian students (β = .30) than for Latino students (β = .23) (another significant difference, $p < .05$)—findings which may indicate that perceptions of internal locus of control may function somewhat differently for Caucasian students and Latino students (within the context of influencing expectancy-value beliefs).

Lastly, in terms of RQ4, the indirect effects (see Table 28) suggest some degree of difference between the groups of students. For example, when considering the nine indirect paths going into AF, six of these indirect paths were stronger for Caucasian students than for Latino students. Next, of the nine indirect paths to SSME, Latino students had five paths which stronger. Lastly, of the nine indirect paths going into PER, five paths were stronger for Latino students compared to Caucasian students. Overall, when considering the results for RQ1-4, it can be said that Latino students and Caucasian were more similar than dissimilar—an interesting finding given the marked cultural differences between Caucasians and Latinos. A more detailed discussion of this, and the other findings, are presented in Chapter Five.

Chapter Five

The primary objective of this study was to examine the relationship between a number of variables associated with Eccles' and colleagues' expectancy-value theory of achievement motivation as predictors of U.S. Latino high school students' academic behaviors and mathematics performance. As part of this investigation, a number of descriptive, correlational, and inferential analyses (i.e. *t*-tests, path analysis) were conducted (see Chapter Four). Discussion of the descriptive, correlational, *t*-tests results are presented first followed by a discussion of the path analysis results (including a discussion of the research questions posited in Chapter One). Lastly, Chapter Five ends with a discussion of possible educational implications (based on study findings), followed by future areas of research and study limitations.

Descriptive, Correlational, and Inferential Analysis Discussion

A closer look at the results from the descriptive, correlational, and inferential comparisons (i.e., *t*-tests) of the study variables revealed a number of important findings regarding the variables at hand and Latino students—while also providing additional insights in terms of the comparison between Latino and Caucasian students on these variables. A discussion of these findings is presented below, by variable.

Index of economic, social, and cultural status (ESCS). As expected, and in line with decades worth of SES research in the United States (see: Ramirez & de la Cruz, 2003; U.S. Census Bureau, 1997, 2010) a comparison of Latino and Caucasian students' economic, social, and cultural status revealed significant differences favoring Caucasian students. Of interest, this large gap (*d* = 1.01) in economic, social, and cultural status (standardized) was the largest observed effect size out of all the mean comparisons conducted in this study. The next largest mean comparison effect size between the two groups was .64 (*d* = .64: mathematics performance), which helps provide some perspective for the magnitude of the difference in economic, social, and cultural status between students. In general, this finding helps underscore the need for greater Latino student academic achievement as educational attainment is one of the best "ladders" to greater economic, social, and cultural status (Slavin & Calderon, 2000).

Further, a closer look at the analysis of ESCS led to another interesting finding as a significant difference (*d* = .12) was observed between Latino male students and Latina female students on this variable. Initially, a comparison of ESCS by gender was not going to be conducted as there is no solid rationale for why ESCS would be different by gender. However, a glance at the mean ESCS scores for Latino male students (M = -.40) and Latina female students (M = -.52) suggested that significant differences may be present—which turned out to be the case. Now, it is not clear why perceptions of ESCS would vary by gender among Latino students but this gender difference (in ESCS) was not observed between Caucasian male students and Caucasian female students. Future research may seek to examine this potential gender discrepancy in ESCS among Latino students as this finding may signal that self-report measures of ESCS/SES may not be completely accurate or it may signal ESCS/SES is perceived somewhat differently by gender.

ESCS and the other study variables. Next, an examination of the correlational relationships between ESCS and the other study variables revealed a number of interesting findings. For instance, the relationship between ESCS and socializers' beliefs-parents (SB-P) and socializers' beliefs-friends (SB-F) was significant for Caucasian students (r = .24, r = .08), but not for Latino students (r = .05, r = .07). When considering these relationships, it is unclear why the relationship between ESCS and SB-P varied between groups of students, though there is some logic that increases in ESCS would accompany increases in parental value beliefs as higher ESCS tends to be associated with greater educational attainment (U.S. Bureau of Labor Statistics, 2016)—which would support the notion that better educated parents would hold higher value beliefs for their children's mathematics performance. Future research may seek to further consider this relationship with Latino students as it appears that the relationship between these two variables functions differently for Latino and Caucasian students.

Next, another difference emerged between the relationship of ESCS and task values (both interest and utility) as these relationships were significant for Caucasian students (interest value: r = .10; utility value: r = .13) but not for Latino students (interest value: r = .04; utility value: r = .07). It is also not clear why the relationship between value beliefs and ESCS differed (in terms of significance) between Latino and Caucasian students. Perhaps this finding is good news for Latino families as increases in ESCS were not associated with greater value beliefs, which may signal Latino students value mathematics regardless of their economic, social, or cultural status. This finding may also serve as an area of future research.

Lastly, when considering the strengths of the relationships between the control variable (ESCS) and the other study variables, a couple of similarities arose as ESCS was most strongly correlated with mathematics performance for both Latino students (r = .31) and Caucasian students, (r = .35). Similarly, the second strongest relationship for both groups of students was between ESCS and mathematics self-efficacy (Latino students: r = .29; Caucasian students: r = .25)—an interesting finding in terms of expectancy-value variables as ESCS was not significantly related to Latino students' task value beliefs but was significantly related to their efficacy beliefs.

Interpretation of socializers' beliefs—parents (SB-P). When considering the analysis of this variable, a consistent trend emerged as Latino students reported significantly higher (d = .27) perceptions of SB-P compared to Caucasian students. In other words, results suggest that Latino students perceived their parents to value mathematics more (i.e., "My parents believe that mathematics is important for my career") compared to Caucasian students' perceptions. This significant difference was also observed between Latino and Caucasian male students (d = .15) (favoring Latino students) and between Latina and Caucasian female students (d = .19) (favoring Latina students). Although the effect sizes were mostly small, these results are interesting for a couple of reasons. First, there was time when educational researchers suggested that one of the reasons for Latino academic underachievement (in this country) was a general lack of parental value for their children's educational attainment (i.e., the "deficit model": Valencia, 1997; Valencia & Black, 2002). These results suggest that Latino parents (as perceived by their children) understand the importance and utility value of mathematics—findings which support more contemporary research which has refuted the "deficit model" of earlier years (Valencia & Black, 2002). Second, these findings could also potentially be understood in terms of a protective factor. For example, in a review of motivational constructs (i.e., expectancies for success, self-concept) and African-American students, Graham (1992) found that African-American students tended to report greater expectancies for success and self-concept beliefs than Caucasian students—even when they performed at lower levels than Caucasian students—a discrepancy which Graham suggested may be adaptive in nature in terms of the protection of self-esteem. This same rationale could also potentially be applied to this finding as Latino students' perceptions of their parents' value beliefs may also be protective as Latino student may be aware of the stereotypes regarding Latino academic achievement (i.e., Latinos don't care about education: Valencia & Black, 2002).

SB-P and the other study variables. When considering the correlational relationships between SB-P and the other study variables, a number of interesting findings arose. First, the relationship between SB-P and mathematics performance was not significant for Latino students (r = .05), which was surprising given that: (a) every other relationship between SB-P and the study variables were significant for Latino students (see Table 16) and (b) this relationship was significant for Caucasian students (r = .19). This pattern also held true when broken down by gender (see Tables 18-21), with this relationship being particular small for Latino male students (r = .01). Although it is not clear why the relationship between SB-P and mathematics performance was not significant for Latino students, this finding may provide direction for future researchers in terms of examining the effects of parental mathematics value beliefs and their children's' mathematics performance.

Second, SB-P was most strongly correlated to students' task utility value beliefs (TUV). This finding held true for all students and across the six correlational analysis (see Tables 16-21), with correlations ranging between .50 and .60—findings which suggest the importance of parental value beliefs in terms of its relationship to their children's utility value beliefs. This finding is also interesting in terms of human development as parents continue to have an important influence on their teenagers' academic utility beliefs—even when the influence of parents tends to decline during the adolescent years (Papalia & Feldman, 2012). Third, although Latino students' perception of this variable was significantly higher than Caucasian students, all the correlations between SB-P and the study variables were stronger for Caucasian students (see Tables 16, 17)—a finding which may also support the need for further research in terms of Latino students. Lastly, when considering the relationship between SB-P and the four outcome variables (attention focusing, self-sustained mathematics efforts, persistence, mathematics performance), Latina female students tended to have stronger relationships between SB-P and the outcomes variables (except for persistence, see Tables 18, 19)—which may suggest that Latina female students may be more susceptible to their parents' value beliefs (compared to Latino male students).

Socializers' beliefs—friends (SB-F). When considering the mean comparison of this variable, (e.g., "Most of my friends do well in mathematics", "My friends enjoy taking mathematics") a significant difference was observed with Caucasian students reporting higher perceptions of SB-F compared to Latino students (d = .10). Although small in terms of effect size, this difference makes sense as Caucasian students tend to outperform Latino students in mathematics, which would translate into Caucasian students having more friends who “do well in mathematics” (assuming most of their friends are also Caucasian).

SB-F and the other study variables. A closer look at the relationship between SB-F and other study variables revealed some interesting findings. First, for both groups of students, SB-F was most strongly related to students’ task interest value, though this relationship was stronger for Caucasian students (r = .33) than for Latino students (r = .21). Second, the relationship between SB-F and mathematics performance was negative for both groups of students—a finding which is somewhat surprising given that one would expect a positive relationship between doing well in mathematics and having friends who “do well in mathematics”, “work hard at mathematics”, and “enjoy mathematics” (Eccles et al., 1983). Of interest, this inverse relationship held true for all comparisons except for Caucasian female students which had a slight positive relationship (r = .01). Although a further examination of this inverse relationship is beyond the scope of this study, this finding does raise questions regarding the influence of friends on students’ academic performance.

Next, when comparing Latino male and female students, some interesting correlational differences arose. For Latino male students, SB-F was most highly correlated to task interest value beliefs (r = .28) while SB-F was most highly correlated to self-sustained mathematics efforts (r = .24) for Latina female students. Further, gender differences were also observed between the relationship of SB-F and: (a) attention focusing (significant for females but not males), (b) persistence (significant for females but not males), and (c) self-efficacy (significant for females but not males) (see Tables 18, 19)—suggesting that the effects of friends may be different for Latino male students and Latina female students. This finding is particularly interesting given that these gender differences were not observed between Caucasian male and female students (see Tables 20, 21). Overall, these findings may serve as an avenue for future research into Latino students as it is not clear why the relationship between SB-F and attention focusing, persistence, and self-efficacy would only be significant for Latina female students. One possible explanation for this discrepancy may be related to gender differences in friendships (during adolescence) as female friendships tend to be more intimate than male friendships (Papalia & Feldman, 2012), which could translate into peer effects being more powerful for females than males (in terms of internalization of beliefs, etc.).

Locus of control (LOC). Students' perceptions regarding their internal locus of control (e.g., "If I put in enough effort I can succeed in mathematics") were not found to differ (mean differences) between groups of students nor by gender—an encouraging finding given the importance of one's belief regarding the amount of control one exerts over life events (see meta-analysis of locus of control and academic achievement: Findley & Cooper, 1983). This finding is also encouraging in terms of ESCS as even though Latino students' reported significantly lower ESCS (compared to Caucasian students), the negative effects often associated with lower levels of ESCS did not appear to negatively impact Latino students' beliefs regarding their internal locus of control.

LOC and the other study variables. When considering the relationship between LOC and the other study variables, a number of interesting relationships were observed. For example, for both Latino and Caucasian students, locus of control was significantly correlated to all the other study variables, with correlations ranging between .08 (r = .08) and .49 (r = .49). For Latino students, locus of control was similarly correlated (in terms of strength) to the expectancy-values variables (TIV: r = .37, TUV: r = .35, MSE: r = .34), a finding that was also observed with Caucasian students (TIV: r = .43, TUV: r = .49, MSE: r = .42). In general, this finding suggests that students' locus of control beliefs are related to students' expectancy-value beliefs. Further, the differences in strength between LOC and motivational variables (about 10 points stronger for Caucasian students) may also suggest that these variables function somewhat differently between Caucasian and Latino students.

Next, a closer look (by gender) revealed that the relationship between LOC and SB-F was not significant for Latino male students (r = .06) nor for Latina female students (r = .08), which is interesting given that this relationship was significant for both Caucasian male students (r = .23) and Caucasian female students (r = .23). It is unclear why these differences emerged as there were no mean differences on LOC and only a small difference (d =.10) on SB-F (favoring Caucasian students). This relational difference may warrant further research with Latino students. Lastly, when considering the relationship between LOC and mathematics performance, Latino students and Caucasian students had an identical relationship between these variables (r = .24), which suggests that students' locus of control beliefs likely function similarly (in terms of performance) across both groups of students.

Task interest value (TIV). A closer look at students' task interest value beliefs (e.g., "I do mathematics because I enjoy it") revealed a number of interesting findings. Overall, Latino students tended to report greater interest value in mathematics than Caucasian students (*d* = .27), with Latino male students (*d* = .26) and Latina female students (*d* = .29) also reporting higher interest value in mathematics than their counterparts. This finding was surprising as there is evidence that more individualistic students (i.e. Caucasian students) tend to favor interest more than more collectivist students (i.e. Latino students) (Markus & Kitayama, 1991)—yet this was not the case with this sample. It is not clear why Latino students reported greater interest value than Caucasian students. Possible reasons for this finding may be that: (a) Latino students are overcompensating and or protecting themselves from negative academic stereotypes (i.e. Latinos don't care about education) or (b) U.S. Latino may not be as collectivist as Latinos from Latin American countries. In general, this finding could be another venue for future motivational research as it would be interesting to talk to Latino students regarding their interest in mathematics, including an inquiry into the factors that influence their perceptions of interest. Further, given that interest is associated with greater effort and academic performance (Schunk et al., 2008); it is not clear why Latino students' greater interest in mathematics did not translate into higher mathematics performance (as measured by PISA).

TIV and the other study variables. For both groups of students, task interest value was most strongly correlated to task utility value—an expected finding given that interest value and utility value are both dimensions of the larger task value—as proposed by Eccles and Wigfield (1995). Next, an examination of the four outcome variables revealed that TIV was most strongly related to students' self-sustained mathematics efforts (r = .43 for both groups of students), a finding which highlights the importance of students' perception of interest in relation to their self-sustained academic efforts—a finding which is supported by previous studies (Hong et al., 2009; Pintrich & De Groot, 1990; Shechter et al., 2011).

Task utility value (TUV). When considering the mean comparison of this variable, students' utility value beliefs (e.g., "Learning mathematics is worthwhile for me because it will improve my career chances") were mostly the same across both groups of students (and by gender) as no significant differences were observed. Although non-significant, these comparisons are interesting as they suggests that both groups of students tended to perceive utility value in mathematics at roughly the same rate—an encouraging sign as there is evidence that utility value beliefs can influence students' school related efforts (Chouinard et al., 2007; Hong et al., 2009; Shechter et al., 2011). This finding is also interesting in terms of adding to one of the larger emergent themes of this study: U.S. Latino students appear to be more similar, than dissimilar, to Caucasian students (in term of the study variables).

TUV and the other study variables. Next, an examination of the correlational relationships between TUV and the other study variables also revealed a number of interesting findings. First, the relationship between TUV and mathematics performance was significant for both groups of students (see Tables 16, 17). However, a closer look at this relationship by gender revealed that TUV and mathematics performance was not significant for Latino male students (r = .08), while this relationship was significant for Latina female students (r = .14). Of interest, this discrepancy was not observed among Caucasian male (r = .22) and female students (r = .20). It is not clear why the relationship between TUV and mathematics performance was not significant for Latino male students, though there appears to be a pattern of gender differences among Latino students. Perhaps Latina female students have a more optimistic outlook of their career chances (in terms of mathematics) compared to Latino male students. Lastly, when considering the relationship between the four outcome variables and TUV, the strongest correlation was observed between TUV and self-sustained mathematics efforts for both Latino (r = .35) and Caucasian students (r = .46). This finding also held true across gender for both groups of students—suggesting that students' perception of utility value could be targeted as a mean towards increasing student effort (Eccles et al., 1983, Hong et al., 2009).

Mathematics self-efficacy (MSE). A number of significant mean differences were observed between students' perceptions of their self-efficacy (e.g., "how confident do you feel in … calculating how many square feet of tiles you need to cover a floor") with Caucasian students (as a group and by gender) consistently reporting greater self-efficacy beliefs than Latino students. Effect sizes for these differences ranged between .24 and .27 (d = .24-.27), suggesting somewhat meaningful differences on this variable between students. Further, a comparison between Latino male students and Latina female students revealed the largest difference in self-efficacy with an observed effect size of .44 (*d* = .44) favoring Latino male students. This finding is particularly concerning for Latina female students as the importance of students' efficacy beliefs is well-established in the literature (Pajares, 2008; Schunk et al., 2008; Schunk & Zimmerman, 2008).

Future researchers may seek to further examine whether this gender difference among Latino students holds true as a difference of this magnitude may signal the need to intervene. Overall, the general trend of Latino students having significantly lower efficacy beliefs may partly explain the observed difference between Latino students' and Caucasian students' mathematics performance. In general, these mean differences may also signal the need for greater research on Latino students' efficacy beliefs as previous findings have also found differences in efficacy beliefs between Latino and Caucasian students (Stevens et al., 2004).

MSE and the other study variables. Next, an examination of the correlation between MSE and the other study variables revealed a number of interesting insights. First, MSE was the strongest correlated variable with mathematics performance for both groups of students (and by gender) with correlations ranging between .44 and .56 (*r* = .44-.56). These findings build on the numerous findings which highlight the importance of students' efficacy beliefs (Pajares, 2008; Schunk et al., 2008). This finding is also important for two additional reasons. First, it provides cross-cultural evidence for the significant relationship between students' efficacy beliefs and mathematics performance. Second, even though Latino students had significantly lower mathematics performance scores than Caucasian students, MSE was still the strongest related variable (*r* = .48) to mathematics performance, a finding which suggests that efficacy beliefs are important for Latino students—even when their performance is relatively low.

Another set of interesting relationships was observed between students' interpretation of socializers' beliefs (SB-P, SB-F) and MSE. For both groups of students (and by gender), interpretation of socializers' beliefs-parents (SB-P) was more strongly correlated to students' efficacy beliefs than students' interpretation of their friends' beliefs (SB-F). For Latino students, the relationship between SB-P and MSE was .26 (r = .26) while the relationship between SB-F and MSE was .12 (r = .12). For Caucasian students, the relationship between SB-P and MSE was .31 (r = .31) while the relationship between SB-F and MSE was .17 (r = .17). In general, these relationships speak to the importance of social influences on students' efficacy beliefs, particularly the importance of parental beliefs. Further, these relationships may raise questions regarding Bandura's (1997) sources of efficacy. For example, according to Bandura, vicarious experiences are the second strongest source of efficacy beliefs—yet the relationship between SB-P (not vicarious) and MSE was almost double that of SB-F (vicarious) and MSE. Although outside the scope of this study, future motivation researchers may want to more fully consider the influence of parents and friends on students' efficacy beliefs—particularly in terms of Bandura's (1997) sources of efficacy beliefs.

Similarly, an interesting set of relationships were observed between MSE and task values (TIV, TUV). For both group of students, interest value was more strongly correlated to efficacy beliefs than utility value. For Latino students, the relationship between MSE and TIV was .42 (r = .42) while the relationship between MSE and TUV was .33 ($r = .33$). This difference also held true for Caucasian students, though the difference was less pronounced (TIV: $r = .42$, TUV: $r = .38$). Of interest, this difference was also observed across gender, suggesting that interest value is more strongly related to efficacy for both groups of students—a finding which is interesting given that there is some evidence that more collectivist cultures (i.e., Asian, Latin American) tend to favor perceptions of utility value over interest value (Shechter et al., 2011).

Lastly, when considering the relationship between MSE and the three other outcome variables (attention focusing, self-sustained mathematics efforts, persistence), a couple of interesting findings were observed. First, MSE was least related to attention focusing (AF) for both groups of students and by gender. Next, a closer look between Latino male students and Latina female students revealed further differences between MSE and the other outcome variables as the relationship between efficacy beliefs and self-sustained mathematics efforts (SSME) was much stronger for Latina female students ($r = .43$) than for Latino male students ($r = .25$). This somewhat pronounced difference in the relationship between MSE and SSME (by gender) may warrant further investigation as this difference was not as pronounced between Caucasian male students ($r = .28$) and Caucasian female students ($r = .35$). Future researchers may want to examine whether this difference between Latino male students and Latina female students holds true as the efficacy literature tends not to differentiate the relationship between efficacy and effort in terms of gender (Schunk et al., 2008).

Attention focusing (AF). The mean comparison of this variable (i.e., “I listen in mathematics class”) revealed some interesting findings. First, no significant mean differences were observed across both groups of students and by gender. This finding, though minor, is encouraging as the ability to focus one's attention is an important aspect of self-regulated learning and academic attainment (Zimmerman, 2000, 2008). This finding is also encouraging as even though there were pronounced differences in students' mathematics performance, it may be inferred that the act of focusing one's attention is not a contributing factor to this gap in performance.

AF and the other study variables. When considering the correlational relationship between AF and the other study variables, a few differences emerged. For example, AF was significantly correlated with all other study variables for Caucasian students, while AF was significantly correlated with all but one study variable (SB-F) for Latino students. Next, a further examination of the relationship between SB-P, SB-F and attention focusing revealed that SB-P was more strongly correlated with AF for both groups of students. However, this difference in relationship was more pronounced among Latino students ($r = .23$), particularly when considering that the relation between AF and SB-F ($r = .05$) was not significant. This correlational finding may also warrant further research as it is not clear why the relationship between SB-F and AF was not significant for Latino students but was significant for Caucasian students ($r = .24$).

Next, a closer look at Latino male students and Latina female students showed that the insignificant relationship between AF and SB-F only held true only for Latino males ($r = -.05$) as this relationship was significant for Latina female students ($r = .13$). This discrepancy was not observed between Caucasian male and female students as AF and SB-F was significant for both males and females. It is unclear why this relationship was different for Latino male students, a finding which may warrant further investigation into possible gender differences among Latino students (in terms of the study variables).

Self-sustained mathematics efforts (SSME). The analysis of students' self-sustained mathematics efforts (i.e., "I work hard on my mathematics homework") revealed some differences and similarities between both groups of students (and by gender). For example, a mean comparison of SSME showed that Caucasian students reported significantly higher effort scores compared to Hispanic students, though the effect size of this difference is considered to be small (d = .14). Similarly, Caucasian female students reported significantly higher scores on SSME than Latina female students (d = .19). When considering these differences in effort, it is not clear why Caucasian students tended to report higher effort than Latino students. For example, attention focusing, which is needed in order to "to work hard on my mathematics homework" or to "study until I understand the mathematics materials", saw no mean differences between both groups or by gender. Similarly, students' internal locus of control beliefs, which is also believed to influence students' academic efforts (Schunk et al., 2008), saw no mean differences between both groups of students or by gender. Further, when considering task interest value, another variable often associated with student effort (Wigfield & Eccles, 2000), mean difference were observed, though Latino students reported greater interest in math than Caucasian students—which also fails to account why Latino students would report lower perceptions of effort. Next, task utility value, also believed to influence student effort (Wigfield & Eccles), saw no mean differences between groups of students, which also fails to account the lower effort reported among Latino students. Lastly, the mean comparison of self-efficacy did reveal significant differences between Latino and Caucasian students, which may explain (in part) why Latino students reported lower effort. Overall, these findings suggest that Latino students' self-sustained mathematics efforts may warrant further research, while also suggesting the need to further examine Latino students' efficacy beliefs as Latino students' lower efficacy beliefs may partly explain the difference in students' self-sustained mathematics efforts.

SSME and the other study variables. When considering the relationship between students' self-sustained mathematics efforts and the other study variables, a few interesting findings arose. First, the relationship between SSME and students' mathematics performance showed some differences as this relationship was twice as strong for Latino students ($r = .16$) than for Caucasian students ($r = .08$). However, a closer look at the relationship between SSME and mathematics performance (for Latino students) revealed that this relationship was not significant for Latino male students ($r = .09$) while this relationship was significant for Latina female students ($r = .24$). Similarly, this relationship was not significant for male Caucasian students ($r = .05$) but was significant for female Caucasian students ($r = .14$)—findings which suggest that gender may be need to be considered when examining the relationship between effort and mathematics performance. Further, this lack of a significant relationship between SSME and mathematics performance (among males) is not supported by the literature as effort has been shown to predict academic performance (Schunk et al., 2008). Future studies with Latino students may want to examine if these results are replicable as gender may moderate the relationship between students' self-sustained effort and mathematics performance.

Next, when considering the relationship between SSME and the remaining study variables, the relationships were mostly the same for both groups of students. For instance, SSME was most strongly correlated to task value beliefs for both group of students (and by gender), with correlations ranging from .31 to .50—moderate relationships which are generally confirmed in the task value literature (Eccles et al., 1984; Schunk et al., 2008; Wigfield & Eccles, 1992, 2000). However, a closer look at the relationship between TIV, TUV and SSME suggests some variation among Latino and Caucasian students as Caucasian students' effort was more strongly correlated to TUV ($r = .46$) (compared to TIV: $r = .43$) while Latino students' SSME was more strongly related to TIV ($r = .43$) (compared to TUV: $r = .35$). Of interest, the relationship between task interest value and SSME was the same for both groups of students ($r = .43$). Overall, this slight variation between utility value and SSME may signal that utility value may function somewhat differently for Latino students (in relation to effort)—a finding which may warrant further research.

Persistence. The analysis of students' perception regarding their academic persistence (i.e., "When confronted with a problem, I do more than what is expected of me") revealed some interesting findings. In terms of group mean comparison, there were no significant differences between Latino students and Caucasian students. There were also no difference between Latino male students and Latina female students. Overall, the lack of significant differences in students' perceptions of their academic persistence is an encouraging finding as differences in persistence by race/ethnicity have been documented previously in the literature, including gaps in persistence between Hispanic students and Caucasian students (Bennett & Okinaka, 1990). Future research may seek to confirm whether this finding holds true, particularly when moving away from self-report measures of persistence and towards more objective measures of persistence.

Persistence and the other study variables. When considering the relationship between persistence and the other study variables, persistence was most strongly related to students' self-sustained mathematics efforts for both Latino students (r = .42) and Caucasian students (r = .39). Further, persistence was significantly correlated to all other study variables for both groups of students. However, a closer look between Latino male students and Latina female students showed some differences among the genders as the relationship between persistence and mathematics performance was non-significant for Latino males. Further, the relationship between socializers' beliefs-friends (SB-F) and persistence was also non-significant for Latino male students. Of interest, gender differences were not observed between Caucasian male students and Caucasian female students as persistence was significantly correlated to all other study variables for both sets of students. Overall, students' perception regarding their persistence, which has been described as an "index" of motivation (Schunk et al., 2008), appears to be similar for both groups of students, though the gender differences observed between Hispanic students may indicate a future avenue for research, particularly given that correlational differences between Latino male and female students have also been documented in other variables of interest.

Mathematics performance. Lastly, students' performance on PISA's mathematics examination revealed some rather striking differences between Latino students and Caucasian students. As expected, and inline with of decades of research (Hemphill & Vanneman, 2011; Slavin & Calderon, 2000), Latino students significantly underperformed when compared to Caucasian students. Although expected, the large effect size (d = .64) of the difference in mathematics performance favoring Caucasian students exemplifies why Latino students ought to garner more attention from educational researchers. When considering Latino male students and Latina female students, Latino male students significantly outperformed Latina female students, though the effect size was small (d = .13). Further, this gap in mathematics achievement favoring Latino male students is consistent with gender gaps in mathematics achievement favoring Caucasian male students (Eccles et al., 1983)—suggesting that the mathematics gap in achievement (favoring male students) also extends to Latino students. Next, a comparison between Latino male students and Caucasian male students (d = .64) and between Latina female students and Caucasian female students (d = .65) further accentuated the difficulties that Latino students are having with mathematics performance in comparison to Caucasian students. Overall, based on these mean comparisons, gaps in mathematics achievement continue to be observed among Latino students (when compared to Caucasian students), even 40 years after they were first recorded by NAEP (Hemphill & Vanneman, 2011). Overall, findings like these continue to highlight the need to further study U.S. Latino students as these gaps in academic achievement have far reaching consequences.

Mathematics performance and the other study variables. Next, a comparison of the relationship between students' mathematics performance and the other study variables showed both similarities and differences across both groups of students. In terms of similarities, self-efficacy (Latino: r = .48, Caucasian: r = .55) and ESCS (Latino: r = .31, Caucasian: r = .35) were the two variables with the strongest relationships to students' mathematics performance (for both groups of students and by gender). This finding, though not surprising, provides further evidence for the importance of students' efficacy beliefs as efficacy was the most strongly correlated variable to performance by healthy margin. Further, this finding also underscores the importance students' home environment (ESCS) on their mathematics performance, something which, unfortunately, students have no control over.

In terms of the value variables and mathematics performance, task values (interest value, utility value) were more strongly correlated to mathematics performance for Caucasian students (interest value: r = .27; utility value: r = .21) than for Latino students (interest value: r = .17; utility value: r = .11). These differences, though not huge, may signal that task values function a bit differently between Caucasian and Latino students, though more research is necessary in order to make such a determination. Lastly, when considering the exogenous variables and mathematics performance, a stark difference arose in the relationship between students' interpretation of their parental beliefs (SB-P) as this relationship was significant for Caucasian (r = .19) but not for Latino students (r = .05). It is unclear why this relationship was non-significant for Latino students as they reported significantly higher scores on SB-P (d = .27) compared to Caucasian students.

Further, when looking at Latino male students, this relationship was even weaker (r = .01), even though Latino male students reported an average score of 3.10 (out of four) on this variable.

Overall, these weak and non-significant relationships raise a number of questions as there is evidence that parents, particularly in Latino culture, play an important role in their children's education (Slavin & Calderon, 2000). Possible explanations to this unexpected finding include: (a) Latino parents may not know how to best help their children gain in mathematics performance due to not being familiar with the American school system (Slavin & Calderon, 2000) and (b) Latino parents' may not possess the necessary academic skills to help their students due to their own (likely) low educational attainment (Fry & Gonzalez, 2008).

Path Analysis Discussion

The model building process afforded a number of findings regarding the functioning of U.S. Latino high school students' cognitive processes (SB-P, SB-F, LOC), expectancy-value beliefs (TIV,TUV, MSE), and their effects on academic behaviors (AF, SSME, PER) and mathematics performance. By considering the direct and indirect effects of the 10 variables of interest (while controlling for SES), more is known regarding the functioning of these well-researched cognitive and motivational constructs as these constructs have been largely studied with European-American middle class students (Graham, 1992; Schunk et al., 2008; Schunk & Usher, 2013; Wigfield & Eccles, 2002). A discussion of the main findings from the model building process is presented below.

Model 1. The hypothesized model (Model 1) tested a total of 28 parameters which examined the directionality (and magnitude) of cognitive processes (SB-P, SB-F, LOC) and motivational processes (TIV, TUV) as predictors of academic behaviors (AF, SSME, PER) and mathematics performance. Although this model did not fit the data, the hypothesized model still provided a number of insights.

Directionality between variables. In terms of directionality, the cognitive variables positively influenced the motivational variables, which in turn positively influenced academic behaviors and performance. This finding is in-line with Eccles' and colleagues' findings regarding the directionality of these variables (Eccles et al., 1983, Wigfield & Eccles, 1992, 2000, 2002). When considering this finding, the directionality of the study variables provides an understanding into ways through which to positively influence students' motivational beliefs, academic behaviors, and mathematics performance. In other words, results from this study provide evidence that: (a) parents and friends can positively influence students' expectancy-value beliefs, (b) locus of control beliefs can positively influence expectancy-value beliefs, and (c) expectancy-value beliefs can positively influence academic behaviors academic performance. In general, the positive directionality between the variables of interest tended to hold true across the four models that were tested—which provides a general understanding regarding a number of psychological factors which can help increase U.S. Latino high school students' academic behaviors and mathematics performance.

Magnitude of relationships between study variables. Next, when considering the causal relationships between the variables of interest, more insights were gained. For instance, results from the hypothesized model question Eccles' and colleagues' initial assertion that value beliefs can directly predict students' academic performance as this direct effect was not observed. This finding is in-line with previous work which also has found that task value beliefs do not predict academic performance (Lee, Lee, & Bong, 2014; Pintrich & De Groot, 1990; Pintrich et al., 1994). Second, when comparing Models 1 and 2 (which did fit the data), findings from this study also call into question Eccles' and colleagues' initial assertion that academic behaviors and academic performance should both be considered outcome variables (see Figure 3). As Model 2 suggests, academic behaviors likely function better as predictors of academic performance as making this change (mathematics performance as the sole outcome variable) improved the model fit to acceptable levels. A discussion of the findings from the various paths that were tested will now follow, beginning with the paths that emerged from the exogenous variables (SB-P, SB-F, LOC).

Path coefficients emerging from the exogenous variables. Model 1 provided a number of insights regarding the strength of the magnitude between the hypothesized relationships. For instance, the paths from SB-P and LOC were better at predicting students' expectancy-value beliefs than the paths that emerged from SB-F. In other words, parents' influence and students' own sense of their locus of control mattered more in terms of predicting students' value and expectancy beliefs (when compared to friend influences). There is value in knowing this as parents can benefit from knowing that their value beliefs can influence their children's expectancy-value beliefs. Further, this finding suggests that examining students' locus of control beliefs can be beneficial as these beliefs predicted students' expectancy-value beliefs.

Next, one of the strongest coefficients observed across the models was observed between SB-P and TUV. This finding is important as it highlights the strength of parental value beliefs in terms of influencing their children's utility value beliefs. This finding makes sense from a social capital perspective as Coleman (1987) has made the case that families have the ability to shape academic attitudes and beliefs. Further, by contrasting the paths from SB-P to TIV and TUV, findings suggest that parents are better able to influence their children's utility value beliefs than interest value beliefs—which provides an added level of insight in terms of Coleman's assertion (i.e., parent beliefs can better influence some academic beliefs than others).

Next, when considering the antecedents to students' self-efficacy beliefs, locus of control beliefs were a stronger predictor of efficacy than parental influences or peer (friends) influences. There is support for this predictive relationship as Phillips and Gully (1997) also found locus of control beliefs to predict self-efficacy beliefs. This finding is important as: (a) the instrumentality of students' efficacy beliefs (in terms of predicting academic behaviors and academic performance) is well understood in the literature (Schunk & Zimmerman, 2008), and (b) this relationship suggests that students' locus of control beliefs is one way through which to increase students' efficacy beliefs.

Cultural variations. Another goal of this study was to examine whether the various relationships of interest functioned differently as a result of students' culture. This was determined in two ways: (a) is a path significant for one group of students and not for the other? and (b) if a path is significant for both groups of students, is one path significantly stronger the other path? Using this criteria, two differences were observed (in terms of the exogenous variables): the relationship between locus of control and task utility value and the relationship between locus of control and self-efficacy. Both of these paths were significant for both groups of students. However, both paths were significantly stronger for Caucasian students compared to Latino students.

In other words, locus of control beliefs functioned differently for Caucasian students as LOC was significantly stronger in predicting utility value and self-efficacy (compared to Latino students). Although it is not clear why LOC functioned differently between students (and beyond the scope of this study), this finding may guide future research efforts into Latino students' locus of control beliefs. This is particularly the case as the paths from SB-P and SB-F to the expectancy-value variables did not function differently as a result of group membership.

Path coefficients emerging from the expectancy-value variables. When considering the paths that emerged from the value variables (TIV, TUV), a pattern emerged as the coefficients from TIV to the behavior variables were stronger than the coefficients from TUV to the behavior variables. The strongest path to come out of the value variables was from TIV to students' self-sustained mathematics efforts (for both groups of students). This finding is in-line with previous studies which have also found interest value to be a stronger predictor of effort than utility value (Hong et al., 2009; Shechter et al., 2011). However, this finding was somewhat unexpected for Latino students as there is evidence that utility value is a stronger predictor of effort among collectivist students (Markus & Kitayama, 1991)—a finding which was not supported by this study. Further, when considering the relationship between the two dimensions of value beliefs and persistence, interest value was a stronger predictor of persistence than utility beliefs. This finding may also having educational implications as appealing to students' sense of interest may be a better way to support persistence than appealing to students' sense of utility value.

The paths that emerged from self-efficacy also provided some interesting insights. In keeping with previous research (Pintrich & De Groot, 1990; Wolters & Pintrich, 1998), efficacy beliefs were weaker in predicting attention focusing and self-sustained efforts when compared to task value beliefs (both TIV and TUV). There is value in this finding as it suggests that value beliefs are a better way to help sustain students' efforts (compared to efficacy beliefs). Knowing this can help teachers, principals, and curriculum specialist as more can be done to make connections between what is to be learned and students' interests in the material. Next, some of the strongest path coefficients in the model were observed between efficacy beliefs and mathematics performance. This finding is also in-line with previous research (Schunk et al., 2008; Schunk & Zimmerman, 2008) as there is much evidence to support the importance of efficacy beliefs in predicting academic performance. Although much is known regarding efficacy beliefs and academic performance, this finding adds cross-cultural validity to this relationship—in terms of U.S. Latino students.

Cultural variations. When considering the various paths that emerged from the expectancy-value variables, three differences emerged that can be understood in terms of functioning differently as a result of group membership. First, the path from self-efficacy to attention focusing was significant for Latino students but not for Caucasian students. Although it is not clear why this path functioned differently, it provides support for this study's premise that relationships between the variables of interest can differ by culture. Future research may wish to confirm this finding as efficacy out to influence attention focusing (Schunk et al., 2008; Zimmerman, 2008).

Second, although the path from self-efficacy to mathematics performance was significant for both groups of students, this path was significantly stronger for Caucasian students. This finding has also been observed by Stevens et al. (2004), which suggests that something about Caucasian makes it so that efficacy beliefs function in a stronger manner. For instance, Stevens et al. suggested that perhaps Caucasian students have greater access to successful role models who are similar to them (teachers, professionals, parents, students, media influences, etc.), which may magnify Caucasian students' efficacy beliefs.

Third, the path from utility value to mathematics efforts was significant for both groups of students; however this path was significantly stronger for Caucasian students than for Latino students. It is not clear why perceptions of utility were a stronger motivator for Caucasian. One possible explanation for this finding is that U.S. Latinos are much less likely to work in mathematics-related fields (compared to Caucasian students) (Slavin & Calderon, 2000), which may dampen the belief that math will serve a useful purpose in Latino students' future careers and or vocations.

Model 2

As mentioned earlier, Model 2 did fit the data. This was accomplished by moving mathematics performance as the sole outcome variable. By making this change, the previous relationships between the exogenous variables and the expectancy-value variables remained largely the same (see Chapter Four). Similarly, the relationships between the expectancy-value variables and the academic behavior variables also remained largely the same. Accordingly, the discussion provided under Model 1 suffices as nothing meaningfully changed in these relationships. The main change occurred in changing the behavior variables (AF, SSME, PER) from outcome variables to mediating variables.

New mediating variables. Attention focusing, self-sustained mathematics efforts and persistence became mediating variables in Model 2. This change was both positive and negative (for the study at hand) as the changes improved the model fit to an acceptable level, however, the paths that emerged from AF, and SSME to MATH were not supported by the motivation literature (Alderman, 2008; Schunk et al., 2008). For example, the paths from AF to MATH were not significant for either group of students. This was surprising as there is evidence that self-regulatory processes can account for significant variance in students' academic performance (Schunk et al., 2008; Wolters & Pintrich, 1998). When considering possible explanations for this finding, the mismatch between the attention focusing items (which measured students' ability to focus their attention in students' current math class) and the outcome variable (mathematics literacy:

which measures application of mathematical knowledge in daily life)—may help explain why attention focusing did not predict performance.

Next, the paths from SSME to MATH were negative for both groups of students, a finding which lacks reason as one's efforts should predict performance (Alderman, 2008; Schunk et al., 2008). It is also not clear why this inverse relationship was observed. Perhaps the mismatch in level of specificity between the SSME items and the mathematics examination partly explains why this path was negative. For example, the SSME items were all framed in terms of students' current mathematics class ("I finish my homework in time for mathematics class", "I am prepared for my mathematics exams"). Given that the majority of study participants were in the 10^{th} grade (see Chapter Three), students likely answered the SSME items in terms of Algebra II. However, the mathematics examination was not an Algebra II test. Instead, PISA tested mathematical concepts in terms of applied settings (i.e., calculating the square footage of an apartment, interpreting bar charts of music sales, etc.) (OECD, 2013b), which further underscores the mistach between SSME items and how mathematics performance was assessed.

Lastly, the path from persistence to mathematics performance functioned differently for Latino and Caucasian students as this path was negative (and non-significant) for Latino students while this path was positive (and significant) for Caucasian students. It is not clear why persistence functioned differently by group membership. This too may be an area of future research for researchers interested in Latino students as persistence is generally believed to be positive (in directionality) in its effect on performance (Anderman, 2008). In general the lack of match between the academic behavior items (all anchored around students' current mathematics class: i.e., Algebra I, Geometry, Algebra II, etc.) and the measured outcome (literacy: i.e., the application of math concepts to everyday problems) likely played a role in these relationships not functioning as expected.

Model 3

As an alternative model, Model 3 tested a total of nine additional paths from the exogenous variables to the behavior variables (AF, SSME, PER). In general, this model added a partial mediation element to the model as the paths from SB-P, SB-F, and LOC to the behavior variables were no longer dependent on the expectancy-value variables. Perhaps the main finding of Model 3 is that the predictive strength of the expectancy-value variables decreased when the direct paths from the exogenous variables were introduced. In considering this, it makes sense that predictive strength decreased as there is evidence that social influences (SB-P, SB-F) and locus of control beliefs can influence academic behaviors (Gonzalez-DeHass, et al., 2005; Phillips & Gully, 1997; Ryan, 2000; Schunk et al., 2008; Wentzel & Wigfield, 1998). However, difference arose in terms of the additional paths that emerged from SB-P, SB-F, and LOC as some paths mattered more than others.

For example, only one (of the three new paths) from SB-P to the behavior variables was significant—the path from SB-P to persistence—though this was only significant for Latino students. In considering these new findings, it is interesting that parental influences influenced students' expectancy-value beliefs but not students' actual behaviors. This may be an important finding as it may signal that parental influences have limitations—mainly that parental values (alone) do not influence students' academic behaviors. Parents could benefit from this knowledge as it gives them a better idea of their influence (in terms of influencing beliefs vs. behaviors). Further this finding supports Coleman's (1987) notion that parents can influence their children's academic socialization (i.e., academic beliefs and attitudes).

Next, the paths from SB-F to the behavior variables drew some sharp distinctions as these paths functioned differently as a result of students' culture. For example, the paths from SB-F to the behavior variables were all significant for Caucasian students, while only one of these paths was significant for Latino students (SB-F to SSME). In considering this, one possible explanation comes to mind. If Caucasian students tend to be friends with mostly other Caucasians (am assumption which holds some logic), then Caucasians would have friends who are more likely to experience academic success, and thus would have a positive influence on their academic behaviors as Caucasians tend to outperform Latinos in academic attainment (Hemphill & Vanneman, 2011; Urdan, 2012). The opposite of this could also be true as Latinos could have more friends which experience less academic success, which could explain why Latino's friends have less of an influence on academic behaviors. This too may be a future area of research as something about the peer influences of Latino and Caucasian students is functioning differently.

Lastly, the direct paths from locus of control to the behavior variables were all significant and were of similar strength for both groups of students. This is an interesting finding neither SB-P nor SB-F were able to do that. Further, these additional significant paths likely signal that locus of control is an important cognitive process to examine in students as they likely have the ability to influence both motivational beliefs and actual academic behaviors (Findley & Cooper, 1983; Phillips & Gully, 1997). It is also interesting to note that locus of control beliefs more strongly predicted motivational beliefs than academic behaviors, which also may add to the understanding of this important psychological construct. Overall, this finding may have educational implications as teachers may wish to talk to their students regarding their perceptions of control and how those perceptions can have a positive influence on both motivational beliefs and academic behaviors.

Model 4

Model 4 tested three alternative direct paths between the exogenous variables and mathematics performance. In general, the addition of the three direct paths provided some marginal insights to the study's overall purpose. First, the path from SB-P to MATH was non-significant for both groups of students. This finding is in line with Model 3 in that it provides insights to the limitations of parental influence (e.g., "My parents believe that mathematics is important for my career") in terms of predicting academic behaviors and academic performance. This finding suggests that parental influence, on its own, does not influence students' academic performance. However, by looking at the other available paths, parental influence may work best (in influencing performance) through students' self-efficacy beliefs (an indirect effect). This finding may have value for parents as it provides (some) evidence that communicating their beliefs regarding the instrumentality and utility value of mathematics (to their children) can predict performance through their children's efficacy beliefs (which is also influenced by parental value beliefs).

Next, the path from SB-F to MATH was significant for both groups of students; however, both of these paths were negative. It is not clear why these paths were negative. It is likely that some type of suppression effect is occurring as the paths from SB-F (in the previous models) have been largely positive in directionality.

Lastly, the path from LOC to MATH was significant for both groups of students, a further indication that locus of control beliefs are important, psychologically speaking, as this was only variable to predict motivation, behavior, and actual performance. Further, the strength of this path was identical for both groups of students, which is interesting as this tended to be the case when considering other the paths that emerged from locus of control to the study variables. Overall, one key finding of this study is that perceptions of control (i.e., internal locus of control) matter in educational settings—a finding which is supported by the achievement motivation literature (Findley & Cooper, 1983; Phillips & Gully, 1997; Wilhite, 1990).

Additional Discussion

In general, the five research questions proposed at the onset of this study have largely been discussed in the previous section (discussion of the four models). However, a few additional points of analysis are now presented. In terms of RQ1 (Do Latino high school students' expectancy and value beliefs predict students' attention focusing, self-sustained mathematics efforts, persistence, and mathematics performance?), Latino students' value beliefs predicted academic behaviors (AF, SSME, PER) while expectancy beliefs predicted both behaviors and performance. Further, results suggest that: (a) interest value and utility value (dimensions of task value beliefs proposed by Eccles et al., 1983) had roughly the same influence on students' attention focusing; (b) interest value was a much stronger predictor of effort compared to utility value; and (c) interest value was a stronger predictor of persistence. In general, these finding add support to Eccles' and colleagues' theoretical contribution that task value is a multidimensional constructs. This is important as some research continues to treat task value as a single dimension construct—a poor practice given that Eccles and Wigfield (1995) have provided evidence for the multidimensionality of this important construct.

Next, in terms of RQ2 (of the two dimensions of task value beliefs being considered, which is a stronger predictor of Latino students' academic behaviors and mathematics performance?), much has already been said regarding the facets of task values that were investigated. However, this notion of utility vs. interest value raises larger cultural questions. As previously stated, there is evidence that utility value is a stronger motivator than interest value among collectivist cultures (Hong et al., 2009; Markus & Kitayama, 1991; Morling & Kitayama, 2008; Shechter et al., 2011), with Latino culture often described in collectivist terms (i.e., interdepence: Delgado-Gaitan, 1993; Halgunseth, Ispa, & Rudy, 2006), which would suggest that utility would be a stronger motivator for Latino students. This was not the case, which raises questions regarding whether distinction should be drawn between East-Asian collectivism and Latin-American collectivism. A similar finding that interest value was a stronger motivator than utility value has also been found with Mexican students (Chirinos, 2016), which suggests that more can be done in investigating the links between collectivist cultures and their preference for utility value.

For RQ3 (What are the direct effects of Latino students' interpretations of socializers' beliefs and locus of control beliefs on students' expectancy-value beliefs?) has also been discussed at length in the previous section, as well as in Chapter Four. In general, it suffices to say that parental influences more strongly influence students' value beliefs (particularly utility value) than efficacy beliefs. This makes sense as the items used by PISA focused on parental value beliefs. Future research in this area could also ask students about their perceptions regarding their parents' efficacy beliefs (regarding mathematics)—and then see if these beliefs predict students' efficacy beliefs. Further, the paths that emerged from SB-F were not very strong in predicting value beliefs (and non-significant in predicting efficacy), which raises questions regarding the influence of peers, particularly with Latino students (see discussion of Model 3 in Chapter Four). The general belief is that peers matter in education (Schunk et al., 2008), though results from this study may suggest that friends' influence lies elsewhere and not in influencing students' expectancy-value beliefs nor academic behaviors.

For RQ4 (What are the indirect effects of Latino students' interpretations of socializers' beliefs and locus of control beliefs on students' academic behaviors and mathematics performance?), as stated previously (see Chapter Four), answering this questioned proved challenging. The original question was framed around the hypothesized model which posited four outcome variables (which did not fit the data), with further unexpected findings (inverse relationships, non-significance) further complicating matters. In general, it was found that a number of indirect effects were observed, though most effects were small. The largest indirect effect for Latino student (to the behavior variables) was the path from locus of control, through task interest value, to self-sustained mathematics efforts (β = .09). Further, the strongest indirect path to students' mathematics performance was from locus of control, through self-efficacy (β = .13). In general, although the indirect effects tended to be small in strength, they do provide alternate ways through which to think to about the various relationships of interest. Given that the strongest indirect effect was observed from LOC through MSE to MATH, more support is given in establishing the importance of these two psychological variables. Accordingly, researchers interested in Latino students may wish to further investigate these two constructs as they matter in influencing performance. Lastly, the indirect path from SB-P, through MSE, to MATH was the second strongest indirect path observed (β = .11)—a finding which has familial applications as parents can influence performance, through their children's efficacy beliefs.

Lastly, RQ5 (Are there significant differences in the relationships established by research questions 1-4 between Latino and Caucasian students?), has also been mostly answered in the results section (Chapter Four). In general, U.S. Latino students tended to be more similar than dissimilar when compared to Caucasian students. This is an interesting finding as one could expect differences given the cultural differences that exist between these two groups of students. However, when attempting to explain the similarities, a few issues must be considered. First, it is not clear how acculturated the participants were who identified themselves as Latino. Perhaps first, or even second generation Latino students identified as Latino, which makes a difference as part of acculturation is to adopt some of the host countries' manner of thinking. Second, perhaps Latinos are more similar than dissimilar to Caucasian students given that both groups of students reside in the Western hemisphere. Further, American culture (i.e., movies, TV shows, music) has long influenced Latin American countries, which may also partly explain the similarities between both groups of students. Future researchers interested in Latino students may wish to further tease out immigrant vs. first generation vs. second generation Latinos as this will contribute to the understanding of a large, and growing segment of the U.S. population

Limitations

As with all research, this study has a number of limitations. First, all student data (except for mathematics performance) is self-reported data and subject to social desirability. Second, although the hypothesized model attempted to test a model based on Eccles' and colleagues' expectancy-value model, an exact replication of their model was not possible as PISA did not measure all the variables associated with Eccles et al.'s model. More specifically, the hypothesized model did not include measures of: (a) students' self-schemata; (b) short-term and long term goals; (c) students' affective memories; (d) causal attributions; (e) gender roles; (f) differential aptitudes of students; (g) previous achievement related experiences; and (h) perceptions of task demands. In considering the many variables not included in the hypothesized model, it is important to recognize that Eccles and colleagues' own work did not actively measure all these variables at once. For example, Eccles et al. (1983) tested "reduced" path analytic models

(p. 134), with latter renditions of the model (e.g. Wigfield & Eccles, 2000, p.73) testing only “aspects” of the expectancy-value model.

Third, it is possible that varying levels of acculturation among U.S. Latino high school students may have an effect on the interpretation of study results as the process of acculturation is believed to influence changes in the behaviors and values of acculturating individuals (Berry, Poortinga, Segall, & Dasen, 2002). In other words, a true comparison between Latino and Caucasian students may not have occurred as acculturation was not controlled for (PISA did not measure acculturation). Although not controlling for acculturation serves as a limitation, it is important to point out that students (in this study) self-identified as Latino or Caucasian, which preserves some degree of distinctness between the groups of students.

Lastly, the low-stakes nature of the PISA examination may also serve as a limitation. According to Wise and DeMars (2005), difference in test taking motivation, as well as test-taking effort, have been documented between high stakes and low stakes testing. This reasonable distinction (in motivation and effort) applies to PISA as students’ performance on this exam has no bearing on their school performance—which may have affected how students approach the test. Although efforts are made by school officials to encourage students to do their best (i.e., this is an important examination as you are representing your country), students’ PISA performance has no real effect on them, which may affect their performance.

Educational Implications

Findings from this study have a number of potential educational implications. Broadly speaking, model results provide a general framework of understanding regarding a host of psychological factors which influence students' academic behaviors and mathematics performance. More specifically, model results suggest that social influences, perceptions of control, and expectancy-value beliefs are psychological factors which influence academic behaviors, as well as academic performance. For example, model findings suggest that students' perceptions of utility value and interest value can influence their self-sustained efforts as greater perceptions of utility and interest value were associated with greater effort. Given this, teachers, administrators, and parents have a better understanding regarding ways through which to get students to produce greater academic effort. In simpler terms, helping students see value in tasks, whether in terms of a task being useful for students' future or appealing to students' interest in a given area will likely results in increases in effort. This matters as engagement, i.e., doing the work, is necessary for academic learning and attainment.

Knowing that perceptions of future utility can predict effort, attention focusing, and persistence (see Chapter Four) also has educational appliacations as this knowledge encourages teachers to find ways through which to communicate the utility value of particular subjects and activities. For instance, within the context of math, teachers can communicate utility value in terms of particular careers such as engineers, scientists, researchers, finance, etc. Similarly, teachers can provide personal experiences of how the study of mathematics helped them prepare for the SAT, for the GRE, or other gatekeeping tests which open up greater options and career opportunities. Consistently appealing to students' utility value (in a given subject) could help students greater believe their efforts now will have far-reaching consequences in their personal lives. Along these lines, teachers (and administrators) can help find ways through which to appeal to students' interest in a subject. As teachers get to know their students better, they can use their creativity to find ways to highlight the appeal of certain activities. For instance, by learning more about their students' interests (e.g., favorite team, favorite movie, etc.) a teacher could tailor assignment around students' interests (e.g., you are your favorite athlete's agent, which contract is best in the long run; you are running a non-profit and are facing budget cuts, which cuts make the most sense, etc.).

Further, model results suggest that the values parents hold regarding a subject influences their children's perception of value in that subject. This too is important as it encourages parents to communicate their value beliefs regarding academic subjects to their children. As parents talk to their children about the value of a given subject, this provides opportunities for parents to obtain other related information (from their children) such as if they believe that accomplishing something is within their control (i.e., if you wanted to, could you do well in mathematics) or if they believe that they able to achieve a certain task (i.e., do you think you are able to learn algebra?). In a similar manner, model results suggest that peer influences can affect students' value beliefs, which could be beneficial in terms of encouraging students to have peers who also value academics and who work hard in school. Lastly, although value appear to be important in encouraging academic behaviors, it is important to note that values on their own do not directly influence performance. This too is important as teachers and parents can benefit from having a realistic understanding of the limits of value beliefs.

Model results also add to the large body of evidence that suggest that students' expectancy beliefs regarding whether they can do something (i.e. how confident are you that you can accomplish a given task) is of great importance, particularly in terms of predicting academic performance. This too has educational implications as there are well-respected theoretical frameworks (i.e., Bandura's sources of efficacy) which posit specific practices that influence efficacy beliefs. Knowing that setting up opportunities for students to experience success (i.e., mastery experiences) influences students' efficacy beliefs has ramifications for teaching practices as teachers should look for ways to set up mastery experiences as part of the learning process. Along these lines, teachers can also seek to build students' efficacy beliefs by setting up group activities that allow for vicarious experiences and by means of social persuasion.

Another practical implication from this study is the finding that perceptions of control are important in educational settings as these beliefs can influence motivational beliefs (i.e., expectancy-value beliefs), academic behaviors (i.e., persistence, attention focusing), as well as actual performance. The versatility of these control beliefs (i.e., whether or not I do well is completely up to me), in terms of influencing other motivational beliefs, as well as behaviors and performance, speaks to the importance of this psychological factor. Accordingly, teachers could gain valuable information by bringing up this topic as part of their class discussion (i.e., "is doing well on this assignment something that is under your control?"). Encourgaing this practice can be of value as some students may not be aware that their perceptions of control matter in terms of influencing motivation, behaviors, and performance. Further, teachers could help students attribute academic success in terms of effort ("you did well on this assignment because you worked hard") or strategy use ("you got that problem correct because you followed the steps"), practices which can help increase students' perceptions of control as effort and strategy use are aspects of learning which are under students' control.

Closing Statement and Future Directions

Educational psychology plays an important role in better understanding the acquisition of academic learning as our beliefs, attitudes, and perceptions, influence what we do (Atkinson, 1957). Research in this area has provided many insights that have the potential to enhance learning. However, the vast majority of the research done in this area has been done with a largely monolithic student population—a limitation which narrows our understanding regarding theoretical constructs. Accordingly, this study has made theoretical contributions to the expectancy-value literature as more is known about these constructs in terms of Latino high school students. For example, when considering potential differences between task utility value and task interest value, findings from this study suggest that for Latino students, interest value is a significantly stronger predictor of effort compared to utility value. This insight, though small, becomes more interesting as this finding was not observed among Caucasian students (utility value and interest value had roughly the same influence on effort)—which raises questions regarding why utility value did not function in the same way among students.

Perhaps one explanation for this difference may be related to U.S. Latino students having few academic role models in this country. If Latino students do not see Latino engineers or Latino scientists (whether in real-life or in the movies/TV shows), then it stands to reason that perceptions of utility value may not motivate Latino students as much as it does Caucasian students. Further, there is some evidence that negative media portrayals of Latinos in U.S. media can negatively impact perceptions of self among Latino high school students (Rivadeneyra, Ward, & Gordon, 2007), which adds support to the notion that Latino students may not really see themselves as engineers given that Latinos are mostly portrayed (in the media) as domestic workers (housekeepers, landscapers) or occupying other low-status occupations (Rivadeneyra et al., 2007).

In terms of future directions, findings from this study suggest that gender differences may be a fruitful area of investigation among researchers interested in U.S. Latino students. For example, correlational findings revealed that the relationships between: (a) task utility value and mathematics performance was significant only for Latina female students; (b) attention focusing and socializers' beliefs-friends was significant only for Latina students; (c) socializers' beliefs-parents and the outcome variables were all stronger for Latina students; (d) persistence and mathematics performance was significant only for Latina students; and (e) self-sustained efforts and mathematics performance was only significant for Latina students. Further investigation into any of these areas could help advance the academic research literature on Latino students. Other areas of future research could further examine the effects of peer influences (i.e., SB-F) on students' expectancy-value beliefs as peer influences had a weaker influence on task value beliefs (compared to parental influences) and no influence on students’ efficacy beliefs.

Appendix A

IRB Approval Letter

Office of Research Integrity and

Assurance

Research Hall, 4400 University Drive, MS 6D5, Fairfax, Virginia
22030 Phone: 703-993-5445; Fax: 703-993-9590

DATE: April 6, 2015

TO: Anastasia Kitsantas
FROM: George Mason University IRB

Project Title: [722888-1] EDEP

823 Proposal SUBMISSION TYPE: New

Project

ACTION: DETERMINATION OF NOT HUMAN SUBJECT RESEARCH
DECISION DATE: April 6, 2015

Thank you for your submission of New Project materials for this project. The Office of Research Integrity
& Assurance (ORIA) has determined this project does not meet the definition of human subject research under the purview of the IRB according to federal regulations.

Please remember that if you modify this project to include human subjects research activities, you are required to submit revisions to the ORIA prior to initiation.

If you have any questions, please contact Bess Dieffenbach at 703-993-5593 or edieffen@gmu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within George Mason University IRB's records.

Appendix B

2012 PISA Student Questionnaire Items (OECD, 2013)

PISA Student Questionnaire Items

Thinking about how people important to you view mathematics: How strongly do you agree with the following statements?

Socializer's Beliefs – Friends

1. Most of my friends do well in mathematics.
2. Most of my friends work hard at mathematics.
3. My friends enjoy taking mathematics.

Socializer's Beliefs – Parents

1. My parents believe it's important for me to study mathematics.
2. My parents believe that mathematics is important for my career.
3. My parents like mathematics.

Thinking about your mathematics lessons: To what extent do you agree with the following statements?

Locus of Control

1. If I put in enough effort I can succeed in mathematics.
2. Whether or not I do well in mathematics is completely up to me.
3. If I wanted to, I could do well in mathematics.

Thinking about your views on mathematics: To what extent do you agree with the following statements?

Task Interest Value

1. I enjoy reading about mathematics.
2. I look forward to my mathematics lessons.
3. I do mathematics because I enjoy it.
4. I am interested in the things I learn in mathematics.

Task Utility Value

1. Making an effort in mathematics is worth it because it will help me in the work that I want to do later on.
2. Learning mathematics is worthwhile for me because it will improve my career chances.
3. Mathematics is an important subject for me because I need it for what I want to study later on.
4. I will learn many things in mathematics that will help me get a job.

How confident do you feel about having to do the following mathematics tasks?

Mathematics Efficacy Expectancy

1. Using a train timetable to work out how long it would take to get from one place to another.
2. Calculating how much cheaper a TV would be after a 30% discount.
3. Calculating how many square meters of tiles you need to cover a floor.
4. Understanding graphs presented in newspapers.
5. Finding the actual distance between two places on a map with a 1:10,000 scale.
6. Calculating the petrol consumption rate of a car.

Thinking about the mathematics you do for school: To what extent do you agree with the following statements?

Attention Focusing

1. I pay attention in mathematics class.
2. I listen in mathematics class.
3. I avoid distractions when I am studying mathematics.

Self-Sustained Math Efforts

1. I finish my homework in time for mathematics class.
2. I work hard on my mathematics homework.
3. I am prepared for my mathematics exams.
4. I study hard for mathematics quizzes.

How well does each of the following statements below describe you?

Persistence

1. I remain interested in the tasks that I start.
2. I continue working on tasks until everything is perfect.
3. When confronted with a problem, I do more than what is expected of me.

References

Alderman, M. K. (2008). *Motivation for achievement: Possibilities for teaching and learning* (3rd ed.). New York, NY: Routledge.

Alfaro, E. C., Umaña-Taylor, A., & Bamaca, M. Y. (2006). The influence of academic support on Latino adolescents' academic motivation. *Family Relations, 55*, 279-291. http://dx.doi.org/10.1111/j.1741-3729.2006.00402.x

Andersen, L., & Ward, T. J. (2014). Expectancy-value models for the STEM persistence plans of ninth-grade, high-ability students: A comparison between Black, Hispanic, and White students. *Science Education*, *98*, 216-242. http://dx.doi.org/10.1002/sce.21092

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *64*, 359-372. http://dx.doi.org/10.1037/h0043445

Azmitia, M., & Brown, J. R. (2002). Latino immigrant parent's beliefs about the "path of life" of their adolescent children. In J. M. Contreras, K. A. Kerns, & A. M. Neal-Barnett (Eds.), *Latino children and families in the United States: Current research and future directions* (pp. 77-131). Westport, CT: Praeger Publisher.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: W. H. Freeman and Company

Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology: An International Review, 51*, 269-290. http://dx.doi.org/10.1111/1464-0597.00092

Battle, E. (1965). Motivational determinants of academic task persistence. *Journal of Personality and Social Psychology, 2*, 209-218. http://dx.doi.org/10.1037/h0022442

Battle, E. (1966). Motivational determinants of academic competence. *Journal of Personality and Social Psychology, 4*, 534-642. http://dx.doi.org/10.1037/h0021207

Bearden, W. O., Sharma, S., & Teel, J. E. (1982). Sample size effects on chi square and other statistics used in evaluating causal models. *Journal of Marketing Research, 19,* 425-430. http://dx.doi.org/ 10.2307/3151716

Bembenutty, H., Cleary, T. J., & Kitsantas, A. (2013). *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman.* Charlotte, NC: Information Age Publishing.

Bennett, C., & Okinaka, M. (1990). Factors related to persistence among Asian, Black, Hispanic, and White undergraduate at a predominantly White university: Comparison between first and fourth year cohorts. *The Urban Review, 22*, 33-60. http://dx.doi.org/10.1007/BF01110631

Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (2002). *Cross-cultural psychology: Research and methods* (2nd ed.). Cambridge, UK: Cambridge University Press

Bong, M. (2001). Role of self-efficacy and task-value in predicting college students' course performance and future enrollment intentions. *Contemporary Educational Psychology*, *26*, 553-570. http://dx.doi.org/10.1006/ceps.2000.1048

Bong, M., Cho, C., Ahn, H. S., & Kim, H. J. (2012). Comparison of self-efficacy beliefs for predicting student motivation and achievement. *The Journal of Educational Research, 105,* 336-352.

Byrnes, J. P. (2003). Factors predictive of mathematics achievement in White, Black, and Hispanic 12th graders. *Journal of Educational Psychology, 95,* 316-326. http://dx.doi.org/10.1037/0022-0663.95.2.316

Calzada, E. J., Fernández, Y., & Cortes, D. E. (2010). Incorporating the cultural value of *respeto* into a framework of Latino parenting. *Cultural Diversity and Ethnic Minority Psychology, 16*, 77-86. http://dx.doi.org/10.1037/a0016071

Cauce, A. M., & Domech-Rodriguez, M. (2002). Latino families: Myths and realities. In J. M. Contreras, K. A. Kerns, & A. M. Neal-Barnett (Eds.), *Latino children and families in the United States: Current research and future directions* (pp. 1-25). Wesport, CT: Praeger Publisher.

Ceballo, R. (2004). From Barrios to Yale: The role of parenting strategies in Latino families. *Hispanic Journal of Behavioral Science 26*, 171-186. http://dx.doi.org/10.1177/0739986304264572

Chirinos, D. S. (2016, April). *Mexican high school students' motivational beliefs, self-regulatory behaviors, and academic achievement: A structural equation model.*

Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C.

Chouinard, R., Karsenti, T., & Roy, N. (2007). Relations among competence beliefs, utility value, achievement goals, and effort in mathematics. *British Journal of Educational Psychology*, *77*(3), 501-517. http://dx.doi.org/10.1348/000709906X133589

Chun, H., & Dickson, G. (2011). A psychological model of academic performance among Hispanic adolescents. *Journal of Youth and Adolescence*, *40,* 1581-1594. http://dx.doi.org/10.1007/s10964-011-9640-z

Coleman, J. S. (1987). Families and schools. *Educational Researcher*, *16*(6), 32-38.

Conchas, G. Q. (2001). Structuring failure and success: Understanding the variability in Latino school engagement. *Harvard Educational Review*, *71,*475-504. http://dx.doi.org/10.17763/haer.71.3.280w814v1603473k

Cox, C. B. & Yang, Y. (2012). Getting off on the wrong foot: Longitudinal effects of Hispanic students' stability attributions following poor initial test performance. *Learning and Individual Differences*, *22*, 123-127. http://dx.doi.org/10.1016/j.lindif.2011.09.008

Crandall, V. J., Katkosky, W., & Preston, A. (1962). Motivational and ability determinants of young children's intellectual achievement behavior. *Child Development*, *33*, 643-661. http://dx.doi.org/10.2307/1126664

D'Andrade, R. G. (1992). Schemas and motivation. In R. G. & C. Strauss (Eds.), *Human motives and cultural models* (pp. 23-44). New York, NY: Cambridge University Press.

Delgado-Gaitan, C. (1993). Parenting in two generations of Mexican American families. *International Journal of Behavioral Development, 16*, 409-427. http://dx.doi.org/10.1177/016502549301600303

Durand, T. M. (2011). Latina mother's cultural beliefs about their children, parental roles, and education: Implications for effective and empowering home-school partnerships. *The Urban Review*, *43*(2), 255-278. http://dx.doi.org/10.1007/s11256-010-0167-5

Eccles, J. S., Adler, T., & Meece, J. L. (1984). Sex difference in achievement: A test of alternate theories. *Journal of Personality and Social Psychology, 46,* 26-43. http://dx.doi.org/10.1037/0022-3514.46.1.26

Eccles, J. S. (1987). Gender roles and women's achievement-related decisions. *Psychology of Women Quarterly*, *11*, 135-172. http://dx.doi.org/10.1111/j.1471-6402.1987.tb00781.x

Eccles, J. S. (1994). Understanding women's educational and occupational choices: Applying the Eccles et al. model of achievement-related choices. *Psychology of Women Quarterly, 18*, 585-609. http://dx.doi.org/10.1111/j.1471-6402.1994.tb01049.x

Eccles, J. S. (2005). Studying gender and ethnic differences in participation in math, physical science, and information technology. *New Directions for Child and Adolescent Development*, *110*, 7-14. http://dx.doi.org/10.1002/cd.146

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and Achievement Motivation: Psychological and Sociological Approaches* (pp. 75-146). San Francisco, CA: W. H. Freeman and Company.

Eccles, J. S., & Harold, R. D. (1991). Gender differences in sport involvement: Applying the Eccles' expectancy-value model. *Journal of Applied Sport Psychology, 3,* 7-35. http://dx.doi.org/10.1080/10413209108406432

Eccles, J. S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin*, *21*, 215-225. http://dx.doi.org/10.1177/0146167295213003

Fast, L. A., Lewis, J. L., Bryant, M. J., Bocian, K. A., Cardullo, R. A., Rettig, M., & Hammond, K. A. (2010). Does math self-efficacy mediate the effect of the perceived classroom environment on standardized math test performance? *Journal of Educational Psychology*, *102*, 729-740. http://dx.doi.org/10.1037/a0018863

Feather, N. T. (1982). Expectancy-value approaches: Present status and future directions. In Feather N. T. (ed.), *Expectations and Actions: Expectancy-Value Models in Psychology* (pp. 395-420). Hillside, NJ: Erlbaum.

Feather, N. T. (1992). Values, valences, expectations, and actions. *Journal of Social Issues*, *48*(2), 109-124. http://dx.doi.org/10.1111/j.1540-4560.1992.tb00887.x

Findley, M. J. & Cooper, H. M. (1983). Locus of control and academic achievement: A literature review. *Journal of Personality and Social Psychology*, *44*, 419-427. http://dx.doi.org/10.1037/0022-3514.44.2.419

Fry, R., & Gonzalez, S. (2008). *One-in-five and growing fast: A profile of Hispanic public school students*. Washington, DC: Pew Hispanic Center.

Fuligni, A. J., & Fuligni, A. S. (2007). Immigrant families and the educational development of their children. In J. E. Landsford, K. Deater-Deckard, & M. H. Bornstein (Eds.), *Immigrant families in contemporary society* (pp. 231-249). New York, NY: Guildford Press.

Garcia, G. N. (2000). The factors that place Latino children and youth at risk of educational failure. In R. E. Slavin & M. Calderon (Eds.), *Effective programs for Latino students* (pp. 307-329). New York, NY: Routledge.

Garcia, E. E., Jensen, B., & Cuellar, D. (2006). Early academic achievement of Hispanics in the United States: Implications for teacher preparation. *The New Educator, 2,* 123-147. http://dx.doi.org/10.1080/15476880600657215

Graham, S. (1992). Most of the subjects were white and middle class: Trends in published research on African-Americans in selected APA journals, 1979-1989. *American Psychologist, 47,* 629-639. http://dx.doi.org/10.1037/0003-066X.47.5.629

Gil, A. G., & Vega, W. A. (1996). Two different worlds: Acculturation stress and adaptation among Cuban and Nicaraguan families. *Journal of Social and Personal Relationships, 13,* 425-456. http://dx.doi.org/10.1177/0265407596133008

Gonzalez, A., Doan Holbein, M., & Quilter, S. (2002). High school students' goal orientations and their relationship to percieved parenting styles. *Contemporary Educational Psychology, 27,* 450-470. http://dx.doi.org/ 10.1006/ceps.2001.1104

Gonzalez-DeHass, A. R., Willems, P. P., & Doan Holbein, M. F. (2005). Examining the relationship between parental involvement and student motivation. *Educational Psychology Review, 17,* 99-123. http://dx.doi.org/10.1007/s10648-005-3949-7

Gonzalez-Ramos, G., Zayas, L. H., & Cohen, E. V. (1998). Child-rearing values of low income, Puerto Rican mothers of preschool children. *Professional Psychology: Research and Practice*, *29*, 377-382. http://dx.doi.org/10.1037/0735-7028.29.4.377

Halgunseth, L. C., Ispa, J. M., & Rudy, D. (2006). Parental control in Latino families: An integrated review of the literature. *Child Development*, *77*(5), 255-278. http://dx.doi.org/10.1111/j.1467-8624.2006.00934.x

Hemphill, F. C., & Vanneman, A. (2011). *Achievement gaps: How Hispanic and White students in public schools perform in mathematics and reading on the National Assessment of Education Progress* (NCES 2011-459). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Hofer, B. K., & Bendixen, L. D. (2012). Personal epistemology: Theory, research, and future directions. In K. R. Harris, S. Graham, T. Urdan, C. B. McCormick, G. Sinatra, & J. Sweller (Eds.), *APA educational psychology handbook, volume 1: Theories, constructs, and critical issues* (pp. 227-256). Washington DC: American Psychological Association.

Hong, E., Peng, Y., & Rowell, L. L. (2009). Homework self-regulation: Grade, gender and achievement-level differences. *Learning and Individual Differences, 19*, 269-276. http://dx.doi.org/10.1016/j.lindif.2008.11.009

Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structural analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55. http://dx.doi.org/10.1080/10705519909540118

Hulleman, C. S., Barron, K. E., Kosovich, J. J., & Lazowski, R. A. (2016). Student motivation: Current theories, constructs, and interventions within an expectancy-value framework. In *Psychosocial Skills and School Systems in the 21st Century* (pp. 241-278). New York, NY: Springer International Publishing.

Hurtado, A. (1995). Variations, combinations, and evolutions: Latino families in the United States. In R. E. Zambrana (Eds.), *Understanding Latino families: Scholarship, policy, and practice* (pp.40-61). Thousand Oaks, CA: Sage Publications.

Izzo, C.V., Weissberg, R. P., Kaspow, W. J., & Fendrich, M. (1999). A longitudinal assessment of teacher perceptions of parent involvement in children's education and school performance. *American Journal of Community Psychology, 6*, 817-839. http://dx.doi.org/ 10.1023/A:1022262625984

Joo, Y. J., Lim, K. Y., & Kim, J. (2013). Locus of control, self-efficacy, and task value as predictors of learning outcomes in an online university context. *Computers and Education*, *62*, 149-158. http://dx.doi.org/10.1016/j.compedu.2012.10.027

Katsberg, D., Roey, S., Lemanski, N., Chan, J. Y., & Murray, G. (2014). *Technical report and user guide for the Program for International Student Assessment (PISA).* (NCES 2014-25). U.S. Department of Education. Washington, D.C.: National Center for Education Statistics.

Kingston, P. W., Hubbard, R., Lapp, B., Schroeder, P., & Wilson, J. (2003). Why education matters. *Sociology of Education*, *76*, 53-70. http://dx.doi.org/ 10.2307/3090261

Kitsantas, A., Cheema, J., & Ware, H. W. (2011). Mathematics achievement: The role of homework and self-efficacy beliefs. *Journal of Advanced Academics, 22,* 310-339. http://dx.doi.org/10.1177/1932202X1102200206

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: The Guildford Press.

Kuhlberg, J. A., Peña, J. B., & Zayas, L. H. (2010). Familism, parent-adolescent conflict, self-esteem, internalizing behaviors and suicide attempts among adolescent Latinas. *Child Psychiatry & Human Development, 41,* 425-440. http://dx.doi.org/10.1007/s10578-010-0179-0

La Roche, M. J., & Shriberg, D. (2004). High stakes exams and Latino students: Toward a culturally sensitive education for Latino children in the United States. *Journal of Educational and Psychological Consultation*, *15*(2), 205-223. http://dx.doi.org/10.1207/s1532768xjepc1502_8

Lee, W., Lee, M-J., & Bong, M. (2014). Testing interest and self-efficacy as predictors of academic self-regulation and achievement. *Contemporary Educational Psychology, 39,* 86-99. http://dx.doi.org/10.1016/j.cedpsych.2014.02.002

Lewin, K. (1938). *The conceptual representation and the measurement of psychological forces*. Durham, NC: Duke University Press.

Liem, A. D., Lau, S., & Nie, Y. (2008). The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome. *Contemporary Educational Psychology*, *33*(4), 486-512. http://dx.doi.org/10.1016/j.cedpsych.2007.08.001

Marchant, G. J., Paulson, S. E., & Rothlisberg, B. A. (2001). Relations of middle school students' perceptions of family and school contexts with academic achievement. *Psychology in the Schools*, *38,* 505-519. http://dx.doi.org/ 10.1002/pits.1039

Markus, H.R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*, 224-253. http://dx.doi.org/10.1037/0033-295X.98.2.224

Meece, J. L., Eccles, J. S., & Wigfield, A. (1990). Predictors of math anxiety and its influence on young adolescents' course enrollment intentions and performance in mathematics. *Journal of Educational Psychology, 82,* 60-70. http://dx.doi.org/10.1037/0022-0663.82.1.60

Mena, J. A. (2011). Latino parent home-based practices that bolster student academic persistence. *Hispanic Journal of Behavioral Sciences, 33*, 490-506. http://dx.doi.org/10.1177/0739986311422897

Mintrum, L., & Lambert, W. (1964). *Mothers of six cultures—antecedents of childrearing*. New York, NY: Wiley.

Morling, B., & Kitayama, S. (2008). Culture and motivation. In J. Y. Shah & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 417-433). New York, NY: The Guildford Press.

OECD (2013a). *PISA 2012 results: What students know and can do*. Paris, France: OECD Publishing.

OECD (2013b). *PISA 2012 results: Ready to learn: Students' engagement, drive, and self-beliefs* (vol. III). Paris, France: OECD Publishing.

OECD (2013c). Context Questionnaires Framework. *In PISA 2012 assessment and analytical framework: Mathematics, reading, science, problem solving, and financial literacy*. Paris, France: OECD Publishing.

OECD (2013d). *PISA 2012 assessment and analytical framework: Mathematics, reading, science, problem-solving, and financial literacy*. Paris, France: OECD Publishing.

Papalia, D. E., & Feldman, R. D. (2012). *Experience human development* (12th ed.). New York, NY: McGraw-Hill.

Pajares, F. (2008). Motivational role of self-efficacy beliefs in self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and application* (pp. 111-168). New York, NY: Routledge.

Pajares, F., & Miller, D. (1994). Role of self-efficacy and self-concept beliefs in mathematical problem solving: A path analysis. *Journal of Educational Psychology, 86*, 193-203. http://dx.doi.org/10.1037/0022-0663.86.2.193

Passel, J. F., & Cohn, D. (2008). *U.S. population projections: 2005-2050*. Retrieved from Pew Hispanic Center website: http://www.pewhispanic.org/2008/02/11/us-population-projections-2005-2050/

Passel, J. F., Cohn, D., & Lopez, M. H. (2011). *Census 2010: 50 million Latinos*. Retrieved from Pew Hispanic Center website: http://www.pewhispanic.org/files/reports/140.pdf

Pew Hispanic Center. (2009). *Between two worlds: How young Latinos come of age in America*. Washington, DC: Pew Research Center. Retrieved from http://www.pewhispanic.org/2009/12/11/between-two-worlds-how-young-latinos-come-of-age-in-america/

Phillips, J. M. & Gully, S. M. (1997). Role of goal orientation, ability, need for achievement, and locus of control in self-efficacy and goal-setting process. *Journal of Applied Psychology, 82,* 792-802. http://dx.doi.org/10.1037/0021-9010.82.5.792

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, *82*, 33-40. http://dx.doi.org/10.1037/0022-0663.82.1.33

Pintrich, P. R., Roeser, R. W., & De Groot, E. A. M. (1994). Classroom and individual differences in early adolescents' motivation and self-regulated learning. *Journal of Early Adolescence, 14,* 139-161. http://dx.doi.org/10.1177/027243169401400204

Ramirez, R. R., & de la Cruz, P. G. (2003). *The Hispanic population in the United States: March 2002* (P20-545). U.S. Census Bureau, U.S. Department of Commerce, Economic and Statistics Administration. Washington, DC. Retrieved from https://www.census.gov/prod/2003pubs/p20-545.pdf

Riconscente, M. (2014). Effects of perceived teacher practices on Latino high school students' interest, self-efficacy, and achievement in mathematics. *The Journal of Experimental Education*, *82*, 51-73. http://dx.doi.org/10.1080/00220973.2013.813358

Rivadeneyra, R., Ward, L. M., & Gordon, M. (2007). Distorted reflections: Media exposure and Latino adolescents' conceptions of self. *Media Psychology*, *9*(2), 261-290. http://dx.doi.org/10.1080/15213260701285926

Rokeach, M. (1980). Some unresolved issues in theories of beliefs, attitudes, and values. *In M. M. Page (Ed.), Nebraska symposium on motivation* (Vol. 20, pp. 261-304). Lincoln, NE: University of Nebraska Press.

Ross, C. E. & Broh, B. A. (2000). The role of self-esteem and the sense of personal control in the academic achievement process. *Sociology of Education, 73,* 270-284. http://dx.doi.org/10.2307/2673234

Rotter, J. B. (1954). *Social learning and clinical psychology.* New York, NY: Prentice Hall

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80,* 1-28. http://dx.doi.org/10.1037/h0092976

Ryan, A. M. (2000). Peer groups as a context for the socialization of adolescent's motivation, engagement, and achievement in school. *Educational Psychologist, 35,* 101-111. http://dx.doi.org/10.1207/S15326985EP3502_4

Schreiber, J. B., Stage, F. K., King, J., Nora, A., & Barlow, E. A. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, *99,* 323-337. http://dx.doi.org/10.3200/JOER.99.6.323-338

Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications* (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Schunk, D. H., & Usher, E. L. (2013). Barry J. Zimmerman's theory of self-regulated learning. In H. Bembenutty, T. Cleary, & A. Kitsantas (Eds.), *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman* (pp. 1-28). Charlotte, NC: Information Age Publishing.

Schunk, D. H., & Zimmerman, B. J. (2008). *Motivation and self-regulated learning: Theory, research, and applications.* New York, NY: Routledge.

Shechter, O. G., Durik, A. M., Miyamoto, Y., & Harackiewicz, J. M. (2011). The role of utility value in achievement behavior: The importance of culture. *Personality and Social Psychology Bulletin*, *37*, 303-317. http://dx.doi.org/10.1177/0146167210396380

Simzar, R. M., Martinez, M., Rutherford, T., Domina, T. & Conley, A. M. M. (2015). Raising the stakes: How students' motivation for mathematics associates with high- and low-stakes test achievement. *Learning and Individual Differences, 39,* 49-63. http://dx.doi.org/10.1016/j.lindif.2015.03.002

Slavin, R. E., & Calderon, M. (Eds.). (2000). *Effective programs for Latino students.* New York, NY: Routledge.

Steinberg, L., Lamborn, S. D., Dornbusch, S. M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Development*, *63*, 1266-1281. http://dx.doi.org/ 10.1111/j.1467-8624.1992.tb01694.x

Stevens, T., Olivarez, A., Lan, W. Y., & Tallent-Runnels, M. K. (2004). Role of mathematics self-efficacy and motivation in mathematics performance across ethnicity. *The Journal of Educational Research*, *97*, 208-221. http://dx.doi.org/10.3200/JOER.97.4.208-222

Suarez-Orozco, C., & Suarez-Orozco, M. M. (1995). *Transformations: Immigration, family life, and achievement motivation among Latino adolescents.* Stanford, CA: Stanford University Press.

Suizzo, M. & Soon, K. (2006). Parental academic socialization: Effects of home-based parental involvement on locus of control across U.S. ethnic groups. *Educational Psychology*, *26*, 827-846. http://dx.doi.org/10.1080/01443410600941961

Tolman, E. C. (1932). *Purposive behavior in animals and men*. New York, NY: Appleton-Century-Crofts.

Trevino, N. N., & DeFreitas, S. C. (2014). The relationship between intrinsic motivation and academic achievement for first generation Latino college students. *Social Psychology of Education*, *17*, 293-306. http://dx.doi.org/10.1007/s11218-013-9245-3

Urdan, T. (2012). Factors affecting the motivation and achievement of immigrant students. In K. R. Harris, S. Graham, T. Urdan, S. Graham, J. M. Royer, & M. Zeidner (Eds.), *APA educational psychology handbook, volume 2: Individual differences and cultural and contextual factors* (pp. 293-313). Washington, DC: American Psychological Association.

U.S. Bureau of Labor Statistics (2016). *Employment projections.* Retrieved from: http://www.bls.gov/emp/ep_chart_001.htm

U.S. Census Bureau (1997). *The Hispanic population in the U.S.: March 1997*. Retrieved from: https://www.census.gov/prod/3/98pubs/p20-511.pdf

U.S. Census Bureau (2010). *The Hispanic population in the U.S.: 2010.* Retrieved from: http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf

U.S. Department of Education, National Center for Educational Statistics (2003, June). *The condition of education 2003* (NCES 2003-067). Washington, DC: Author. Retrieved from: http://nces.ed.gov/pubs2003/2003067.pdf

U.S. Department of Education, National Center for Educational Statistics (2005, June). *The condition of education 2005* (NCES 2005-094). Washington, DC: Author. Retrieved from: http://nces.ed.gov/pubs2005/2005094.pdf

U.S. Department of Education, National Center for Educational Statistics (2010, May). *The condition of education 2010* (NCES 2010-028). Washington, DC: Author. Retrieved from: http://nces.ed.gov/pubs2010/2010028.pdf

U.S. Department of Education, National Center for Education Statistics. (2010). *The condition of education 2010* (NCES 2010-028), Table A-19-2. Retrieved from http://nces.ed.gov/pubs2010/2010028.pdf

Valdes, G. (1996). *Con respeto: Bridging the distances between culturally diverse families and schools: An ethnographic portrait*. New York, NY: Teachers College Press.

Valencia, R. R. (Ed.) (1997). *The evolution of deficit thinking: Educational thought and practice.* London, UK: Routledge Falmer.

Valencia, R. R., & Black, M. S. (2002). "Mexican-Americans don't value education!"—On the basis of the myth, mythmaking, and debuking. *Journal of Latinos and Education, 1,* 81-103. http://dx.doi.org/ 10.1207/S1532771XJLE0102_2

Vega, W. A. (1995). The study of Latino families: A point of departure. In R. E. Zambrana (Eds.), *Understanding Latino families: Scholarship, policy, and practice* (pp.3-17). Thousand Oaks, CA: Sage Publications.

Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques.* Thousand Oaks, CA: Sage Publications.

Weiner, B. (1986). *An attributional theory of motivation and emotion.* New York, NY: Springer-Verlag.

Weiner, B. (1990). History of motivational research in education. *Journal of Educational Psychology, 82*, 616-622. http://dx.doi.org/10.1037/0022-0663.82.4.616

Wentzel, K. R. & Wigfield, A. (1998). Academic and social motivational influences on students' academic performance. *Educational Psychology Review, 10,* 155-175. http://dx.doi.org/10.1023/A:1022137619834

Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review, 6,* 49-78. http://dx.doi.org/10.1007/BF02209024

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*, 265-310. http://dx.doi.org/10.1016/0273-2297(92)90011-P

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81. http://dx.doi.org/10.1006/ceps.1999.1015

Wigfield, A., & Eccles, J. S. (2002). *Development of achievement motivation.* San Diego, CA: Academic Press.

Wilhite, S. C. (1990). Self-efficacy, locus of control, self-assessment of memory ability, and study activities as predictors of college course achievement. *Journal of Educational Psychology, 82*, 696-700. http://dx.doi.org/10.1037/0022-0663.82.4.696

Wise, S. L., & DeMars, C. E. (2005). Low examinee effort in low-stakes assessment: Problems and potential solutions. *Educational Assessment*, *10*(1), 1-17.

Wolters, C. A., & Pintrich, P. R. (1998). Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms. *Instructional Science*, *26*(1-2), 27-47. http://dx.doi.org/10.1023/A:1003035929216

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekarts, P. Pintrich, & M. Siedner (Eds.), *Self-regulation: Theory, research, and applications* (pp.13-39). Orlando, FL: Academic Press.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal, 45*, 166-183. http://dx.doi.org/10.3102/0002831207312909

Zimmerman, B. J., Bandura, A., & Martinez-Pons (1992). Self-motivational attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal*, *29*, 663-676. http://dx.doi.org/10.3102/00028312029003663

Zimmerman, B. J. & Kitsantas, A. (2005). Homework practices and academic achievement: The mediating role of self-efficacy and perceived responsibility beliefs. *Contemporary Educational Psychology*, *30*, 397-417. http://dx.doi.org/10.3102/00028312029003663

Zimmerman, B. J., & Schunk, D. H. (2003). *Educational psychology: A century of contributions.* New York, NY: Routledge.

Biography

David S. Chirinos was born in Arica, Chile. Along with his family, David immigrated to the United States at age nine. David graduated from Berkmar High School in Lilburn, Georgia. David earned a Bachelors of Science degree in Psychology from Utah State University, a Masters of Science degree in Educational Psychology from George Mason University, and a Doctor of Philosophy degree in Education, with a Specialization in Educational Psychology, from George Mason University. David's main area of interest lie at the intersection of self-regulated learning, academic motivation, and Latino student achievement.