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Parental Autonomy Support in Academically Talented Adolescents: Evaluating Predictors, Mediators, and Moderators for Academic Outcomes

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Parental Autonomy Support in Academically Talented Adolescents: Evaluating Predictors, Mediators, and Moderators for Academic Outcomes

by

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Committee in charge:

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Professor Susan Holloway
Professor Qing Zhou

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Abstract

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In this study, the associations between parenting type (autonomy supportive or controlling) and academic outcomes (achievement, enjoyment, and effort) were examined in a large group ($N = 656$) of high achieving adolescents enrolled in an academic summer program. Mediators and moderators were also examined. Results from the study indicated that perceived autonomy support and controlling parenting did not meaningfully predict academic achievement, enjoyment, and effort. With regards to mediation analyses, intrinsic motivation mediated the association between perceived autonomy support and all academic outcomes. Perceived competence was also found to mediate the relationship between perceived autonomy support and academic achievement and enjoyment, but to a lesser degree than intrinsic motivation. Hierarchical linear regression analyses showed that the association between parenting type and final course grades was not moderated by students' GPA. Further, results indicated that the decision to attend the program variable accounted for more variance in predicting course grades than the perceived autonomy support scale. Finally, with respect to cross-cultural analyses, on average, Asian American students perceived their parents to be more controlling and less autonomy supportive than European American students. However, group membership did not moderate the association between perceived parenting types and academic achievement. The implications and limitations of the findings are discussed.

Keywords: autonomy supportive parenting, intrinsic motivation, academic achievement, Asian American, self-determination theory

Contents

List of Figures

List of Tables

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Parental Autonomy Support in Academically Talented Adolescents: Evaluating Predictors, Mediators, and Moderators for Academic Outcomes

According to the National Center for Education Statistics' annual report on the progress of education in the United States (U.S. Department of Education, 2016), only 25% of 12th-grade students are at or above proficient in math and 37% are at or above proficient in reading. Furthermore, math performance in fourth and eighth graders and reading performance in eighth graders has decreased from 2013 to 2015 (U.S. Department of Education, 2016). As a result, researchers have made attempts to better understand how to promote learning outcomes and student engagement both at school and at the home. Because parents are major agents of socialization, there have been efforts to better understand the multiple ways that parents support their children's schooling across the home, school, and community settings. However, much of the research on parent engagement has focused on the activities that parents engage in, rather than on *how* they engage (McWayne, 2015; Pomerantz, Moorman, & Litwack, 2007). That is, little is known about how the quality of parents' engagement predicts motivation and academic success. Understanding the quality of parent engagement is critical because it has implications for how children interpret the engagement and, ultimately, the effectiveness of parents' involvement (Pomerantz et al., 2007). Pomerantz and colleagues (2007) argued that parent engagement with children's schooling that encompasses an autonomy supportive rather than controlling style may be particularly beneficial to children and adolescents.

One social-cognitive theory of motivation, self-determination theory (SDT; Deci & Ryan, 1985) has suggested that promoting autonomy is one of three universal needs required for healthy development. The other two innate needs, relatedness and competence, will be discussed in greater detail in the following sections. Ryan, Deci, and Grolnick (1995) defined autonomy as

> The extent that one is operating agentically, from one's core sense of self. To be autonomous thus means to be *self*-initiating and *self*-regulating. In contrast, to the extent that one feels coerced or seduced into behaving—with one's actions not emanating from one's core sense of self—one would not be described as autonomous. (p. 621)

SDT suggests that without autonomy, the desire to pursue an activity for its own sake in lieu of an external reward (i.e., intrinsic motivation) is seriously undermined (Grolnick, 2003). Additionally, some scholars have argued that autonomy granting is particularly relevant and critical for adolescents who face the unique task of becoming independent from their parents during this developmental stage (Steinberg, 1990; Steinberg, Elmen, & Mounts, 1989, Wentzel & Battle, 2001).

Autonomy supportive parenting promotes children's intrinsic motivational resources (Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993; Grolnick, Frodi, & Bridges, 1984). A growing body of research suggests that parents who support their children's autonomy may be particularly effective in promoting school achievement (Grolnick & Ryan, 1989), positive school affect (Annear & Yates, 2010), and engagement (Ng, Kenney-Benson, & Pomerantz, 2004) in their children. Furthermore, scholars have documented the positive outcomes associated with autonomy support-

ive parenting in students of all ages (Grolnick et al., 1984; Grolnick & Ryan, 1989; Steinberg et al., 1989; Turner, Chandler, & Heffer, 2009).

Although there is evidence that parenting style predicts achievement in youth, the child's level of achievement likely moderates this relationship (Pomerantz et al., 2007). Past empirical research has found that lower achieving students benefit more from autonomy supportive parenting than higher achieving students (Ng et al., 2004). However, few studies have examined the relationship between autonomy supportive parenting and academic variables in samples of academically talented individuals.

There is a need for additional research on how the quality of parent engagement affects academic outcomes in high achieving individuals. The current study is designed to study this question by examining how children's competency experiences moderate the effects of parental autonomy support on academic achievement, enjoyment, and effort. Currently, there are only a handful of studies that examine whether high achieving students also benefit from environments that satisfy their autonomy needs (Garn, Matthews, & Jolly, 2010; Ng et al., 2004). Additionally, past studies have focused on the relationship between autonomy support and academic achievement, rather than on scholastic enjoyment and effort. I will address the gaps in the literature by focusing on a large group of academically talented adolescents as well as several academic outcomes.

In this thesis, I will first provide brief background information on the use of control and autonomy in research on parent-child relationships. Secondly, I will provide an overview of self-determination theory, focusing on the psychological need for autonomy. Thirdly, I will discuss autonomy supportive parenting and its influence on intrinsic motivation. I will then review the literature on autonomy supportive parenting, academically talented students, and the outcome variables, academic achievement, enjoyment, and effort. Finally, I will present a study showing the effects of perceived autonomy supportive parenting on the outcomes of interest in academically talented adolescents. Mediator and moderator analyses will also be conducted.

Early Research on Parenting Socialization

Preliminary studies have focused on parents' use of control as a key area of interest. For example, after studying the inner workings of families, Baumrind (1967, 1991) suggested that parenting styles can be classified into three categories: authoritarian, authoritative, and permissive. Each category is correlated with different child outcomes. According to Baumrind (1967), authoritarian parents attempt to control their child's behavior and attitudes, value obedience and respect for authority figures, and discourage verbal negotiation. Permissive or lenient parents are not controlling and place few demands and punishments on their child. Lastly, the authoritative parenting style is marked by high demands and high responsiveness; authoritative parents are firm in their requests, allow for verbal give and take, and affirm their child's independence and growing sense of autonomy.

Maccoby and Martin (1983) later proposed that the three parenting styles also differ with respect to their level of demandingness (i.e., control) and responsiveness (i.e., warmth). Steinberg and colleagues (1989) found that a crucial component of an authoritative parenting style is the emphasis on autonomy granting. In fact, SDT, (Deci & Ryan, 1985) suggests that promoting au-

tonomy is one of three universal needs required for healthy development. In the present study, control and autonomy support were conceptualized using SDT.

Self-Determination Theory

SDT suggests that children are born with an inherent desire to be active, explore their environments, and be agentic (Grolnick, 2003). Social environments, however, can influence children's thoughts, behaviors, attitudes, and intrinsic motivation (Deci & Ryan, 2012). Ryan and Deci (2000) defined intrinsic motivation as "doing an activity for the inherent satisfaction of the activity itself" (p. 71). SDT posits that there are three universal ingredients that affect motivation and development: competence (i.e., the belief that outcomes are attainable), relatedness (i.e., developing satisfying social connections), and autonomy (i.e., initiating and regulating outcomes; Deci & Ryan, 1985). Deci and Ryan (1985) proposed that all three factors are required for natural development to occur, irrespective of cultural background and belief systems. Accordingly, they proposed that environments that support psychological needs for competence, relatedness, and autonomy also support intrinsic motivation, growth, and well-being, alongside enjoyment and interest. In this paper, I will focus on the psychological need for autonomy, as it relates to parenting, because it has been identified as a psychological construct that is particularly important for adolescents (Wentzel & Battle, 2001).

Autonomy. In the context of SDT, autonomy is operationalized as acting with volition. To be autonomous necessitates that individuals perceive they are the source of their own behaviors (Deci & Ryan, 2012). Autonomous actions create a situation in which people have a perceived internal locus of causality and see their behavior as a manifestation of a choice they made (Deci & Ryan, 1985). Ryan and Deci (2000) conceptualized autonomy as living as one's true self, which means that an individual behaves in a manner that is authentic and consistent with her needs and desires. Autonomy is therefore distinct from independence, individualism, or non-reliance on other people or environmental influences (Deci & Ryan, 2012; Ryan & Deci, 2000). In the following section, I will highlight the differences between autonomy supportive and controlling environments and how individual factors can define how an environment is construed.

Autonomy supportive vs. controlling environments. Environments can support or hinder autonomous behavior (Deci & Ryan, 2012). An autonomy supportive environment refers to a context in which a person of authority takes into account others' opinions and thoughts, provides rationales, and gives choices and opportunities for problem-solving (Deci & Ryan, 1985; Zhou, Ma, & Deci, 2009). For example, in the classroom, an autonomy supportive teacher might elicit student feedback on the course content and lesson plans (Reeve & Jang, 2006). Autonomy supportive climates can in turn facilitate autonomous events and promote positive development. This type of environment is in contrast to those climates deemed controlling (Deci & Ryan, 1987).

In a controlling environment, an authority figure demands and coerces others to behave and think in a certain way and is less interested in taking into consideration individual interests (Grolnick, 2009). Reeve and Jang (2006) argued that authority figures often use rewards or punishments in controlling environments to elicit behaviors consistent with their agenda. This process can result in motivation that is contrived and weaker than motivation elicited from individual interests,

values, and needs (Reeve, Deci, & Ryan, 2004). In contrast to autonomous environments, in environments that are controlling, people are pressured to think, act, or behave in a certain way and do not have the ability to make choices. Because personal choice is not supported, behavior is perceived to be influenced by external forces and therefore is said to have an external rather than internal locus of causality. The type of control that is discussed here should be contrasted with structure and having high expectations and demands for youth (Grolnick, 2003). Rather, the latter type of control is beneficial and does not undermine children's ability to act agentically in their environment (Grolnick, 2003).

Individual factors that influence autonomy support and control. Individuals can differ regarding whether they perceive an environment to be autonomy supportive or controlling (Grolnick, 2003; Ryan & Grolnick, 1986). The same environment can be construed as highly autonomous by one student and highly controlling by another. For instance, in their study of 140 elementary-aged students, Ryan and Grolnick (1986) found large variations in whether children perceived that their teacher was autonomy supportive or controlling. They concluded that the functional significance of the environment (i.e., how an individual construes his environment) is an important variable of interest to consider (Ryan & Grolnick, 1986). Similarly, individual children may elicit opposing behaviors from adults (Grolnick, 2003). Two siblings with different temperaments can draw very different parent orientations regarding autonomy.

A child's current level of development also influences parenting approaches (Grolnick, 2003); a preschooler, of course, will have notable differences in her needs for autonomy when compared with a college student. There may also be a bi-directional effect such that students who are more competent and exhibit certain traits also elicit different parental responses and levels of autonomy support (Pomerantz et al., 2007). A discussion of how competence moderates the relationship between parental autonomy support and achievement will be described in greater detail. It appears that an authority figure's autonomous or controlling orientation interacts with an individual's personality characteristics and current developmental and competence levels to contribute to the person's functional significance or subjective account of the environment.

In addition to the characteristics of the child, other factors such as parents' role construction (i.e., the role that parents believe they should take with regards to their children's schooling; Hoover-Dempsey & Sandler, 1997), psychological functioning, availability of resources, social support (Belsky, 1984), and cultural background (Holloway & Kunesh, 2015) are also associated with differences in parenting styles and practices. In the next section, I will focus on the role of culture in influencing parenting behaviors.

Culture. Cultures are often described as individualist or collectivist (Grusec, 2011; Oyserman, Coon, & Kemmelmeier, 2002). Individualistic cultures (e.g., Western countries) tend to value autonomy, independence, democratic parenting, whereas collectivist cultures (e.g., Asian countries) emphasize the importance of family, family obligations, and obedience (Chao & Tseng, 2002). This categorization has been extended to parenting styles by suggesting that individualistic cultures are more likely to practice authoritative parenting and collectivist cultures such as Asian Americans are more likely to practice authoritarian parenting (Chao & Tseng, 2002). However, the categorization of individualistic and collectivistic cultures has been criticized for a number of reasons (Oyserman et al., 2002). First, researchers have not been in agreement regarding the oper-

ationalization of these constructs. Second, it has been established that there exists a great diversity of viewpoints within both individualistic and collectivistic cultures. Third, effect sizes reported in studies examining the effects of cultural worldview on psychological functioning and behaviors have been small.

Several researchers have examined whether cultural background moderates the effects of parenting styles on child well-being and academic achievement (Chao & Tseng, 2002). For example, Dornbusch, Ritter, Leiderman and Roberts (1987) found that an authoritative parenting style, which is marked by high parental autonomy support and more democratic practices, was significantly but modestly associated with greater school achievement for European American students ($\beta = .05, p < .05$). An authoritative parenting style was not significantly associated with greater achievement for Asian American students ($\beta = -.07, p > .05$). However, the effect sizes were small for both correlations. They further found that an authoritarian style, which is marked by low autonomy support, was negatively and moderately associated with academic achievement for both European American ($\beta = -.26, p < .001$) and Asian American students ($\beta = -.19, p < .001$). Parenting style, in combination with socioeconomic background and other demographic variables, predicted moderate amounts of variance in grades for European American students (14%) and Asian students (16%).

Focusing on one Asian American subgroup, Chinese Americans, Chao (2001) found that an autonomy supportive authoritative parenting style was not significantly correlated with improved grades for first generation Chinese adolescents ($r = .06, p > .05$) but was significantly and modestly correlated with improved grades for second generation Chinese ($r = .20, p < .01$) and European American adolescents ($r = .25, p < .01$). A more controlling authoritarian parenting style was not significantly or practically associated with achievement for first generation Chinese ($r = .02, p > .05$), second generation Chinese ($r = -.02, p > .05$), and European American adolescents ($r = -.14, p > .05$). Although not statistically or practically significant, the association between authoritarian parenting and grades was the strongest for European American students.

With regards to academic effort, Chao (2001) found there to be a positive and moderate association between authoritative parenting and school effort for European American adolescents ($r = .25, p < .01$) and second generation Chinese American adolescents ($r = .28, p < .01$), but not for first generation Chinese American adolescents ($r = .14, p > .05$). Authoritarian parenting was not significantly or practically associated with effort for first generation Chinese students ($r = .01, p > .05$) and for second generation Chinese student ($r = -.04, p > .05$). However, authoritarian parenting was significantly yet modestly correlated with decreased effort for European American adolescents ($r = -.15, p < .05$). In the study, an authoritarian parenting style was generally not associated with grades and effort. One exception was that, within the subgroup of European American students, an authoritarian parenting style predicted reduced academic effort. Further, second generation Chinese American adolescents generally had similar characteristics to European American students, suggesting that the generation status of an individual is important to consider in cross-cultural analyses.

More recently, using a three-wave longitudinal design, Kim, Wang, Orozco-Lapray, Shen, and Murtuza (2013) studied a sample of Chinese American adolescents over the course of early adolescence, middle adolescence, and emerging adulthood. The sample mostly consisted of first gen-

eration Chinese Americans; seventy-five percent of the sample was born in the United States to parents who had immigrated from China. In their study, Kim and colleagues identified four parenting profiles, which were distinguished by their levels of warmth and control. The majority of the mothers and fathers in the study were characterized as having a supportive parenting style. A supportive parenting style refers to parents who promote autonomy, encourage communication, and utilize low levels of control and shaming, and is similar to Baumrind's (1967) authoritative parenting profile. Using student and parent reports, Kim et al. measured the associations between parenting profiles and adolescent outcomes across the three waves. They found that across the adolescent groups, supportive parenting was associated with positive outcomes, including increased grade point averages ($\beta = .13$ to $.28, p < .01$) and academic attainment ($\beta = .18$ to $.24, p < .01$). A supportive parenting style was also significantly correlated with fewer negative outcomes, including decreased academic pressure ($\beta = -.33$ to $-.16, p < .01$), depressive symptoms ($\beta = -.40$ to $-.13, p < .01$), and feelings of alienation from their parents ($\beta = -.51$ to $-.16, p < .01$). Effect sizes, as measured by standardized coefficients, ranged between small to medium, depending on the outcomes measured.

Overall, there is inconsistent evidence regarding whether Asian American, and more specifically Chinese American, students benefit from autonomy supportive parenting. Further, generation status is an important moderating factor (Chao, 2001) that is often overlooked in studies (Holloway & Kunesh, 2015). In the following section, the effects of autonomy supportive parenting on academic factors and adolescent well-being will be reviewed.

Autonomy Supportive Parenting

Autonomy supportive parents encourage verbal give-and-take with their children, provide choices when possible, communicate in an open and non-controlling manner, and encourage initiative (Deci & Ryan, 2012). In autonomy supportive environments, parents provide their children with rationales for expected behaviors instead of providing expectations without context and reasoning. Moreover, parents who support autonomy also tend to support relatedness and competence (Deci & Ryan, 2012). For instance, when approached for assistance with a difficult math problem, an autonomy supportive interaction between a parent and child will likely involve a discussion of the problem and encouragement to try strategies the child sees fit. In contrast, a controlling parent would likely tell their child how to solve the problem, eliciting little feedback and individual agency. At a school event such as an open-house, autonomy supportive parents may suggest that their child show them around and choose which projects to focus their attention on. Controlling parents, on the contrary, might lead the tour and not permit their child to take initiative. According to SDT, providing autonomy support promotes and facilitates integration of values, and reinforces self-regulated behavior and problem-solving (Grolnick & Ryan, 1989).

There is a positive association between autonomy supportive parent-child interactions and academic, social, and psychological outcomes (Deci, Schwartz, Sheinman, & Ryan, 1981; Ginsburg & Bronstein, 1993; Grolnick, Deci, & Ryan, 1997). Autonomy supportive parenting is related to increased motivation (Grolnick et al., 1984), increased self-regulation (Grolnick & Ryan, 1989), and greater feelings of connectedness and closeness with parents (Avery & Ryan, 1988). Further-

more, scholars have documented the benefits of parental autonomy support during early childhood (Grolnick et al., 1984), middle childhood (Grolnick & Ryan, 1989), adolescence (Steinberg et al., 1989), and even during the college years (Turner et al., 2009). On the basis of a longitudinal study, Hess and McDevitt (1984) suggested that the academic benefits of autonomy support span across developmental periods. Furthermore, in a study examining Russian and American adolescents, Chirkov and Ryan (2001) demonstrated that the positive relationship between autonomy supportive parenting, academic motivation, and well-being is present in both national contexts.

Mediators. Pomerantz and colleagues (2007) proposed two explanations for why students may benefit academically from autonomy supportive parenting styles. First, parents who provide opportunities for their children to solve problems on their own give their children opportunities to build and develop their skills and perceptions of competence (Grolnick & Ryan, 1989). In a study of 302 middle schoolers, Grolnick and Slowiaczek (1994) assessed whether children's perceived competence (among other variables) mediated the relationship between parent involvement and academic achievement. They found that children's perceived competence was one of the mechanisms through which parent engagement positively influenced academic achievement. However, a limitation of this study was that parent engagement was measured in terms of the activities that parents engage in (i.e., behavioral, personal, intellectual) rather than the quality of the engagement (i.e., autonomy supportive or controlling). Lastly, in a recent meta-analysis, Vasquez, Patall, Fong, Corrigan, and Pine (2015) examined 36 published and unpublished studies that explored the effect of autonomy supporting behavior on psychosocial and academic outcomes. Vasquez and colleagues found that the correlation between parental autonomy support and perceived competence was small ($r = .21$).

Secondly, parents who are autonomy supportive increase their children's sense of intrinsic motivation by allowing their children to display initiative and control over their surroundings (Zuckerman, Porac, Lathin, Smith, & Deci, 1978). In contrast, controlling parents may decrease their child's sense of competence and freedom. To illustrate, in one study, Grolnick and colleagues (1984) examined how mothers' interactions with their one-year-old children influenced how long they persisted on tasks. The researchers videotaped mothers for 3 minutes as they were instructed to sit next to their child as they played with a toy. They rated mothers as autonomy supportive if they supported their children as they played and did not attempt to change their infants' ongoing activity. After the initial mother-child interactions, children played with toys independently. Grolnick et al. found that infants whose mothers were rated as autonomy supportive displayed more persistence in working through challenging tasks than children whose mothers were rated as controlling. The association between parenting style and persistence had a medium effect size ($r = .33, p < .05$). Their results suggested that maternal autonomy support is related to infants' intrinsic motivation. Deci and colleagues (1993) found similar results in a sample composed of children between the ages of 5 and 7; their results indicated that there is a moderate and significant negative association between controlling parenting and intrinsic motivation ($r = -.34, p < .05$).

Many scholars have also established that providing choice, a key component of autonomy supportive parenting, is associated with increased intrinsic motivation (Cordova & Lepper, 1996; Iyengar & Lepper, 1999; Patall, Cooper, & Robinson, 2008; Swann & Pittman, 1977; Zuckerman et al., 1978). For example, in one meta-analysis that included 41 studies, Patall and colleagues

(2008) examined the effects of choice on intrinsic motivation and other related variables in a sample that included adults and children. Their results showed that choice-granting increased intrinsic motivation, effort, task performance, and satisfaction with the task, among other dependent variables. The overall effects of choice on intrinsic motivation was found to have an effect size of $d = 0.30$.

In the current study, I investigated whether motivation and perceived competence mediate the relationship between perceived parental autonomy support and academic achievement, enjoyment, and effort in a high achieving academically talented population. In the next section, I describe previous research on parental autonomy support that has examined the key variables and population in the present studies: academic achievement, enjoyment, and effort.

Autonomy supportive parenting and academic attainment. Several researchers have studied the effects of parents' autonomy support on school achievement in average achieving populations (Steinberg et al., 1989; Vasquez et al., 2015). In one study, Steinberg and colleagues (1989) illuminated the unique effects of different components of authoritative parenting (acceptance, behavioral control, and autonomy granting) on adolescents' academic achievement. After controlling for past achievement and demographic variables such as socioeconomic status (SES), Steinberg et al. found that students who described their parents as autonomy granting had greater improvements in their grades over a one-year period, when compared with students who did not describe their parents as autonomy granting. Bronstein, Ginsburg, and Herrera (2005) found that mothers' surveillance of homework, a behavior associated with controlling parenting, was correlated with lower grades over a 2-year period ($\beta = -.33, p < .001$); the effect size fell in the medium range.

In a study that used a sample of 66 students in elementary and middle school, Grolnick and Ryan (1989) measured parents' autonomy support through in-depth parent interviews. They found that higher parental autonomy support (as determined by raters) was associated with higher standardized test scores ($r = .30, p < .05$) and grades ($r = .46, p < .01$), and fewer behavioral problems in school ($r = -.41, p < .01$). In their follow-up study, Grolnick, Ryan, and Deci (1991) used children's perceptions of their parents' autonomy support rather than the interviewers' ratings. They concluded that children's perception of parents' autonomy support was also correlated with children's relative autonomy, which in turn predicted students' grades ($\beta = .03, p < .01$). However, the effect size was small. In their meta-analysis, Vasquez and colleagues (2015) measured student achievement using report card grades, grade point averages, task performance, non-standardized and standardized test scores, course grades, homework completion, and homework grades. They found there to be a small positive relationship of $r = .11$ between parental autonomy support and academic achievement. The correlations differed depending on whether students were in elementary school ($r = .10$), middle school ($r = .20$), or high school ($r = .11$). In summary, the findings in the studies suggest an overall small correlation between parental autonomy support and academic achievement, though all of the studies included average achieving populations. The present study will serve to address this gap in the literature by focusing on academically talented students.

Autonomy supportive parenting and academic enjoyment. Several investigators have studied the effects of autonomy supportive parenting and academic enjoyment. In one study, Annear and Yates (2010) examined the relationship between maternal and paternal autonomy granting and middle school students' school affect (measured by the degree to which they enjoyed attending

school). They found that mothers' self-reported autonomy granting was positively correlated with their children's self-reported school affect ($r = .23, p < .05, R^2 = .08$), such that mothers who reported that they supported their child's autonomy had children who expressed deriving greater satisfaction from school. However, the size of the effect was small.

Ferguson, Kasser, and Jahng (2010) compared the school satisfaction of 322 students from Denmark, South Korea, and the United States. They found that Danish students had the highest parental autonomy support and school satisfaction, followed by American and South Korean students, respectively. The effect size of the correlation between autonomy support and well-being was large for Dutch adolescents ($r = .45, p < .001$), small for American adolescents ($r = .16, p < .05$), and small for South Korean students ($r = .22, p > .05$). Ferguson and colleagues reported that the differences in school satisfaction among the students from Denmark, the United States, and South Korea were partially explained by the differing levels of perceived autonomy support. In their large meta-analysis, Vasquez et al. (2015) also found that parental autonomy support had a small but positive relationship with attitudes toward school ($r = .22$). Overall, the findings from the studies suggest that autonomy supportive parenting consistently predicts school enjoyment in average achieving populations, and that the effect sizes of the correlations were mostly small.

Autonomy supportive parenting and academic effort. Although there are numerous studies on autonomy support and academic achievement, no known studies have examined the relationship between parental autonomy support and academic effort, operationalized as time spent studying and completing homework. However, some researchers have found that manipulating autonomy support in a laboratory setting influences how long students spend on a task. In this section, I will review three studies that assess whether autonomy supportive conditions influence students' effort.

Zuckerman and colleagues (1978) found that introducing choice to college students promoted intrinsic motivation, which they operationalized as the time students spent on a task. In their study, Zuckerman et al. gave 80 students puzzles to solve. They gave half of the students the ability to choose which puzzles they wanted to solve, whereas the other half did not have a choice. After the students' allotted time to solve the puzzles ended, the experimenter left for 8 minutes and told the students that they were retrieving questionnaires for them to answer. The authors operationalized intrinsic motivation by measuring how many minutes students spent trying to solve the puzzle after the experimenter left. They found that the students who were in the choice condition on average spent 94.5 more seconds trying to solve the puzzles and concluded that they were more intrinsically motivated. Effect sizes were not reported.

In a laboratory experiment, Deci, Eghrari, Patrick and Leone (1994) gave 192 college students an uninteresting computer game to play, which they described as a "perceptual activity" (p. 192). As they introduced the task, the experimenters manipulated whether the participants' environment supported autonomy. Students in the high control condition heard words such as "should," "must," and "have to" (Deci et al., 1994, p. 128) whereas participants in the low control condition were granted choices. After the students completed the game, the experimenter left the students alone for 5 minutes and as an aside told them that they could continue to play the game if they would like. Deci and colleagues found that students in the low control conditions spent more time, on average, on the uninteresting task when compared with the high control condition in six out of the

eight conditions. Results from hierarchical regressions indicated that an autonomy supportive, low control environment predicted small amounts of variance in engagement time (3.7%).

Similarly, Joussemet, Koestner, Lekes, and Houlfort (2004) assessed the effects of autonomy support on the time children spent working on a dull task using a similar procedure as Deci et al. (1994). Unlike the studies described earlier, Joussemet et al. found that reward and autonomy support had no effect on how long the children spent engaged in the task once the experimenter left. Based on the discussion above, it is unclear whether autonomy supportive environments predict effort. In the next section of the paper, I will review the research literature on autonomy granting and level of competence.

Autonomy supportive parenting and competence level. The existing research on academically talented students and academic motivation has primarily focused on school factors such as teaching styles and classroom climate (e.g., Ee, Moore, & Atputhasamy, 2003; Gari, Kalantzi-Azzi, & Mylonas, 2000). Little is known about how parenting styles can influence academically talented adolescents' academic motivation (Garn et al., 2010). Although it is established that parenting style predicts children's academic achievement (Vasquez et al., 2015), this relationship is likely bidirectional, such that children's competency levels influence the degree of parent engagement and parenting style (Pomerantz, Wang, & Ng, 2005). Parents tend be more engaged with their children's schooling when their children are low achieving than when they are high achieving (Levin et al., 1997). Further, for low achieving students, the quality of the parent engagement tends to be more controlling rather than autonomy supportive (Pomerantz & Eaton, 2001).

As discussed earlier, intrinsic motivation and perceptions of competence are theorized to be the mechanisms through which autonomy supportive parent engagement predicts academic achievement (Pomerantz et al., 2007). Research to date has found that children with lower levels of competency are more likely to be sensitive to the quality of parent engagement, because they lack the psychological resources that the parent engagement provides (Ng et al., 2004). On the other hand, children with higher competency levels are less sensitive to the quality of parent engagement and whether it is controlling or autonomy supportive, because they likely already possess psychological resources. In the following section, I will review several studies that explored the relationship between autonomy support and academic outcomes in high achieving populations.

Through observations of child-mother dyads engaging in a challenging task, Ng and colleagues (2004) found that elementary-aged children's initial achievement in a 14-minute-long challenging task moderated the effects of autonomy supportive parenting on engagement and performance. Results from hierarchical linear modeling showed that mothers' use of control in their interactions with their children during the challenging activity significantly and negatively predicted engagement in students who were initially low achieving in the first 4 minutes of the task. Use of control did not significantly predict achievement in students who began the task as average achieving or high achieving. Effect sizes were not reported.

In the second part of their study, Ng and colleagues (2004) studied mothers' responses to their elementary-aged and middle-school-aged children's academic failure, which was measured using a daily checklist. They found that mothers' autonomy supportive responses to failure predicted future achievement to a greater extent in low achieving children ($\beta = .54, p < .001$), compared with average achieving children ($\beta = .28, p < .001$), and high achieving children ($\beta = .03, p > .05$). The

size of the effect was large for low achieving students, moderate for average achieving students, and small for high achieving students. As in the first study, children's competence moderated the relationship between autonomy support and achievement, such that children who were low achieving were more affected by controlling parenting than children who were high achieving. When discussing their results, Ng et al. suggested that students who were initially lower achieving may have felt less competent than their initially higher achieving peers and may have therefore been more susceptible to the effects of controlling parenting.

Conversely, students who were initially higher achieving may have felt less sensitivity surrounding issues of competence because of their prior achievement and successes, and in turn may have benefited less from autonomy supportive parenting that seeks to increase feelings of competence. Ng and colleagues (2004) also found that mothers' use of autonomy support predicted low and average achieving children's achievement over time, but did not predict high achieving students' performance. This study suggests that parental autonomy support is more critical for low or average achieving student populations, when compared to academically talented or higher achieving populations. Several limitations to the studies were also noted. In the second study, mothers self-rated their level of autonomy support using a questionnaire, which gives rise to issues of social-desirability bias. Further, the participants studied in Ng and colleagues' two-part study ranged in age from 7 to 12. Additional studies need to be conducted on older adolescent populations who may require a different level of autonomy than younger adolescents.

In a qualitative study, Garn and colleagues (2010) examined the strategies that parents of academically talented children use at home in order to foster academic motivation. Garn et al. interviewed 59 parents from low socioeconomic backgrounds and asked them the following two questions: (a) "What approaches would you use to motivate your academically talented child if you observed a lack of motivation in a particular subject or on a particular assignment" and (b) "What types of help, if any, do you give your child with homework" (p. 265). Results revealed that parents of academically talented children identified using both controlling and autonomy supportive strategies in order to foster academic motivation in their children. For instance, parents discussed how they relate their children's homework to their interests in order to increase motivation. On the other hand, parents also reported using rewards and punishments, which are techniques indicative of a more controlling parenting style. Overall, 80% of the parents reported using autonomy supportive strategies, which were nestled under motivational scaffolding techniques.

In my previous work (Pazner & Worrell, 2017), the relationship between parental autonomy support and academic achievement, enjoyment, and effort, was studied in the context of a summer program for academically talented adolescents. Results from the two-part study showed that students who reported exhibiting greater parental autonomy support were more successful in their classes ($d_{\text{study1}} = 0.39; d_{\text{study2}} = 0.43$), and reported enjoying their studies more than students whose parents decided to enroll them in the program ($d_{\text{study1}} = 0.49; d_{\text{study2}} = 0.77$). Effect sizes ranged between medium to large in magnitude.

However, in both studies, higher levels of autonomy support did not predict higher levels of academic effort in academically talented youth, as measured by the time students spent studying and completing assignments. One limitation of this study was that it assumed that students making the decision on their own to attend the summer program could be used as a statistical proxy for

parental autonomy support. One of the goals of the current work is to address this limitation by using a psychometrically sound instrument in order to measure perceived parental autonomy support.

Although past research has reported a positive relationship between autonomy supportive parenting and academic outcomes, little research has explored the strength of this relationship with respect to a population of academically talented adolescents, who are highly competent. Academically talented students may already draw on internal motivational resources and may be less susceptible to controlling parenting styles. Further, the research that does exist regarding this unique population does not provide a clear picture about the effects of parental autonomy support on learning enjoyment and effort. Finally, to the author's knowledge, there are no studies that examine whether perceived competence and intrinsic motivation mediate the relationship between perceived parental autonomy support and achievement for academically talented youth. Drawing on SDT, the proposed study will serve to fill these gaps.

The Present Study

The current study will add to the existing literature by examining the strategies that parents of academically talented students utilize, as perceived by adolescents. The associations and mechanisms underlying perceived parental autonomy support and perceived controlling parenting and academic achievement, enjoyment, and effort will be explored. The analyses will be guided by five research questions: (a) Do perceived parental autonomy support and control predict academic achievement, enjoyment, and effort in a group of academically talented adolescents; (b) Do intrinsic motivation and perceived competence mediate the relationship between perceived parental autonomy support and each of the outcome variables (i.e., academic achievement, enjoyment, and effort); (c) Does GPA moderate the relationship between perceived parenting style and students' final course grades; (d) Does ethnic background moderate the relationship between parenting style and academic outcomes; and (e) Is the student making the decision on her own to attend the program associated with perceived autonomy support?

I had several hypotheses concerning the relationship between parenting types (perceived autonomy support and controlling parenting) and grades, course enjoyment, and course effort. First, I predicted that perceived autonomy support would be positively and significantly correlated with students' course grades. However, as previously established in a comprehensive meta-analysis by Vasquez and colleagues (2015), I also predicted that the association between autonomy support and academic achievement would be small. Similarly, I predicted that there would be a significant, negative, and small correlation between perceived controlling parenting and final course grades. I further hypothesized that perceived autonomy support would be positively and significantly associated with academic enjoyment and that controlling parenting would be negatively and significantly associated with academic enjoyment. Given the inconclusive studies regarding the effect of perceived parenting style on academic effort, I hypothesized that perceived autonomy support and perceived controlling parenting would both not be significant predictors of academic effort. Finally, I predicted that the subcategories for perceived parental autonomy support and perceived controlling categories would function similarly to their respective global categories.

I hypothesized that both intrinsic motivation and perceived competence would independently *mediate* the relationship between autonomy support and students' final course grades and students' academic enjoyment, but not academic effort. I also predicted that the effect sizes for final course grades and academic enjoyment would be greater for the models that included intrinsic motivation as a mediator compared to perceived competence.

I predicted that students' prior achievement (operationalized as their school GPAs) would *moderate* the association between perceived parenting style and academic achievement, such that the size of the effect would be smaller for students who had higher GPAs, and thus were more competent. Alternatively, I hypothesized that students with lower GPAs would have greater academic benefits from perceived autonomy supportive parenting. Regarding perceived controlling parenting, I hypothesized that students with lower GPAs would be more negatively affected by perceived controlling parenting compared with students who have higher GPAs. Lastly, I predicted that the relationship between perceived parenting style (either autonomy supportive or controlling) and academic achievement would not statistically or practically vary by East Asian or European American ethnicities.

My final research question was whether the student making the decision on her own to attend the program was associated with perceived autonomy support. I hypothesized that global autonomy support would be moderately correlated with students' self-report of who made the decision to attend the summer program. My second hypothesis was that within perceived parental autonomy support, the autonomy choice subscale would be most associated with students' self-reported decision-making.

Method

Participants

The sample included 656 (51.30% female) middle and high school students who participated in a 6-week summer school program during summer of 2017. The program offers acceleration and enrichment opportunities for academically talented students at a large, public research university on the West Coast. Participant information was collected and cross-referenced from an online survey and the program's database. The details of the cross-referencing process are described in greater detail in the subsequent section. The ages of the participants ranged from 11 to 18 years ($M_{\text{age}} = 14.39, SD = 1.40$). Students attended public and charter schools (75.38%), private schools (24.46%), or were home-schooled (0.15%). Students were selected to participate in the academic program based on the following criteria: (a) school grade point average (GPA), (b) standardized test scores, (c) teacher recommendations, and (d) written personal statements. The average GPA of participants was 3.81 ($SD = 0.30$). A total of 49 courses were offered, with some courses having multiple sections. Thirty-six courses were designated as 5-unit courses and 13 courses were designated as 10-unit courses. Most participants (77.44%) were enrolled in a 5-unit course.

Students represented a wide range of ethnic groups: 37.54% ($n = 244$) were East Asian (i.e., Chinese American, Japanese, Korean), 22% ($n = 143$) were South Asian (i.e., Indian or Pakistani American), 14.15% ($n = 92$) were European American, 5.85% ($n = 38$) were Other Asian American (i.e., Filipino, Other Asian American), 5.69% ($n = 37$) were underrepresented minorities (i.e.,

Latino American, African American, Pacific Islander, and American Indian), and 2.77% ($n = 18$) identified as multi-ethnic. Twelve percent ($n = 78$) of students identified as having international origin. The SES of participants ranged from poor to wealthy, with 61.27% of students describing their families as middle class.

Procedure and Measures

During the final two weeks of the summer session, students were asked to fill out a 15-minute online survey about their experience with the program. Students were told that their responses would not influence their course grade and would be used to help improve the program and learn more about the participants. Teachers were encouraged to remind their students to participate in the survey and students had the option to fill out the survey at home or in class. Out of 778 program participants, all students received the survey and 691 complete unique responses were received (89%). Participants' responses to the survey were cross-referenced with the summer program's internal database of official course grades and school GPAs. Approximately 95% of the survey respondents were matched with the summer program's database. Entries that could not be matched using identifying information between the two sets of data were not included in the study. The matching procedure resulted in a final sample of 656 students. Students who did not complete the survey ($n = 116$) had an average GPA of 3.72 ($SD = 0.36$), compared to the final total sample ($N = 656$), which had an average GPA of 3.81 ($SD = 0.30$). Demographic information was only collected by means of the survey, and was therefore not available for the students who did not submit responses. Missing data for dependent variables were handled using expectation-maximization imputation (700 iterations).

Autonomy support and control. The Perceived Parental Autonomy Support Scale (P-PASS; Mageau et al., 2015) was administered in order to assess perceived autonomy support and controlling parenting (see Appendix A for complete items). Students' reports were used as they are considered a less biased measure of parenting style than parents' reports (Schwarz, Barton-Henry, & Pruzinsky, 1985). The scale includes three dimensions of autonomy support: (a) providing a rationale, (b) providing choice, and (c) acknowledging feelings. The dimensions of controlling parenting included (a) inducing guilt, (b) threatening punishment, and (c) encouraging performance goals. Response choices were presented on a Likert scale ranging from 1 (*do not agree at all*) to 7 (*very strongly agree*). Using exploratory factor analyses, Mageau and colleagues (2015) found that the items in the scale formed two factors, autonomy support and control, which explained 54% of the variance. Therefore, perceived autonomy support and control were investigated separately in the present study. Relevant items were reverse-scored and averaged in order to obtain a total score. In their validation study of an adolescent sample, Mageau et al. also found that the internal consistency (α) of P-PASS scores ranged from .89 to .94. Lastly, the scale was shown to have concurrent validity with other parenting measures. In the current sample, the Cronbach's alphas for scores on perceived autonomy support and control were .93 and .92, respectively.

Decision to attend program. Students' self-report about who made the decision to attend the program was measured with a single item that has five possible answer choices: "it was entirely my parents' decision," corresponding to unilateral decision making by the parent; "it was mostly my

parents' decision," corresponding to mostly unilateral decision making by the parent; "my parents and I decided equally," corresponding to joint decision making; "it was mostly my decision," corresponding to mostly unilateral decision making by the student; and "it was entirely my decision," corresponding to unilateral decision making by the student. Responses were assigned numerical values (i.e., *parent unilateral* = 1; *mostly parent unilateral* = 2; *joint* = 3; *mostly student unilateral* = 4; *student unilateral* = 5).

Academic motivation. The high school version of the Academic Motivation Scale (AMS; Vallerand, Blais, Brière, & Pelletier, 1989) was administered in order to assess students' motivation (see Appendix B for complete items). The scale measures extrinsic motivation (i.e., identified, introjected, and external regulation), intrinsic motivation, (i.e., knowledge, accomplishment, stimulation), and amotivation (i.e., absence of motivation). Respondents were asked to indicate to what extent each of the items corresponded to one of the reasons why they go to school. The reasons were scored on a seven-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). In a group of adolescents, the English version of the AMS was found to have adequate levels of reliability, with a mean Cronbach's alpha of .81 for AMS scores (Vallerand et al., 1992). AMS scores have also been shown to have factorial validity (Vallerand et al., 1992) and concurrent validity with other motivational measures (Vallerand et al., 1993). For the current study, the three intrinsic motivation subscales were combined to create a mean total score. In the current sample, the Cronbach's alpha for scores on intrinsic motivation was .95.

Perceived competence. Perceived competence was measured by asking students to respond to the following item: "Rate yourself in academic ability compared to others in your course." Answer choices were presented on a five-point Likert scale ranging from 1 (*among poorest*) to 5 (*among best*).

Academic achievement. At the end of the summer session, teachers assign students final course grades. Possible grades include A+, A, A-, B+, B, B-, Pass (C range), and No Pass (D, F range), with credit only granted to students who received scores in the A and B ranges. Grades were recoded and assigned numerical values in order for statistical analyses to be performed (i.e., No Pass = 1; Pass = 2; B- = 3; B = 4; B+ = 5; A- = 6; A = 7; A+ = 8).

Academic enjoyment. Participants' satisfaction with the accelerated program was measured by asking students, "How much did you enjoy your class?" Students were given five possible options. Responses were assigned numerical values from low to high levels of enjoyment (i.e., *not at all* = 1; *very little* = 2; *it was okay* = 3; *quite a bit* = 4; *a great deal* = 5).

Academic effort. The number or hours students spent studying and doing homework per week was combined into one composite variable, encoded on a scale from 2 to 16. Possible answer choices were presented in ranges (i.e., *less than 1 hour*, *1 to 2 hours*, *2 to 4 hours*, *. . . 10 to 12 hours* and *more than 12 hours*).

Control variables. Students were asked to provide demographic information (i.e., gender, SES, age, and ethnicity). Program staff calculated students' current school GPA from the report card submitted with the application as a criterion for deciding program admittance. GPAs were unweighted and ranged from 2.20 to 4.0. Twenty-one students did not have a GPA available in the database, either because they were homeschooled or because they attended a school that does not assign grades. These students were assigned a GPA of 3.81, which was the mean GPA of all other

participants.

SES consisted of six categories (i.e., *poor* = 1, *working class* = 2, *lower middle class* = 3, *middle class* = 4, *lower upper class* = 5, *wealthy* = 6). Age was a continuous variable that ranged from 11 to 18. There were seven ethnicity categories (i.e., East Asian, South Asian, European American, Other Asian American, underrepresented minorities, multi-ethnic, and international). Each reported ethnicity was assigned a unique numeric identifier, which was then used to generate dummy variables for the purpose of regression. Finally, school type (i.e., public or private) and course enrollment type (i.e., 5-unit or 10-unit course) were also controlled for in statistical analyses.

Results

Descriptive Statistics

Stata Statistical Software (Release 13.0) and SPSS (Version 24) were used for all analyses. Table 1 shows the means, standard deviations, skewness, and kurtosis for the major outcome variables. Mean final course grades were between A- and B+ ($M_{\text{grade}} = 5.88, SD = 1.80$). On average, participants enjoyed their classes "quite a bit" ($M_{\text{enjoy}} = 3.96, SD = 0.88$). With regards to academic effort, on average, students taking 5-unit courses and 10-unit courses spent between 5 to 8 hours per week studying and completing homework assignments ($M_{\text{effort5-units}} = 5.37, SD = 1.92; M_{\text{effort10-units}} = 5.52, SD = 1.95$). According to Kline (2016), skewness values greater than an absolute value of 3 and kurtosis values greater than an absolute value of 10 indicate severe non-normal distributions. Skewness and kurtosis levels ranged from -0.96 to 1.31 and 3.11 to 6.33, respectively, indicating that there were no major problems with skewness and kurtosis.

Table 2 shows the means, standard deviations, skewness and kurtosis for global perceived parenting type (i.e., autonomy supportive or controlling) and the subtypes associated with each category. Figure 1 and Figure 2 show the percentage distribution of participants' perceived autonomy support and controlling parenting, respectively. The distribution representing perceived autonomy supportive parenting was left-skewed whereas the distribution representing perceived controlling parenting was right-skewed. However, based on the criteria suggested by Kline (2016), major skewness and kurtosis issues were not found. Perceived autonomy supportive and controlling parenting were negatively and moderately related ($r = -.45$).

Effects of Parenting Style on Outcome Variables

Separate multiple regression analyses were conducted to examine whether global measures of perceived parental autonomy support, controlling parenting, and their respective subcategories predicted academic achievement, enjoyment, and effort. Gender, age, SES, ethnicity, GPA upon admission, school type, and course type, were used as control variables in all of the statistical models. Ethnicity was dummy coded, with East Asian group membership set as the reference group. Using the Bonferroni adjustment, the critical value used to determine significance was .017. Results are reported in Tables 3 through 10.

Autonomy support and outcomes. Table 3 shows predictors of academic achievement, enjoyment, and effort by global measures of perceived autonomy support. Students' course grade was not meaningfully correlated with perceived parental autonomy support and the variables in the model predicted 10.86% of the variance. Exploratory analyses were also conducted to examine the contributions of the predictor variables and each type of perceived autonomy support variable (i.e., providing a rationale, providing choice, and acknowledging feelings). Students' academic achievement had near-zero correlations with providing a rationale (Table 4), providing choice (Table 5), and acknowledging feelings (Table 6).

The next set of analyses sought to examine the extent that students' ratings of perceived parental style predicted how much they enjoyed their classes. Perceived parental autonomy support was found to be positively and modestly associated with course enjoyment (Table 3). Within autonomy support, exploratory analyses revealed positive yet small correlations between academic enjoyment and providing a rationale (Table 4), providing choice (Table 5), and acknowledging feelings (Table 6). Overall, effect sizes were small for all perceived autonomy support subcategories.

Controlling for the predictor variables, perceived parental autonomy support was not meaningfully correlated with academic effort (Table 3) and accounted for 3.90% of the variance. For the autonomy support subcategories, providing a rationale had a near-zero correlation with academic engagement (Table 4), as did providing choice (Table 5), and acknowledging feelings (Table 6).

Controlling parenting and outcomes. Table 7 shows predictors of academic achievement, enjoyment, and effort by global measures of controlling parenting. Academic achievement was not significantly correlated with control and the variables in the model accounted for 11.22% of the variance. Subcategories of controlling parenting (i.e., inducing guilt, threatening punishment, and encouraging performance goals) were also examined. Academic attainment was significantly associated with threatening punishment, (Table 9), and encouraging performance goals (Table 10), but was not significantly associated with inducing guilt. However, the effect sizes were small for all subcategories. Academic enjoyment was not associated with broad control (Table 7), as well as inducing guilt (Table 8), threatening punishment (Table 9), and encouraging performance goals (Table 10). Controlling parenting accounted for 3.11% of variance in predicting course enjoyment. Overall, the effect sizes were modest. Finally, academic effort was not correlated with broad control (Table 7), including guilt (Table 8), threatening punishment (Table 9), and encouraging performance goals (Table 10). Controlling parenting accounted for 3.34% of variance in predicting course effort. As in the earlier models, effect sizes were small.

Mediation Analyses

A mediator is a variable through which an independent variable affects a dependent variable. Baron and Kenny's (1986) causal steps approach has been utilized widely in the social sciences for determining mediation. Their method requires four steps. First, the total effect between the dependent and independent variable (path *c*) is required to be statistically significant. If that criterion is met, the investigator proceeds with the second step of the procedure and assesses whether there is a significant effect when the mediator variable is regressed on the independent variable (path *a*). If the second criterion is also met, the investigator tests whether there is a significant

association between the mediator and dependent variable (path b). Finally, if all three conditions were successfully met, the researcher assesses whether the total effect between the independent and dependent variable becomes non-significant when the mediator is controlled for in the model (path c'). If, after controlling for the mediator, c' is closer to zero than c, and there is no significant effect between the independent and dependent variables, *full mediation* is established. However, if c' is closer to zero than c but the association remains significant, *partial mediation* exists. Partial mediation suggests the existence of additional mediators, which have not been accounted for in the current model (Baron & Kenny, 1986; Hayes, 2013). The Sobel test (1982) indicates whether the effect of the independent variable on the dependent variable is significantly reduced after the addition of the mediator. However, the Sobel test is not recommended since it assumes that the sampling distribution of $a \times b$ is normal (Hayes, 2013; Preacher & Hayes, 2004). Simulation studies have shown that $a \times b$ distributions, especially in small samples, are often not-normal (Hayes, 2013).

Although Baron and Kenny's (1986) procedure is widely used, there are several limitations to their method (Hayes, 2013). One limitation is that the causal steps method solely relies on statistical significance testing, and is contingent on the rejection of three null hypotheses. However, when researchers conduct numerous hypotheses tests, they are more likely to make errors (Hayes, 2013). Another constraint of Baron and Kenny's method, is that when a criterion is not met for one step in the procedure, and a null hypothesis cannot be rejected, the rest of the testing ceases. The variable in question, therefore, cannot be claimed to be a mediator. Additionally, the first step that the researcher has to establish in testing for mediation is the significance of the total effect or the direct association between the independent and dependent variables. According to this logic, a mechanism cannot mediate the association between two variables if the association between the two variables is not significant.

Quantitative methodologists have refuted this claim and have found that there can be a significant indirect effect even if a direct effect is not significant (Hayes, 2013; Zhao, Lynch, & Chen, 2010). In other words, a variable can mediate the association between an independent and dependent variable, even if a direct effect between the independent and dependent variable is not observed. For example, two mechanisms can indirectly mediate the association between an independent and dependent variable. If the indirect effect through one mechanism is positive, but the indirect effect through the other mechanism is negative, and the size of the coefficients is roughly equivalent, there will be a near-zero total effect. Therefore, a direct effect will not be observed even though the two variables do indeed indirectly mediate the association between the predictor and outcome variable. A final limitation of Baron and Kenny's (1986) method is that it does not quantify the indirect effect, $a \times b$, in a straightforward manner. Rather, an indirect effect is measured through the outcomes of several tests that independently measure path a and path b.

Due to the limitations of Baron and Kenny's (1986) causal steps method, ordinary least squares path analysis, or the product of coefficients approach, was utilized in order to assess whether perceived competence and intrinsic motivation mediated the relationship between perceived parental autonomy support and academic outcomes. A diagram of the statistical model is represented in Figure 3. The standardized coefficients a, b, and c' were obtained through two standard multiple linear regression models, which are presented in the subsequent paragraphs. First, the standard-

ized coefficient, a, was obtained by regressing the mediator variable (i.e., intrinsic motivation or perceived competence) on the independent variable (i.e., perceived autonomy support):

$$M = i_1 + aX + e_M$$

The remaining coefficients, b and c', were obtained by regressing the dependent variable (i.e., academic achievement, enjoyment, or effort) on the independent variable, controlling for the mediator. Therefore, c' represents the *direct effect* of the independent variable on the dependent variable, holding the mediator constant:

$$Y = i_2 + c'X + b_M + e_Y$$

The product $a \times b$ represents the *indirect effect* of the independent variable on the dependent variable through the mediator, referred to as the indirect path. The *total effect*, c, represents the total effect of the independent variable on the dependent variable. It can be obtained by regressing the dependent variable Y on the independent variable X alone:

$$Y = i_3 + cX + e_Y$$

It is equivalent to the sum of the indirect effect and the direct effect:

$$c = c' + a \times b$$

Therefore, the indirect effect, $a \times b$, is also equivalent to the difference of the direct effect from the total effect:

$$c - c' = a \times b$$

Zhao and colleagues' (2010) procedure for testing and classifying mediation was used in the analyses. They described three types of patterns that point to mediation, including complementary, competitive, and indirect-only mediation. A *complementary* mediation is said to occur when (a) there is a direct effect between the predictor variable and outcome variable, (b) there is an indirect and significant mediated effect between the predictor variable and outcome variable through the mediator, and (c) the above effects point to the same direction. Zhao and colleagues' complementary mediation is comparable to Baron and Kenny's (1986) partial mediation. *Competitive* mediation is said to occur when (a) there is a direct effect between the predictor variable and outcome variable, (b) there is an indirect and significant mediated effect between the predictor variable and outcome variable through the mediator, and (c) the above effects point in opposite directions. It overlaps with Baron and Kenny's full mediation. Thirdly, *indirect-only* mediation is said to occur when (a) there is an indirect and significant mediated effect between the predictor variable and outcome variable through the mediator and (b) a direct effect between the predictor and outcome variable is not observed. For scenarios in which an indirect effect is not observed, mediation cannot be established, regardless of whether a direct effect is observed.

In the present study, I investigated whether perceived competence and intrinsic motivation mediated the relationship between perceived parental autonomy support and academic outcomes, achievement, enjoyment, and effort. A bootstrapping procedure was used instead of the Sobel

test (1982), as recommended by Hayes (2013). Bootstrapping, which is a method by which the original sample is resampled with replacement numerous times, is considered a better alternative, because it does not assume that $a \times b$ is normally distributed. Bootstrap procedures were applied in all of the models (50 replications). When theoretically relevant, effect sizes were estimated by calculating the ratio of the indirect effect to the total effect. This method can be used to measure how much the mediator affects the outcome variable through the predictor variable. In this case, the relevant quantity is the proportion of the total mediated effect, which is calculated using the following equation:

$$P_M = \frac{ab}{c} = \frac{ab}{c' + ab}$$

Academic achievement. In the first model, I examined whether intrinsic motivation mediated the relationship between perceived autonomy supportive parenting and academic achievement, measured by students' final course grades (Figure 4). The direct effect (c') between perceived parental autonomy support and final course grade was not found to be practically or statistically significant. The indirect path ($a \times b$) between perceived autonomy support and final course grades through intrinsic motivation was found to be significant, suggesting indirect mediation. For every one point increase in perceived autonomy support, students' grades increased by .08 units, on average, with .06 of those units being attributed to their level of intrinsic motivation and the remaining .02 units due to another mediator not present in the model. Overall, 75% of the effect of perceived autonomy support on academic achievement occurred indirectly through intrinsic motivation. Further, the model accounted for 15.5% of the variance.

The model for perceived competence mediating the relationship between perceived autonomy support and academic achievement is presented in Figure 5. The direct effect of perceived competence on final course grades was not found to be significant. However, the indirect path between perceived autonomy support and final course grades through perceived competence was significant, which suggests indirect mediation. The findings indicate that with every one point increase in perceived autonomy support, students' grades increased by approximately .09 units, with .05 units due to perceived competence and .04 units due to other processes not indicated in the model. Approximately 56% of the effect of perceived autonomy support on academic achievement occurred indirectly through perceived competence. The model accounted for 1.5% of the total variance.

Academic enjoyment. Again, ordinary least squares path analysis was used to measure the direct and indirect effects of perceived autonomy support on academic enjoyment through intrinsic motivation (Figure 6). It was found that perceived autonomy support had a direct and significant influence on course enjoyment and that intrinsic motivation was a mechanism by which perceived autonomy support exerted its effect indirectly on academic enjoyment. This analysis suggests that intrinsic motivation is a complementary mediator for perceived autonomy support and course enjoyment. Approximately half (48%) of the effect of perceived autonomy support on academic enjoyment occurred indirectly through intrinsic motivation. The model accounted for 16.6% of the variance.

The mediation model between perceived autonomy support and academic enjoyment through perceived competence is presented in Figure 7. When perceived competence was examined as a potential mediator, the direct path between perceived autonomy support and course enjoyment was

significant. Further, there was a significant indirect path between perceived autonomy support and academic enjoyment through perceived competence. Perceived competence explained only 13% of the effect of perceived autonomy support on academic enjoyment. This finding suggests that perceived competence does not account for most of the effect of autonomy support on academic enjoyment, and that there are other mechanisms or processes which can better explain the association. Overall, the mediation is described as complementary, and the model accounted for a modest 5.6% of the variance.

Academic effort. As Figure 8 illustrates, the direct effect of autonomy support led to a significant and small decrease in academic effort. Through an indirect effect, increased autonomy support was associated with increased intrinsic motivation which in turn was associated with a significant increase in academic effort. Since the direct and indirect effects pointed in opposite directions, negative, and positive, respectively, this type of mediation is said to be competitive mediation. It suggests that there exists an additional mechanism, which would result in a negative indirect path between autonomy supportive parenting and academic effort. The model explained a moderate 16.6% of the variance.

Finally, perceived competence did not mediate the relationship between perceived autonomy support and academic effort (see Figure 9). The direct path between perceived autonomy support and academic effort and the indirect path between perceived autonomy support through perceived competence on academic effort, were both not found to be statistically or practically significant ($R^2 = .018$).

Moderation Analyses

Moderating effects of GPA. In order to test whether GPA moderated the relationship between students' final grades and perceived parental autonomy support, a hierarchical multiple regression analysis was conducted (see Table 11). In the first hierarchical regression model, final course grades were entered as the dependent variable. Students' perceived parental autonomy support and GPA were included in Block 1 and an interaction term between perceived parental autonomy support and GPA was included in Block 2. Perceived autonomy support and GPA accounted for a modest 5.96% of the variance in predicting final grades. When the interaction term of GPA and perceived parental autonomy support was added in Block 2, the variance was unchanged ($\Delta R^2 = 0$). Further, the interaction term was not found to be a significant predictor of students' final grades. GPA was not found to moderate the relationship between perceived parental autonomy support and academic achievement.

Hierarchical regression was also conducted to assess whether GPA affected the relationship between perceived controlling parenting and final course grades; the results are presented in Table 12. Students' final course grades were entered as the dependent variable. In Block 1, perceived controlling parenting and GPA were included. The variables accounted for a significant but small amount of variance in course grades. In Block 2, the interaction term between GPA and perceived controlling parenting was added and also accounted for a significant but very small amount of variance in final course grades ($\Delta R^2 = -.003$). The interaction term was not a statistically or

practically significant predictor of final course grades. Overall, the effect of perceived controlling parenting on final course grades was not moderated by student's prior achievement or GPA.

Moderating effects of ethnicity. Table 13 shows the means, standard deviations, and inferential statistics for perceived autonomy supportive and controlling global and subcategories differentiated by European American and East Asian participants. Independent, two-tailed *t*-tests were used to compare the two groups' means for each category of perceived autonomy supportive and controlling parenting. European American students reported significantly greater perceived parental autonomy support compared to East Asian adolescents. In addition, European American students reported receiving greater choice and acknowledgment of feelings than their East Asian peers. As can be seen, effect sizes were between small to medium for broad autonomy support, as well as for choice and acknowledgment of feelings. Of note, East Asian and European American students did not report practically significant differences regarding whether their parents provided rationales for expected behaviors. Lastly, within the category of controlling parenting, East Asian students perceived their parents to be more controlling compared with European American students. They also reported their parents engaging in greater controlling behaviors compared with their European American peers, particularly with regards to encouraging performance goals, which had a medium effect size. No significant differences were found between European American and East Asian adolescents, with regards to inducing guilt and threatening punishment.

A series of hierarchical regressions were also performed to examine whether the relationship between perceived parenting style and final course grades varied by European American and East Asian group membership (Table 14). In the first model, students' final grades were entered as the dependent variable, perceived autonomy supportive parenting and group membership were entered in Block 1, and the interaction term between perceived autonomy supportive parenting and group membership was entered in Block 2. The interaction of perceived autonomy support and group membership was not a significant predictor of students' course grades. Further, adding the interaction term to the model did not contribute to additional variance in final course grades ($\Delta R^2 = 0$).

In the second model, I investigated whether the effects of perceived controlling parenting on final course grades was moderated by group membership (Table 15). As in the previous model, students' final course grades were entered as the dependent variable, perceived controlling parenting and group membership were entered in Block 1, and the interaction term between controlling parenting and group membership was entered in Block 2. Again, the interaction of controlling parenting and group membership was not a practically or statistically significant predictor of students' course grades. Adding the interaction variable did not result in a change in the variance ($R^2 = 0$). Overall, group membership was not found to moderate the association between perceived parenting style and academic achievement. That is, the effect of controlling parenting on final course grades, did not significantly change as a function of whether participants were East Asian or European American.

Association Between P-PASS and Decision to Attend Program

Table 16 displays the results of Pearson's correlations between the student making the decision to attend the program item and the autonomy support subscales from the P-PASS (Mageau et al., 2015). Broad autonomy supportive parenting and all of the autonomy support subscales were statistically and positively correlated with the decision to attend the program variable; effect sizes ranged between small to medium ($.17 \leq r \leq .38$). The relationship between broad perceived autonomy supportive parenting and the decision to attend the program was practically and statistically significant. As expected, the strongest correlation was between the decision to attend the program and the perceived autonomy support choice subscale, which was found to be a moderate effect size. There was also a positive correlation between the decision to attend the program item and acknowledging feelings and providing a rationale.

Hierarchical linear regression procedures were used in order to further assess whether the perceived parental autonomy support scale was a better predictor of students' final grades compared with the decision to attend the program item (see Table 17). In Block 1, perceived autonomy support and SES were entered to determine the contribution of these variables in predicting the dependent variable, students' final course grade. Autonomy support and SES accounted for 0.7% of the variance in students' final grades. When the decision to attend the program variable was added in Block 2, the total variance increased ($\Delta R^2 = .04$). Results indicated that the decision to attend the program variable accounted for more variance in predicting course grades than the perceived autonomy support scale. However, the difference in variance contribution between the single item and the full scale was small.

Discussion

Although many studies have examined the relationship between autonomy support and control and academic outcomes, few have studied these variables in a sample of high achieving middle and high schoolers. Additionally, the studies that have examined the relationship between perceived autonomy support and academic outcomes in high achieving populations primarily focused on measures of academic achievement rather than measures of academic enjoyment and effort. Therefore, the purpose of the present study was to better understand predictors, moderators, and mediators of perceived parental autonomy support and controlling parenting on academic outcomes in high achieving adolescents. Below, I summarize the major findings from the study and discuss them within the context of the empirical literature.

Parenting Strategies for Academically Talented Adolescents

Results indicated that a majority (70%) of students who participated in the study perceived their parents to be autonomy supportive. On the other end of the continuum, 68% of participants reported that their parents were not controlling. These findings imply that parents of academically talented adolescents tend to utilize more autonomy supportive strategies such as offering choices, explaining rationales behind demands, and acknowledging their children's feelings rather than controlling strategies such as inducing guilt, threatening punishment, and encouraging performance

goals. This finding is similar to the finding from Garn and colleagues' (2010) qualitative study, which reported that 80% of parents of academically talented students reported using autonomy supportive strategies.

Predictors of Academic Outcomes

One of the main goals of the study was to explore whether global perceived parental autonomy support and global perceived controlling parenting predicted academic achievement, enjoyment, and effort in a group of academically talented adolescents. Students' demographic characteristics (i.e., sex, age, ethnicity, SES), prior achievement, and type of course and school enrolled in, were all accounted for in the models. I further examined the effects of the perceived autonomy supportive and controlling parenting subtypes on the academic outcomes.

Academic achievement. Contrary to the hypotheses, both broad autonomy supportive and controlling parenting types were not found to be *statistically* significant predictors of academic achievement. This statement held true for all perceived autonomy supportive parenting subtypes. Within the perceived controlling category, threatening punishment and encouraging performance goals were both significantly and negatively correlated with academic achievement; however, the effect sizes were small. The third perceived controlling parenting subcategory, inducing guilt, was not significantly associated with academic achievement.

The hypothesis that parenting type would be a meaningful and significant predictor of academic achievement was partially supported. Although the effect sizes were small, within the perceived controlling category, threatening punishment and encouraging performance goals were both significantly and negatively correlated with academic achievement. Perhaps, students with lower academic achievement are more likely to elicit specific controlling behaviors from their parents, including making threats and placing performance pressures, compared with higher achieving students. It is conceivable that parents who observe poor academic performance are more likely to utilize a controlling style, with the belief that this parenting style will improve academic performance. However, broad autonomy support and controlling parenting were not significantly or practically associated with academic attainment. Consistent with the literature (e.g., Ng et al., 2004; Pomerantz et al., 2005), it is possible that the population studied, which consisted of academically talented and highly competent individuals, already possess several of the psychological resources that autonomy supportive parenting is theorized to elicit. As a result, the students may have been less likely to be sensitive to the quality of parent engagement and to whether their parents were autonomy supportive or controlling. In a future study, it would be important to separately sample students who are low, average, and high achieving in order to examine whether competence level moderates the relationship between perceived parenting style and academic outcomes. Second, past research has found that the association between academic achievement and autonomy support is strongest if the autonomy support measures are directly related to the outcome variables (Vasquez et al., 2015). In other words, generally asking students to reflect on parenting style, rather than on parenting style related specifically to academics, may have resulted in weaker associations between perceived autonomy supportive and controlling parenting styles and academic achievement.

Academic enjoyment. On the other hand, as hypothesized, global perceived autonomy support and all autonomy supportive subtypes were positively and significantly associated with academic enjoyment. The results suggest that students who perceive their parents as more likely to provide choice, give rationales, and acknowledge their feelings, are more likely to enjoy their classes, on average. However, the effect sizes were small. The finding that autonomy support does not meaningfully predict academic enjoyment and school satisfaction is consistent with previous research (Annear & Yates, 2010; Ferguson et al., 2010, & Vasquez et al., 2015). Further, the correlation between controlling parenting and academic enjoyment was not significantly or practically significant. Annear and Yates (2010) similarly found a negative but small effect between parent restrictiveness and school enjoyment.

Academic effort. Finally, global perceived autonomy support and all of the autonomy support subtypes did not significantly predict academic effort, in keeping with the initial hypothesis. Controlling parenting also did not predict academic effort. In general, these results provide support for the hypotheses in this paper as well as other results previously reported in the literature (Joussemet et al., 2014; Pazner & Worrell, 2017).

Mechanisms

The second goal of the study was to assess whether students' self-reported intrinsic motivation and perceived competence were mechanisms through which perceived autonomy supportive parenting had an effect on the outcome variables.

Academic achievement. As hypothesized, intrinsic motivation and perceived competence were found to be significant mechanisms by which perceived autonomy supportive parenting exerted its influence on academic achievement. Perceived parental autonomy support had an indirect positive effect on academic achievement through both intrinsic motivation and perceived competence. Direct effects were not found to be significant between perceived autonomy support and academic achievement when controlling for each mediator. That is, when intrinsic motivation and perceived competence each independently served as controls in the models, meaningful effects between an autonomous parenting style and academic achievement were not found. Comparing the two mechanisms, intrinsic motivation was found to be a stronger mediator than perceived competence. Most of the effect of perceived autonomy support on academic achievement occurred indirectly through intrinsic motivation. However, approximately half of the effect of perceived autonomy support on academic achievement occurred through perceived competence.

The findings that intrinsic motivation and perceived competence mediate the relationship between autonomy supportive parenting and academic achievement corroborate the findings in the literature (e.g., Vasquez et al., 2015; Zuckerman et al., 1978). These results also suggest that the relationship holds true for highly competent individuals, a novel contribution to the literature in the field. It is likely that parents who are autonomy supportive increase their children's sense of intrinsic motivation and perceived competence by allowing their child to develop skills independently and display initiative and control over their surroundings. In turn, increased intrinsic motivation and perceived competence predicts greater academic achievement. The results of this study suggest that these two constructs play an important role in the relationship between perceived parental au-

tonomy support on academic attainment. Additionally, the results indicate that intrinsic motivation is the more prominent of these two mechanisms.

Academic enjoyment. As hypothesized, intrinsic motivation and perceived competence were both found to be complementary mediators by which perceived autonomy support exerts its effect on academic enjoyment. According to Zhao et al. (2010), the presence of complementary mediators suggests the existence of additional variables that were not accounted for in the models and that can be examined in future studies. However, as in the earlier models, which included academic achievement as the outcome variable, intrinsic motivation was found to be a stronger mechanism than perceived competence. In relationship to perceived competence, intrinsic motivation explained more of the effect of autonomy support on academic enjoyment. According to these findings, academically talented students who report that their parents provide choices, acknowledge their feelings and give rationales, are on average more likely to exhibit intrinsic motivation, which in turn is associated with greater academic enjoyment.

Academic effort. I hypothesized that intrinsic motivation would not mediate the relationship between perceived parental autonomy support and academic effort. However, according to the classification system of Zhao et al. (2010), intrinsic motivation was found to be a competitive mediator. Therefore, it is likely that there exists an additional mechanism, which would result in a negative indirect path between autonomy supportive parenting and academic effort. This possibility can be explored in future research. Surprisingly, increased perceived autonomy support is negatively associated with academic effort. Perhaps, parents who are on average more autonomy supportive are less likely to coerce their children to spend more time studying or completing homework. However, increased autonomy support is still associated with increased intrinsic motivation, which is indirectly associated with increased academic effort among high achieving adolescents.

Lastly, the second hypothesis was that perceived competence would not be found to be a mediator by which perceived autonomy supportive parenting exerted its influence on academic effort. This hypothesis was supported since neither direct nor indirect effects were detected.

Moderators

GPA. Contrary to the hypothesis, GPA, which represented current achievement level, did not moderate the relationship between final course grades and perceived autonomy support. One possible reason for this finding is that students' GPA was negatively skewed, given the nature of the population that was sampled. Approximately 88.60% of the students in the sample had school GPAs that were above 3.5. One would expect that in a more academically heterogeneous sample, GPA would meaningfully interact with perceived autonomy support in predicting achievement.

Asian American group membership. Mean differences across European American and East Asian groups were examined for the perceived autonomy support and controlling broad categories and subcategories. Compared with students who were European American, on average, students who were East Asian reported that their parents were less autonomy supportive and more controlling in all perceived autonomy support and controlling categories. Specifically, East Asian students reported scores that were meaningfully and statistically significantly lower than their European American peers for broad autonomy support and the subcategories, providing choice, acknowledg-

ing feelings, and encouraging performance goals. Overall, effect sizes were in the small to medium range for all comparisons, except for the difference on encouraging performance goals, which had a medium effect size. In other words, whereas East Asian adolescents on average perceived their parents to be less autonomy supportive and more controlling, the magnitude of the phenomenon was generally small. Notably, the greatest effect size was found for the encouraging performance goals subtype, which suggests that compared to European American participants, East Asian adolescents feel more pressure by their parents to succeed and be the best among their peers. This finding is consistent with Qin and colleagues' (2012), study of academically talented adolescents, which found that Asian American students are on average more anxious than European American adolescents. Qin (2008) found that Asian American parents of psychologically distressed adolescents were more likely to place extremely high expectations on their adolescent children, which overshadowed their adolescents' non-academic needs. As a result, children internalized a very strong desire to succeed. Thus, the hypothesis that the relationship between parenting style (either autonomy supportive or controlling) and academic achievement would not meaningfully vary by East Asian or European American group membership was supported. Additionally, ethnic group membership did not moderate the association between perceived parenting styles and academic achievement. This finding is in line with several previous studies (Chau, 2001; Kim et al., 2013), which have not been able to clearly establish that East Asian and European American students respond to autonomy supportive or controlling parenting styles in different ways.

Association with Decision to Attend Program

The prediction that the student making the decision to attend the program variable would be moderately associated with the P-PASS scale was supported. The perceived autonomy global scale was meaningfully associated with students' responses for who made the decision to attend the program. Additionally, as hypothesized, the autonomy choice subscale had the largest correlation with the decision to attend the program item compared with the other perceived autonomy support subscales. Results also indicated that more of the variance in the model was explained by using the single decision to attend the program item than scores on the P-PASS scale. One possible explanation for this finding is that the decision to attend the program item captures additional constructs other than perceived parental autonomy support.

For example, it is likely that the decision to attend the program item also encompasses students' internal motivation and enthusiasm for their choice of course. Furthermore, it is also plausible that students' response regarding who chose to enroll in the summer program is a better predictor of the P-PASS because the item captures students' perceived autonomy support as it relates specifically to the summer course and academics, rather than general perceived autonomy support, which includes autonomy support at school and at home. Previous empirical research (Vasquez et al., 2015) has substantiated the claim that domain-specific autonomy support measures are better predictors of outcomes relating to the same domain. This finding suggests some utility in using a single-item measure rather than the P-PASS in predicting academic achievement.

Conclusions

In summary, the current study describes the nature of parenting behaviors that academically talented adolescents perceive their parents to undertake. It suggests that many academically talented students perceive their parents to be fairly autonomy supportive rather than autonomy thwarting. However, autonomy supportive and controlling styles are not meaningfully associated with academic achievement, enjoyment, or effort, after taking the control variables into account.

Intrinsic motivation mediated the relationship between perceived autonomy support and academic achievement and enjoyment, and intrinsic motivation, but not perceived competence, mediated the relationship between autonomy support and academic effort. The findings support the hypothesis that parents who are autonomy supportive increase their children's sense of intrinsic motivation by allowing their children to display initiative and control over their surroundings (Zuckerman et al., 1978). Increased intrinsic motivation is in turn correlated with academic achievement, enjoyment, and effort.

Perceived competence also mediated the relationship between perceived autonomy support and academic achievement and enjoyment, but to a lesser degree than intrinsic motivation. Perhaps, parents who are more autonomy supportive are more likely to offer their children opportunities to build and develop their skills, which results in enhanced perceptions of efficacy (Grolnick & Ryan, 1989). Enhanced perceptions of efficacy are in turn associated with greater academic achievement and academic affect.

The effect of autonomy support and control on final course grades was not moderated by student's prior achievement or GPA, but this finding may differ with a more academically heterogeneous sample. East Asian students described their parents to be less autonomy supportive and more controlling than their European American peers, but the effect sizes were found to range between small to medium, and ethnic-racial group membership did not moderate the association between autonomy supportive and controlling parenting styles and academic achievement. These findings support the tenets of SDT, which suggest that the need for autonomy is universal and not dependent on group membership (Deci & Ryan, 1985). Finally, students' self-reported measure about who made the choice to attend the program was a better predictor of academic achievement than scores on the P-PASS, a scale assessing adolescents' perceived parental autonomy support. Future studies may benefit from developing autonomy supportive scales that are brief and specific to the outcome that is being measured.

Limitations and Future Research

There are several limitations to this study. One limitation is that causal inferences cannot be made when discussing the role that perceived parenting style has on academic outcomes, as the data were cross-sectional, and random assignment and experimental manipulation did not take place. Second, the present study utilizes a variable-centered approach to studying parenting behaviors by focusing on perceived autonomy supportive and controlling parenting. Although this strategy has several advantages, such as allowing researchers to draw correlations among variables, it also has several disadvantages (Kim et al., 2013). For example, one limitation of this approach is that it is likely that numerous parenting dimensions are associated with adolescent academic outcomes.

Future studies can address this issue by utilizing person-centered methodological approaches that examine how the interaction of several parenting dimensions predict scholastic outcomes.

Further, in the current study I used the P-PASS to measure perceived parenting type. In a future study, using a diary-based moment-to-moment measure of autonomy support, which requires students to rate their perceptions of autonomy support at random times throughout the day, may be a helpful way to measure this construct. A moment-by-moment assessment of autonomy support could be useful because perceptions of autonomy support can vary depending on the context (Kim, Holloway, Bempechat, & Li, 2018). However, one negative feature of this approach is that a time-use diary is often inconvenient for respondents and requires significant researcher involvement.

It is also important to note that participants were asked to rate their parents' level of autonomy support and control, rather than differentiate between multiple caregivers. Mothers, fathers, or other caregivers, may adopt different parenting roles and may be perceived differently by adolescents. Therefore, in a future study it may be beneficial to ask students to rate the level of autonomy support or control for each caregiver. Similarly, another methodological limitation is that parenting style was only measured by single informants (adolescents) and may only indicate perceptions of parenting style rather than actual parenting style. Therefore, the associations found among autonomy support and the outcome and mediator variables can be partly due to shared method variance. Future studies would benefit by surveying additional informants to measure autonomy support and controlling parenting.

With respect to the moderating role of ethnicity, it is well established that there is great variability within ethnic groups. Further, culture is dynamic and can evolve across generations as a result of exposure to different environmental contexts (Holloway & Kunesh, 2015). Therefore, it would be advantageous for future researchers to include explicit measures of adolescents' acculturation levels when considering whether group membership moderates the association between parenting type and academic outcomes. Also, examining Asian American participants from different countries of origin in analyses rather than combining all participants into one group would be a fruitful endeavor (Holloway & Kunesh, 2015).

Finally, children's and adolescents' perceptions of autonomy and control are continuously shaped throughout development and can differ by context. These perceptions are not unilaterally shaped by parents, but also by peers and other individuals that children interact with, in particular, educators. It is possible that teachers, who frequently interact with students and are in positions to grant or thwart autonomy in the academic sphere, may influence students' perceptions of autonomy granting from other adults in their environment such as their parents or caregivers. In a future study, it would be insightful to examine whether the autonomy support that teachers grant students contribute to the relationship between perceived parental autonomy support and the outcome variables. Nonetheless, the current findings provide insight regarding psychosocial factors that promote academic outcomes in academically talented individuals.

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Table 1
Descriptive Statistics for Outcome Variables

Sample	*M*	*SD*	Skew	Kurtosis
Final Course Grade	5.88	1.80	-0.96	3.11
Academic Enjoyment	3.96	0.88	-0.69	3.42
Academic Effort (5 Units)	5.37	1.92	1.19	6.33
Academic Effort (10 Units)	5.52	1.95	1.31	5.30

Table 2
Descriptive Statistics for Perceived Autonomy Supportive and Controlling Parenting Categories

Sample	*M*	*SD*	Skew	Kurtosis
Autonomy Supportive Parenting	4.94	1.14	-0.55	3.28
Choice	5.16	1.22	-0.69	3.39
Rationale	4.92	1.21	-0.46	3.20
Acknowledging feelings	4.74	1.35	-0.43	2.93
Controlling Parenting	3.04	1.27	0.68	3.16
Inducing Guilt	2.46	1.41	1.10	3.68
Threatening Punishment	3.04	1.51	0.63	2.83
Encouraging Performance	3.62	1.50	0.17	2.43

Table 3
Summary of Multiple Regression Analyses for Perceived Autonomy Supportive Parenting and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Autonomy Support	0.09	0.06	.06	.00	0.16*	0.03	.21*	.04*	-0.13	0.07	-.08	.01
Male	-0.06	0.13	-.02	.00	-0.01	0.07	-.01	.00	-0.61*	0.15	-.16*	.02*
GPA	1.48*	0.23	.25*	.06*	-0.08	0.12	-.03	.00	0.17	0.26	.03	.00
SES	0.03	0.09	.01	.00	-0.03	0.04	-.02	.00	-0.03	0.10	-.01	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.05	.00	0.09	0.05	.06	.00
Public School	-0.13	0.16	-.03	.00	-0.16	0.08	-.08	.01	-0.08	0.18	-.02	.00
10-Unit Course	0.14	0.16	.03	.00	0.10	0.08	.05	.00	0.19	0.18	.04	.00
South Asian	0.54*	0.18	.13*	.01*	0.33*	0.09	.15*	.02*	0.04	0.21	.01	.00
European American	-0.08	0.21	-.02	.00	0.13	0.11	.05	.00	-0.78*	0.24	-.14*	.02*
Other Asian	-0.44	0.30	-.06	.00	0.30	0.15	.08	.01	-0.02	0.33	.00	.00
Minorities	-0.54	0.31	-.07	.00	0.38*	0.15	.10*	.01*	0.10	0.34	.01	.00
Multi-ethnic	-1.44*	0.42	-.13*	.02*	0.02	0.21	.00	.00	0.52	0.47	.04	.00
International	0.21	0.23	.04	.00	0.19	0.11	.07	.00	-0.27	0.25	-.04	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 4
Summary of Multiple Regression Analyses for Providing a Rationale and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Providing Rationale	0.06	0.06	.04	.00	0.13*	0.03	.18*	.03*	-0.11	0.06	-.07	.00
Male	-0.07	0.14	-.02	.00	-0.02	0.07	-.01	.00	-0.60*	0.15	-.16*	.02*
GPA	1.48*	0.23	.25*	.06*	-0.08	0.12	-.03	.00	0.18	0.26	.03	.00
SES	0.04	0.09	.02	.00	-0.02	0.05	-.02	.00	-0.04	0.10	-.02	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.06	.00	0.08	0.05	.06	.00
Public School	-0.12	0.16	-.03	.00	-0.15	0.08	-.07	.01	-0.09	0.18	-.02	.00
10-Unit Course	0.14	0.16	.03	.00	0.10	0.08	.05	.00	0.19	0.18	.04	.00
South Asian	0.56*	0.18	.13*	.01*	0.34*	0.09	.16*	.02*	0.02	0.20	.01	.00
European American	-0.06	0.21	-.01	.00	0.17	0.11	.07	.00	-0.81*	0.23	-.15*	.02*
Other Asian	-0.45	0.30	-.06	.00	0.27	0.15	.07	.00	0.00	0.33	.00	.00
Minorities	-0.53	0.31	-.07	.00	0.40*	0.15	.11*	.01*	0.09	0.34	.01	.00
Multi-ethnic	-1.41*	0.42	-.13*	.02*	0.06	0.21	.01	.00	0.49	0.47	.04	.00
International	0.21	0.23	.04	.00	0.21	0.11	.08	.00	-0.27	0.25	-.05	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 5
Summary of Multiple Regression Analyses for Providing Choice and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Providing Choice	0.10	0.06	.07	.00	0.14*	0.03	.20*	.04*	-0.12	0.06	-.07	.01
Male	-0.07	0.13	-.02	.00	-0.02	0.07	-.01	.00	-0.60*	0.15	-.16*	.02*
GPA	1.48*	0.23	.25*	.06*	-0.07	0.12	-.02	.00	0.16	0.26	.03	.00
SES	0.04	0.09	.02	.00	-0.02	0.04	-.02	.00	-0.04	0.10	-.02	.00
Age	0.18*	0.05	.14*	.02*	0.02	0.02	.04	.00	0.09	0.05	.07	.00
Public School	-0.14	0.16	-.03	.00	-0.18	0.08	-.09	.01	-0.06	0.18	-.01	.00
10-Unit Course	0.13	0.16	.03	.00	0.08	0.08	.04	.00	0.21	0.18	.05	.00
South Asian	0.54*	0.18	.13*	.01*	0.34*	0.09	.16*	.02*	0.02	0.20	.01	.00
European American	-0.10	0.21	-.02	.00	0.13	0.11	.05	.00	-0.77*	0.24	-.14*	.02*
Other Asian	-0.41	0.30	-.05	.00	0.33	0.15	.09	.01	-0.04	0.33	-.01	.00
Minorities	-0.53	0.31	-.07	.00	0.41*	0.15	.11*	.01*	0.08	0.34	.01	.00
Multi-ethnic	-1.44*	0.42	-.13*	.02*	0.04	0.21	.01	.00	0.51	0.47	.04	.00
International	0.20	0.23	.04	.00	0.20	0.11	.07	.00	-0.27	0.25	-.04	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 6
Summary of Multiple Regression Analyses for Acknowledging Feelings and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Acknowledging Feelings	0.06	0.05	.05	.00	0.13*	0.03	.20*	.04*	-0.10	0.06	-.07	.00
Male	-0.06	0.14	-.02	.00	0.00	0.07	.00	.00	-0.62*	0.15	-.16*	.03*
GPA	1.49*	0.23	.25*	.06*	-0.06	0.12	-.02	.00	0.15	0.26	.02	.00
SES	0.03	0.09	.01	.00	-0.03	0.05	-.03	.00	-0.03	0.10	-.01	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.05	.00	0.09	0.05	.06	.00
Public School	-0.13	0.16	-.03	.00	-0.16	0.08	-.08	.01	-0.08	0.18	-.02	.00
10-Unit Course	0.14	0.16	.03	.00	0.10	0.08	.05	.00	0.19	0.18	.04	.00
South Asian	0.55*	0.19	.13*	.01*	0.33*	0.09	.16*	.02*	0.03	0.21	.01	.00
European American	-0.08	0.21	-.02	.00	0.13	0.11	.05	.00	-0.78*	0.24	-.14*	.02*
Other Asian	-0.43	0.30	-.06	.00	0.30	0.15	.08	.01	-0.02	0.33	.00	.00
Minorities	-0.54	0.31	-.07	.00	0.37*	0.15	.10*	.01*	0.10	0.34	.01	.00
Multi-ethnic	-1.43*	0.42	-.13*	.02*	0.02	0.21	.00	.00	0.52	0.47	.04	.00
International	0.21	0.23	.04	.00	0.20	0.11	.07	.00	-0.28	0.25	-.05	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 7
Summary of Multiple Regression Analyses for Perceived Controlling Parenting and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Parental Control	-0.12	0.05	-.08	.01	-0.04	0.03	-.06	.00	0.02	0.06	.01	.00
Male	-0.02	0.14	-.01	.00	0.01	0.07	.00	.00	-0.62*	0.15	-.16*	.02*
GPA	1.46*	0.23	.24*	.06*	-0.05	0.12	-.02	.00	0.14	0.26	.02	.00
SES	0.05	0.09	.02	.00	-0.01	0.05	-.01	.00	-0.04	0.10	-.02	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.05	.00	0.09	0.05	.06	.00
Public School	-0.13	0.16	-.03	.00	-0.16	0.08	-.08	.01	-0.08	0.18	-.02	.00
10-Unit Course	0.15	0.16	.04	.00	0.09	0.08	.04	.00	0.20	0.18	.04	.00
South Asian	0.57*	0.18	.13*	.01*	0.38*	0.09	.18*	.03*	-0.01	0.20	.00	.00
European American	-0.09	0.21	-.02	.00	0.17	0.11	.07	.00	-0.82*	0.24	-.15*	.02*
Other Asian	-0.40	0.30	-.05	.00	0.32	0.15	.09	.01	-0.03	0.33	.00	.00
Minorities	-0.51	0.30	-.07	.00	0.44*	0.16	.12*	.01*	0.05	0.34	.01	.00
Multi-ethnic	-1.37*	0.42	-.13*	.01*	0.13	0.21	.02	.00	0.43	0.47	.04	.00
International	0.22	0.23	.04	.00	0.24	0.12	.09	.01	-0.30	0.25	-.05	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 8
Summary of Multiple Regression Analyses for Inducing Guilt and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Inducing Guilt	-0.02	0.05	-.01	.00	-0.04	0.02	-.06	.00	0.05	0.05	.04	.00
Male	-0.06	0.14	-.02	.00	0.00	0.07	.00	.00	-0.63*	0.15	-.16*	.03*
GPA	1.50*	0.23	.25*	.06*	-0.04	0.12	-.01	.00	0.15	0.26	.02	.00
SES	0.04	0.09	.02	.00	-0.01	0.05	-.01	.00	-0.05	0.10	-.02	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.06	.00	0.08	0.05	.06	.00
Public School	-0.13	0.16	-.03	.00	-0.16	0.08	-.08	.01	-0.08	0.18	-.02	.00
10-Unit Course	0.14	0.16	.03	.00	0.10	0.08	.05	.00	0.19	0.18	.04	.00
South Asian	0.57*	0.18	.13*	.01*	0.38*	0.09	.18*	.03*	-0.01	0.20	.00	.00
European American	-0.06	0.21	-.01	.00	0.18	0.11	.07	.00	-0.81*	0.23	-.15*	.02*
Other Asian	-0.42	0.30	-.06	.00	0.32	0.15	.09	.01	-0.04	0.33	-.01	.00
Minorities	-0.51	0.31	-.07	.00	0.43*	0.16	.12*	.01*	0.06	0.34	.01	.00
Multi-ethnic	-1.38*	0.42	-.13*	.01*	0.13	0.21	.02	.00	0.43	0.47	.04	.00
International	0.23	0.23	.04	.00	0.23	0.12	.09	.01	-0.29	0.25	-.05	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 9
Summary of Multiple Regression Analyses for Threatening Punishment and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Threatening	-0.13*	0.05	-.11*	.01*	-0.04	0.02	-.07	.01	-0.04	0.05	-.03	.00
Male	-0.01	0.14	.00	.00	0.01	0.07	.00	.00	-0.59*	0.15	-.15*	.02*
GPA	1.42*	0.23	.24*	.05*	-0.06	0.12	-.02	.00	0.11	0.26	.02	.00
SES	0.04	0.09	.02	.00	-0.01	0.05	-.01	.00	-0.04	0.10	-.02	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.05	.00	0.09	0.05	.06	.00
Public School	-0.14	0.16	-.03	.00	-0.16	0.08	-.08	.01	-0.08	0.18	-.02	.00
10-Unit Course	0.15	0.16	.04	.00	0.09	0.08	.04	.00	0.21	0.18	.05	.00
South Asian	0.56*	0.18	.13*	.01*	0.38*	0.09	.18*	.03*	-0.01	0.20	.00	.00
European American	-0.05	0.21	-.01	.00	0.19	0.11	.07	.00	-0.82*	0.23	-.15*	.02*
Other Asian	-0.42	0.29	-.06	.00	0.31	0.15	.08	.01	-0.02	0.33	.00	.00
Minorities	-0.47	0.30	-.06	.00	0.45*	0.16	.12*	.01*	0.07	0.34	.01	.00
Multi-ethnic	-1.41*	0.42	-.13*	.02*	0.12	0.21	.02	.00	0.42	0.47	.04	.00
International	0.26	0.23	.05	.00	0.25	0.12	.09	.01	-0.29	0.25	-.05	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 10
Summary of Multiple Regression Analyses for Performance Goals and Outcome Variables ($N = 643$)

	Final Grade				Course Enjoyment				Academic Effort			
	b	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2	*b*	*SE b*	β	sr^2
Performance Goals	-0.11*	0.05	-.09*	.01*	-0.02	0.02	-.04	.00	0.04	0.05	.03	.00
Male	-0.02	0.14	-.01	.00	0.00	0.07	.00	.00	-0.62*	0.15	-.16*	.03*
GPA	1.48*	0.23	.25*	.06*	-0.04	0.12	-.01	.00	0.14	0.26	.02	.00
SES	0.05	0.09	.02	.00	-0.01	0.05	-.01	.00	-0.05	0.10	-.02	.00
Age	0.19*	0.05	.15*	.02*	0.03	0.02	.05	.00	0.09	0.05	.06	.00
Public School	-0.13	0.16	-.03	.00	-0.16	0.08	-.08	.01	-0.08	0.18	-.02	.00
10-Unit Course	0.15	0.16	.03	.00	0.09	0.08	.04	.00	0.20	0.18	.04	.00
South Asian	0.57*	0.18	.13*	.01*	0.39*	0.09	.18*	.03*	-0.01	0.20	.00	.00
European American	-0.13	0.21	-.03	.00	0.17	0.11	.07	.00	-0.80*	0.24	-.15*	.02*
Other Asian	-0.40	0.30	-.05	.00	0.31	0.15	.08	.01	-0.03	0.33	.00	.00
Minorities	-0.54	0.30	-.07	.00	0.43*	0.16	.12*	.01*	0.06	0.34	.01	.00
Multi-ethnic	-1.33*	0.42	-.12*	.01*	0.14	0.22	.03	.00	0.42	0.47	.04	.00
International	0.20	0.23	.04	.00	0.23	0.12	.09	.01	-0.29	0.25	-.05	.00

Note. Ethnicity was dummy coded, with East Asian group membership set as the reference group.
*$p < .017$.

Table 11
Hierarchical Multiple Regression on Final Course Grades, Perceived Autonomy Support, and GPA ($N = 656$)

		b	*SE b*	β	Adjusted R^2
Step 1					.0596
	Constant	-0.06	0.90		
	Autonomy Support	0.11	0.06	.07	
	GPA	1.42**	0.23	.24**	
Step 2					.0596
	Constant	-3.63	3.71		
	Autonomy Support	0.85	0.75	.54	
	GPA	2.36*	0.98	.39*	
	Autonomy Support × GPA	-0.20	0.20	-.51	

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

Table 12
Hierarchical Multiple Regression on Final Course Grades, Perceived Control, and GPA (N = 656)

		b	*SE b*	β	Adjusted R^2
Step 1					.0614
	Constant	0.91	0.91		
	Control	-0.11*	0.05	-.08*	
	GPA	1.40**	0.23	.23**	
Step 2					.0645
	Constant	-2.95	2.36		
	Control	1.06	0.67	.75	
	GPA	2.41**	0.62	.40**	
	Control × GPA	-0.31	0.18	-.83	

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

Table 13
Means, Standard Deviations, Paired Sample t-tests, and Effect Sizes for Perceived Autonomy Supportive and Controlling Parenting by European American and East Asian Groups

	European American		East Asian		2-tailed *t*-test	Effect Size
	M	*SD*	*M*	*SD*	*t*	*d*
Autonomy Support	5.10	1.13	4.74	1.15	2.55*	0.31
Rationale	4.92	1.27	4.76	1.24	1.02	0.12
Choice	5.42	1.24	4.99	1.20	2.86*	0.35
Acknowledging feelings	4.96	1.31	4.47	1.35	2.98*	0.36
Controlling	2.77	1.36	3.07	1.21	-1.92	-0.24
Inducing Guilt	2.31	1.52	2.49	1.37	-1.06	-0.13
Threatening Punishment	2.96	1.59	3.00	1.46	-0.20	-0.02
Encouraging Performance	3.05	1.52	3.72	1.44	-3.73**	-0.46

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

Table 14
Hierarchical Multiple Regression on Final Course Grades, Perceived Autonomy Support, and East Asian Status ($N = 656$)

		b	*SE b*	β	Adjusted R^2
Step 1					.0045
	Constant	5.21**	0.33		
	Autonomy Support	0.14*	0.06	.09*	
	East Asian	-0.01	0.15	-.00	
Step 2					.0044
	Constant	4.97**	0.41**		
	Autonomy Support	0.18*	0.08	.12*	
	East Asian	0.60	0.64	.16	
	Autonomy Support × East Asian	-0.13	0.13	-.17	

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

Table 15
Hierarchical Multiple Regression on Final Course Grades, Perceived Control, and East Asian Status ($N = 656$)

		b	*SE b*	β	Adjusted R^2
Step 1					.008
	Constant	6.35**	0.19		
	Control	-0.15*	0.06	-.11*	
	East Asian	-0.05	0.15	-.01	
Step 2					.007
	Constant	6.40**	0.22		
	Control	-0.17*	0.07	-.12*	
	East Asian	-0.20	0.38	-.05	
	Control × East Asian	0.05	0.12	.05	

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

Table 16
Pearson's Correlations Between Decision to Attend the Program and Perceived Autonomy Supportive Parenting Subscales

	Decision to Attend Program
Autonomy Support	.29**
Choice	.38**
Rationale	.17**
Acknowledging feelings	.26**

** $p < .001$.

Table 17
Hierarchical Multiple Regression on Final Course Grades, SES, Perceived Autonomy Support, and Decision to Attend Program Variables ($N = 648$)

		b	*SE b*	β	Adjusted R^2
Step 1					.007
	Constant	4.73**	0.48		
	Autonomy Support	0.13	0.06	.08	
	SES	0.12	0.09	.05	
Step 2					.047
	Constant	3.90**	0.49		
	Autonomy Support	0.03	0.06	.02	
	SES	0.14	0.08	.06	
	Decision to Attend Program	0.35**	0.07	.21**	

** $p < .001$.

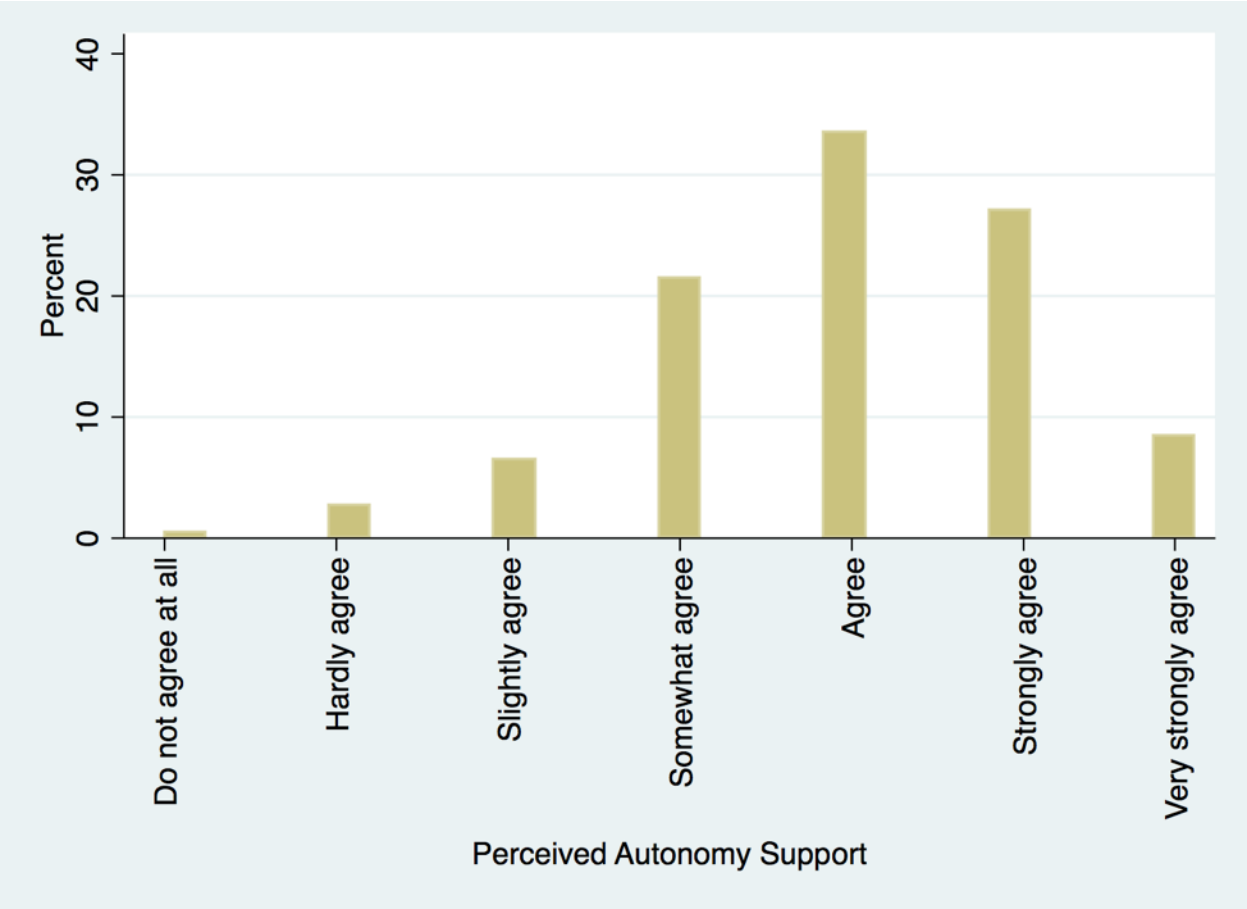

Figure 1. Percentage distribution of participants' perceived autonomy support.

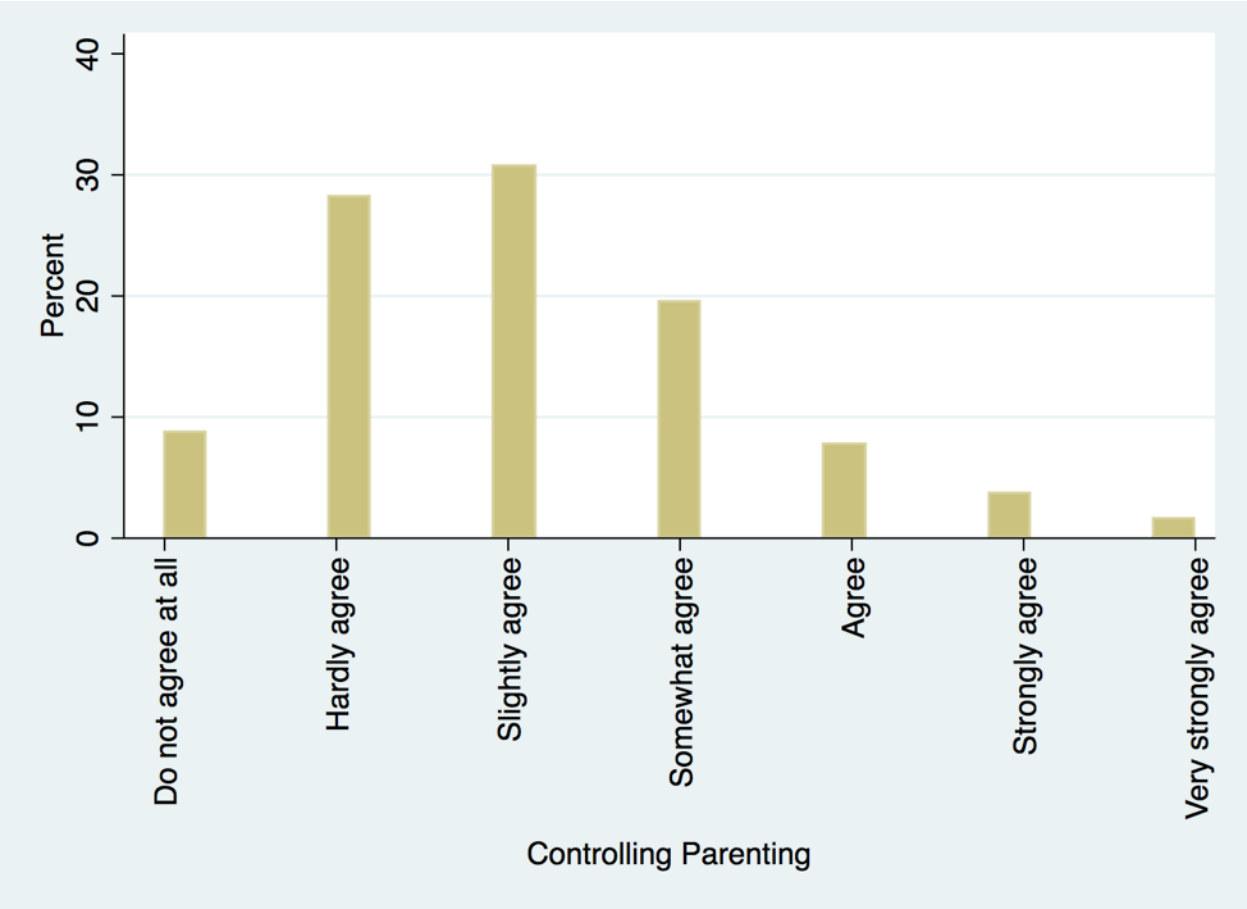

Figure 2. Percentage distribution of participants' perceived parental control.

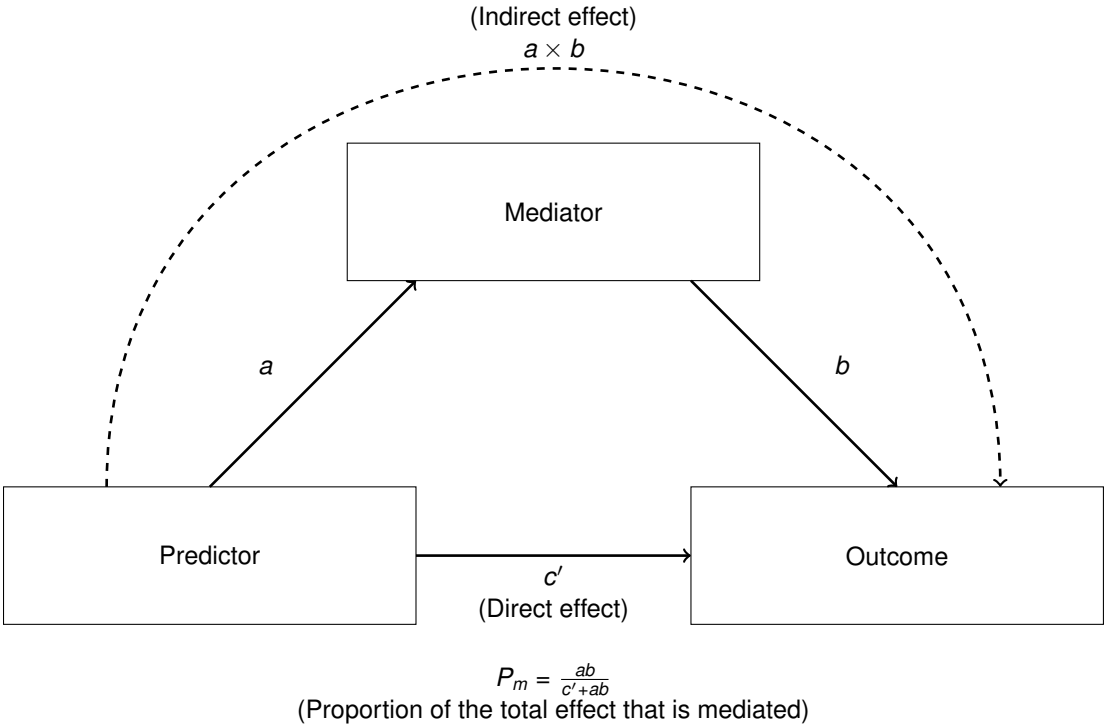

Figure 3. Conceptual diagram of a simple mediation model.

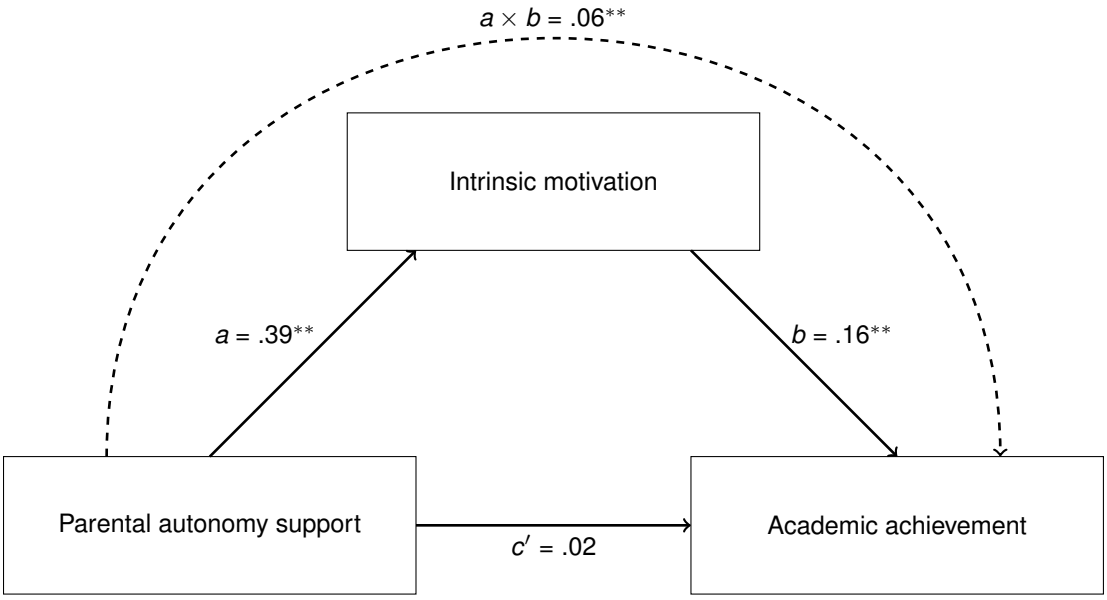

Figure 4. Standardized regression coefficients for the relationship between perceived parental autonomy support and final course grades mediated by intrinsic motivation.
$^{*}p < .05.^{**}p < .001$.

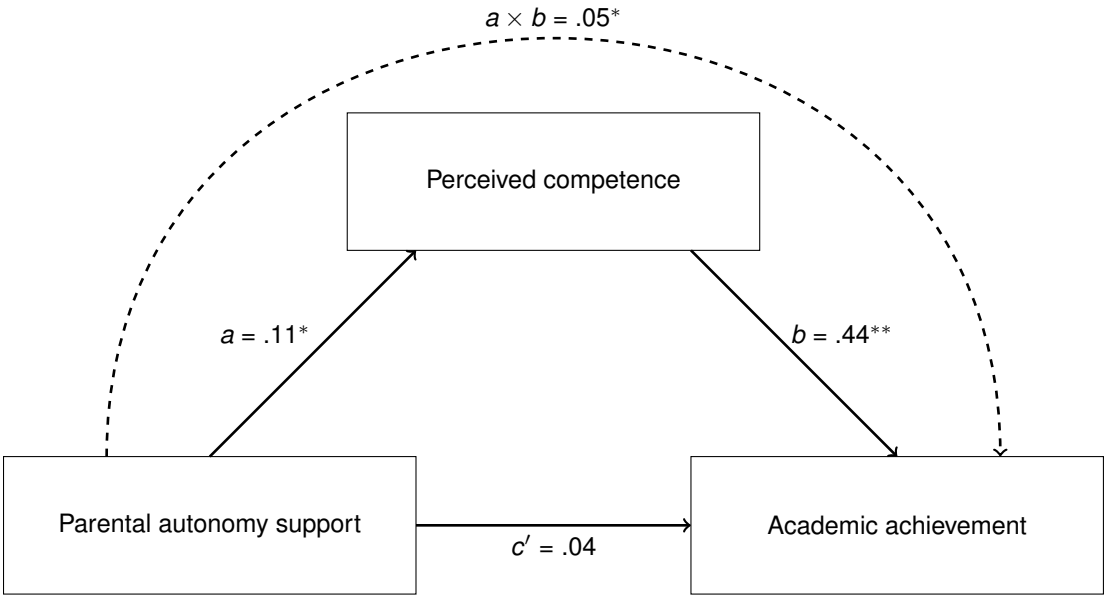

Figure 5. Standardized regression coefficients for the relationship between perceived parental autonomy support and final course grades mediated by perceived competence.
$^{*}p < .05.^{**}p < .001$.

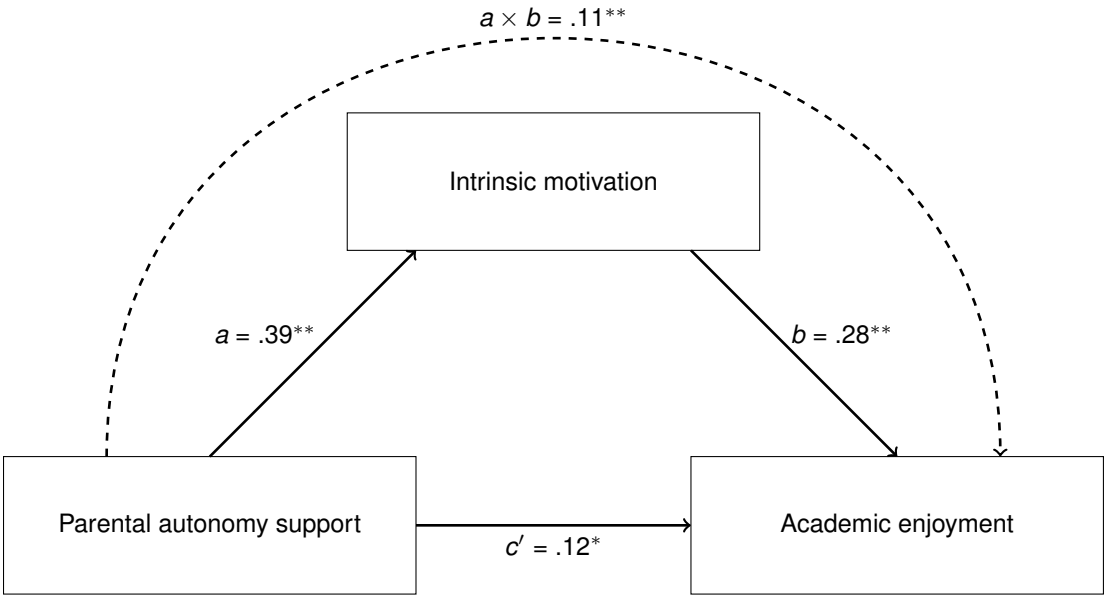

Figure 6. Standardized regression coefficients for the relationship between perceived parental autonomy support and academic enjoyment mediated by intrinsic motivation.
$^{*}p < .05.^{**}p < .001$.

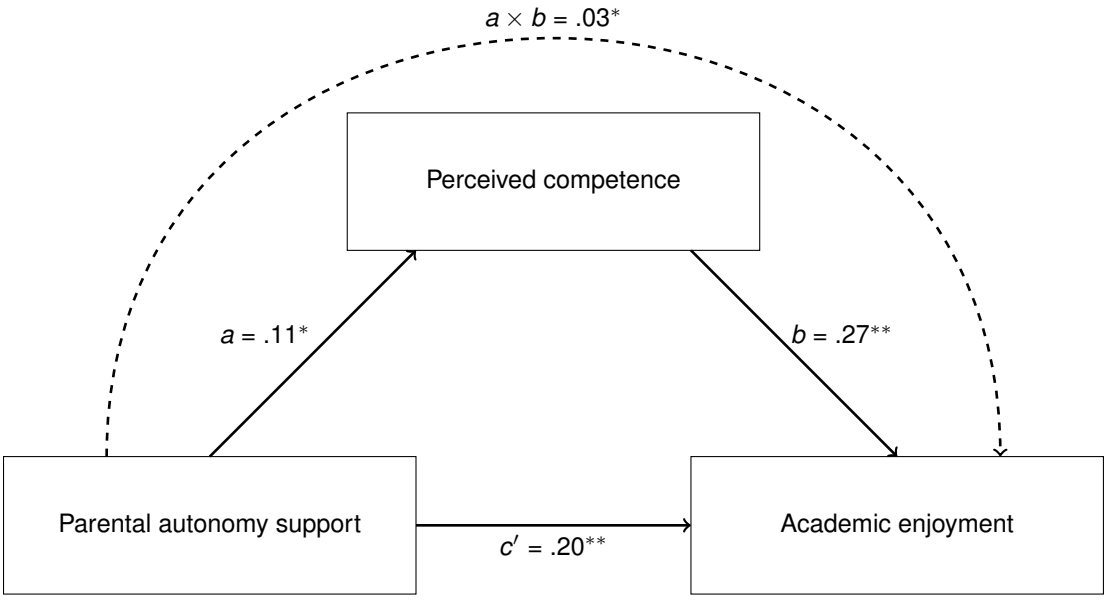

Figure 7. Standardized regression coefficients for the relationship between perceived parental autonomy support and academic enjoyment mediated by perceived competence.
$^{*}p < .05.^{**}p < .001$.

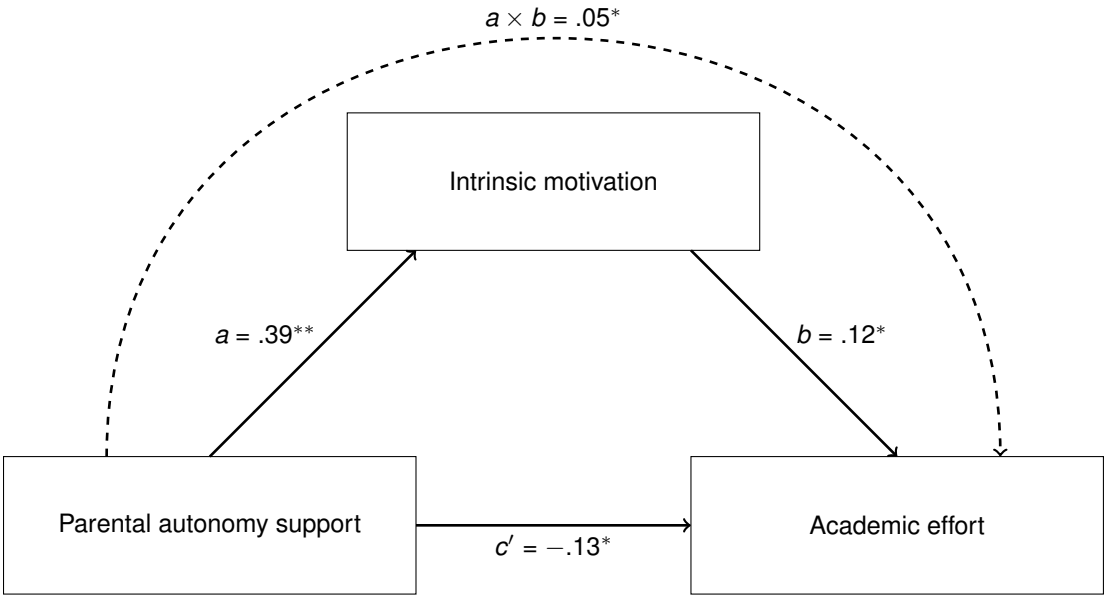

Figure 8. Standardized regression coefficients for the relationship between perceived parental autonomy support and academic effort mediated by intrinsic motivation.
$^{*}p < .05.^{**}p < .001$.

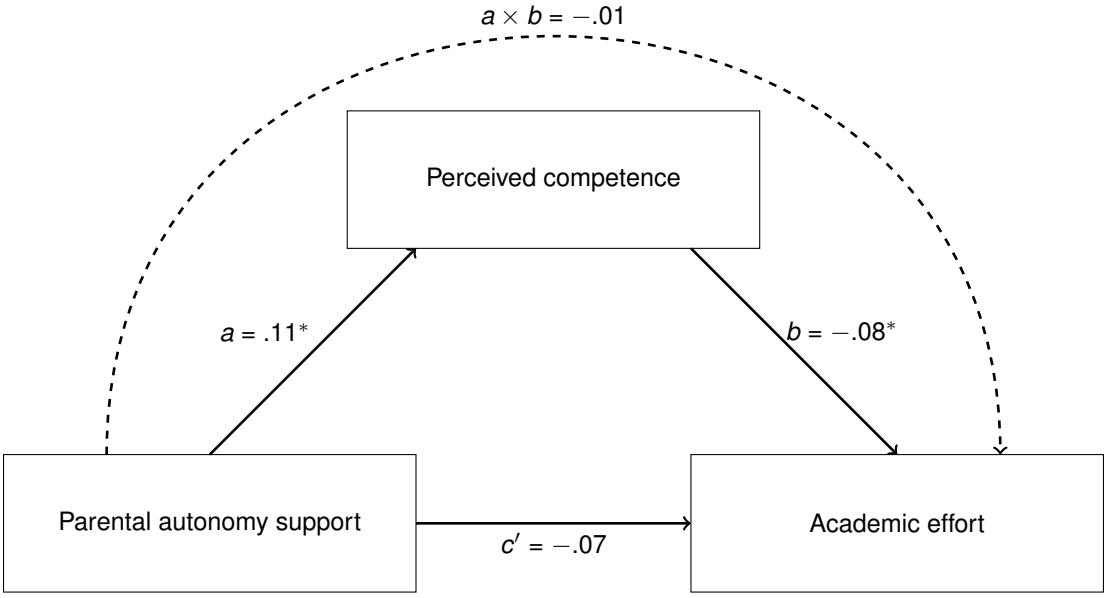

Figure 9. Standardized regression coefficients for the relationship between perceived parental autonomy support and academic effort mediated by perceived competence.
$^*p < .05.^{**}p < .001$.

Appendix A

Perceived Parental Autonomy Support Scale (P-PASS)

Please answer the following questions about your parents or guardians. For the past few months...

	Do not agree at all	Hardly agree	Somewhat agree	Agree	Strongly agree	Very strongly agree
1. My parents gave me many opportunities to make my own decisions about what I was doing.	○	○	○	○	○	○
2. When my parents asked me to do something, they explained why they wanted me to do it.	○	○	○	○	○	○
3. When I refused to do something, my parents threatened to take away certain privileges in order to make me do it.	○	○	○	○	○	○
4. My point of view was very important to my parents when they made important decisions concerning me.	○	○	○	○	○	○
5. My parents refused to accept that I could want simply to have fun without trying to be the best.	○	○	○	○	○	○
6. When my parents wanted me to do something differently, they made me feel guilty.	○	○	○	○	○	○

7. My parents encouraged me to be myself.	○	○	○	○	○	○
8. Within certain limits, my parents allowed me the freedom to choose my own activities.	○	○	○	○	○	○
9. When I was not allowed to do something, I usually knew why.	○	○	○	○	○	○
10. I always had to do what my parents wanted me to do, if not, they would threaten to take away privileges.	○	○	○	○	○	○
11. My parents believed that, in order to succeed, I always had to be the best at what I did.	○	○	○	○	○	○
12. My parents made me feel guilty for anything and everything.	○	○	○	○	○	○
13. My parents were able to put themselves in my shoes and understand my feelings.	○	○	○	○	○	○
14. My parents hoped that I would make choices that corresponded to my interests and preferences regardless of what theirs were.	○	○	○	○	○	○

15. When my parents wanted me to do something, I had to obey or else I was punished.	○	○	○	○	○	○
16. My parents were open to my thoughts and feelings even when they were different from theirs.	○	○	○	○	○	○
17. In order for my parents to be proud of me, I had to be the best.	○	○	○	○	○	○
18. When my parents wanted me to act differently, they made me feel ashamed in order to make me change.	○	○	○	○	○	○
19. My parents made sure that I understood why they forbid certain things.	○	○	○	○	○	○
20. As soon as I didn't do exactly what my parents wanted, they threatened to punish me.	○	○	○	○	○	○
21. My parents used guilt to control me	○	○	○	○	○	○
22. My parents insisted that I always be better than others.	○	○	○	○	○	○
23. When I asked why I had to do, or not do, something, my parents gave me good reasons.	○	○	○	○	○	○

24. My parents listened to my opinion and point of view when I disagreed with them.	○	○	○	○	○	○

Appendix B

Academic Motivation Scale (AMS)

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to school.

	1	2	3	4	5	6	7
	Does not correspond			Corresponds moderately			Corresponds exactly
1. Because I experience pleasure and satisfaction while learning new things	○	○	○	○	○	○	○
2. For the pleasure I experience when I discover new things never seen before	○	○	○	○	○	○	○
3. For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.	○	○	○	○	○	○	○
4. Because my studies allow me to continue to learn about many things that interest me	○	○	○	○	○	○	○
5. For the pleasure I experience while surpassing myself in my studies	○	○	○	○	○	○	○
6. For the pleasure I experience while I am surpassing myself in one of my personal accomplishments.	○	○	○	○	○	○	○

7. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities	○	○	○	○	○	○	○
8. Because school allows me to experience a personal satisfaction in my quest for excellence in my studies.	○	○	○	○	○	○	○
9. Because I really like going to school	○	○	○	○	○	○	○
10. Because for me, school is fun	○	○	○	○	○	○	○
11. For the pleasure that I experience when I am taken by discussions with interesting teachers	○	○	○	○	○	○	○
12. For the ”high” feeling that I experience while reading about various interesting subjects	○	○	○	○	○	○	○
13. Because I think that school will help me better prepare for the career I have chosen	○	○	○	○	○	○	○
14. Because eventually it will enable me to enter the job market in a field that I like	○	○	○	○	○	○	○
15. Because this will help me make a better choice regarding my career orientation	○	○	○	○	○	○	○
16. Because I want to show myself that I can succeed in my studies	○	○	○	○	○	○	○

17. To prove to myself that I am capable of completing my high-school degree	○	○	○	○	○	○	○
18. Because of the fact that when I succeed in school I feel important	○	○	○	○	○	○	○
19. To show myself that I am an intelligent person	○	○	○	○	○	○	○
20. Because I need school in order to find a high-paying job later on	○	○	○	○	○	○	○
21. In order to obtain a more prestigious job later on	○	○	○	○	○	○	○
22. Because I want to have ”the good life” later on	○	○	○	○	○	○	○
23. In order to have a better salary later on	○	○	○	○	○	○	○
24. Honestly, I don’t know; I really feel that I am wasting my time in school	○	○	○	○	○	○	○
25. I once had good reasons for going to school; however, I now wonder whether I should continue	○	○	○	○	○	○	○
26. I can’t see why I should go to school and frankly, I couldn’t care less	○	○	○	○	○	○	○
27. I don’t know; I can’t understand what I am doing in school	○	○	○	○	○	○	○