Perceptions of Parental Involvement and Autonomy Support:
Their Relations with Self-Regulation, Academic Performance, Substance Use and Resilience among Adolescents

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This study examined the effects of perceived parental involvement and autonomy support on academic performance and substance use among 171 adolescents. Participants reported their perception of parental involvement and autonomy support, reasons for doing school work, ability to control their attention and behavior, school grade, classroom disruptive behavior and substance use. Teacher and school administrators provided information about students' academic performance. Self-regulation variables mediated the effects of perceived parental involvement and autonomy support on academic performance and classroom disruptive behavior in both low and high-risk students. Among high-risk students only, classroom disruptive behavior was significantly related to greater substance use. A higher level of perceived parental involvement and autonomy support and greater self-regulation predicted better outcomes for all students.

Three important developmental tasks for adolescents in the U.S. are doing reasonably well in schools, behaving in a manner that does not disrupt others, and resisting the urge to use alcohol and other drugs (Masten, 2001; Masten & Reed, 2002). This study examined how parental involvement and parental autonomy support were related to these three psychosocial outcomes in adolescence, i.e., academic performance, disruptive behavior and substance use. Additionally, this study tested whether self-regulation mediated the effects of parental involvement and autonomy support on these outcomes. Moreover, this study examined the relations among parenting practices, self-regulation and resilience, i.e., good adaptation in spite of adversity.

Past research has found that perception of parental involvement and autonomy support are positively related to academic performance (Grolnick, Ryan, & Deci, 1991; Grolnick & Slowiaczek, 1994; Soenens & Vansteenkiste, 2005). Parental involvement is the extent to which parents are interested in, knowledgeable about, and willing to take an

active role in the day-to-day activities of their children. Parental autonomy support is the extent to which parents value and use techniques that facilitate independent problem solving, choice, and self-determination in their children. Specifically, perception of greater parental involvement is associated with higher standardized achievement scores, higher teacher rated competence, and better school grade (Grolnick et al., 1991; Grolnick & Slowiaczek, 1994). Perception of greater parental autonomy support is related to higher grade point average, higher teacher-rated competence, more active job search behavior, and a strong vocational identity (Grolnick et al., 1991; Soenens & Vansteenkiste, 2005).

This study examined the effects of perceived parental involvement and autonomy support on academic performance, classroom disruptive behavior and substance use in adolescence. Classroom disruptive behavior and substance use are two important psychosocial outcomes that have not been studied in previous research on perceived parental involvement and autonomy support (Grolnick et al., 1991; Grolnick & Slowiaczek, 1994; Soenens & Vansteenkiste, 2005). Additionally, this study examined how perceived parental involvement and autonomy support were related to resilience, i.e., positive adaptation in spite of adversity (Luthar, Cicchetti, & Becker, 2000; Masten, 2001). I compared the effects of perceived parental involvement and autonomy support on psychosocial outcomes between high-risk and low-risk students: those who were in challenging circumstances (i.e., having low parental education and low parental acculturation) and those who were not. Past research has shown that low parental education and acculturation were correlated with a number of poor outcomes in children and adolescents such as low academic performance (Blair, Blair & Madamba, 1999; Farver, Bhadha, & Narang, 2002), more substance use (Conway, Swendsen, Dierker, Canino & Merikangas, 2007; Rodriguez, Henderson, Rowe, 2007) and a high frequency of sexual behavior (Wills, Gibbons, Gerrard, Murray & Brody, 2003).

Parenting practices and characteristics of parent-child interactions have been linked to behavioral problems, substance use (Hawkins, Catalano, & Miller, 1992; Petraitis, Flay, & Miller, 1995) and resilience (Luthar & Zelazo, 2003; Masten & Reed, 2002). Factors such as parents' permissiveness, inconsistent and unclear behavioral limits, unrealistic parental expectations, negative communication patterns, and lack of parental monitoring were associated with earlier initiation and higher rates of drug use (Baumrind, 1991; Chilcoat & Anthony, 1996). Greater perceived parental support and responsiveness together with high parental expectations were associated with resilience in children and youth (Forgatch & DeGarno, 1999; Masten & Reed, 2002).

Relatively little is known about the mediators that may explain the effects of perceived parental involvement and autonomy support on academic performance or other important psychosocial outcomes in adolescence (Barber & Harmon, 2002; Grolnick, 2002). Identifying possible mediators may allow parents, educators, and psychologists to understand more about how to affect these outcomes. To the best of my knowledge, only one study (Grolnick et al., 1991) focused on such mediators. In that study, academic competence, control understanding (i.e., understand that one's behavior could affect academic outcomes) and autonomous self-regulation in schoolwork mediated the effects of perceived parental involvement and autonomy support on academic performance. Are there other mediators that may explain the effects of parental involvement and autonomy support on outcomes?

In identifying variables that may mediate the relationship between parenting practices and psychosocial outcomes in adolescence, this study focused on the processes of self-regulation. Self-regulation refers to any efforts by the human self to alter its own psychological states or behavior (Vohs & Baumeister, 2004). Two components of self-regulation were examined –effortful control and academic self-regulatory styles. Effortful control is an individual's ability to inhibit a dominant response to perform a subdominant response (Rothbart & Bates, 1998; Rothbart, Derryberry, & Posner, 1994). It involves one's ability to voluntarily inhibit, activate, and change attention and behavior (Eisenberg, Smith, & Sadovsky, 2004). More effortful control was related to less negative emotionality (Eisenberg et al., 1999; Kochanska, Murray & Harlan, 2000), an ability to delay gratification (Sethi, Mischel, Aber, Shoda & Rodriguez, 2000), compliance to adult demands (Kochanska, Coy, & Murray, 2001), the development of empathy, prosocial behavior, and conscience (Eisenberg et al., 1996; Eisenberg et al., 1997; Kochanska & Knaack, 2003), and greater social competence and adjustment (Henry, Caspi, Moffitt, Harrington, & Silva, 1999). Whether effortful control mediates the effects of parental involvement (or autonomy support) on psychosocial outcomes has not been addressed by previous studies. This study addresses this gap.

Academic self-regulatory styles pertain to students' reasons for doing academic work (Grolnick & Ryan, 1987; Grolnick et al., 1991; Soenens & Vansteenkiste, 2005). Some students may do the work because of external factors (e.g., to avoid parental punishment) or internal pressures (e.g., guilt or wanting to obtain social approval). Some may do the work because it is important or valuable to them or because the work is intrinsically interesting. These reasons have been shown to affect learning and academic performance (Grolnick & Ryan, 1987; Grolnick et al., 1991). Students who do their work for external (i.e., external factors

or pressure) or introjected reasons (i.e., internal pressures such as guilt or social approval) are less likely to perform as well as those who do their work for identified (i.e., school work is personally valuable) or intrinsic reasons (i.e., school work is intrinsically interesting). Greater perceived parental involvement and autonomy support were significantly related to a more autonomous style of self-regulation (i.e., doing schoolwork for identified or intrinsic reasons as opposed to external or introjected reasons), which in turn predicts better academic performance (Grolnick et al., 1991). This study extended findings of previous studies by examining whether academic self-regulatory styles mediated the relationship of parental involvement and autonomy support on substance use and resilience.

To summarize, the present study had three hypotheses. First, the study examined whether perception of parental involvement and parental autonomy support were related to three psychosocial outcomes, i.e., academic performance, classroom disruptive behavior and substance use. Second, the study tested whether academic self-regulatory styles and effortful control might mediate such relations. Third, the study ascertained whether the relations among parenting characteristics, effortful control, academic self-regulatory styles and outcomes are the same for high risk and low risk students.

METHOD

Participants

One hundred and seventy-one adolescents (71 boys, 100 girls) participated in the study. All were students from a middle school and a high school from the northwestern U.S. The mean age of these students was 14.05 (SD = 1.46). 56.8% of the students were Caucasians, 35.8% were Hispanics, 3.4% were Native Americans, 0.6% were African Americans and 3.4% were students from other ethnic groups. Less than half of the students had parents who finished an associate degree or a bachelor degree (32% of fathers, 44% of mothers). Less than 10% of parents had obtained a postgraduate education (8% of fathers, 4% of mothers). About one quarter of students indicated their parents did not speak English well (27% of fathers, 25% of mothers). Many of these parents were recent immigrants or migrant workers from Mexico.

Measures

Perceived parental involvement and autonomy support. Perceived parental involvement and autonomy support were assessed by the *Perceptions of Parents Scale* (POPS; Grolnick et al., 1991). POPS consists of 22 questions (11 each for mother and father) that assess children's perception of whether their parents are involved in their lives (e.g., being available to them, knowledgeable about their lives, concerned

about their everyday activities) and support their choices and decisions. For each item, four choices are available. Students were asked to pick statements that best describe their mother and father. A sample item of parental involvement is "a. Some mothers (fathers) never have enough time to talk to their children. b. Some mothers (fathers) usually don't have enough time to talk to their children. c. Some mothers (fathers) sometimes have enough time to talk to their children. d. Some mothers (fathers) always have enough time to talk to their children." A sample item of parental autonomy support is "a. Some mothers (fathers) always tell their children what to do. b. Some mothers (fathers) sometimes tell their children what to do. c. Some mothers (fathers) sometimes like their children to decide for themselves what to do. d. Some mothers (fathers) always like their children to decide for themselves what to do". POPS has been frequently used in studies on parenting context and behavior (Grolnick, Deci, & Ryan, 1997). In this study, the Cronbach's alpha was .63 for maternal involvement scale, .55 for maternal autonomy support, .78 for paternal involvement and .56 for paternal autonomy support.

Self-regulatory styles in academic work. Self-regulation in academic work was measured by the *Academic Self-Regulation Questionnaire* (SRQ-A; Ryan & Connell, 1989). The SRQ-A consists of 32-items about children's reasons for doing schoolwork. Specifically, children were asked to indicate their reasons for the following activities: "why do I do school work?", "why do I work on my class work?", "why do I answer hard questions in class?" and "why do I try to do well in school?" Responses were given in a 4-point Likert type scale (1 "very true" to 4 "not at all true"). Based on the responses to the questions, scores for 4 types of self-regulation were calculated - external regulation (engage in academic work to avoid negative consequences or to obey externally imposed rules: e.g., "I do my homework because I'll get in trouble if I don't"), introjected regulation (engage in academic work to gain adult's approval or to avoid negative feelings such as guilt: e.g., "I do my homework because I want the teacher to think I'm a good student"), identified regulation (engage in academic work because it is important and valuable: e.g., "I do my homework because it's important to me") and intrinsic regulation (engage in academic work because the inherent enjoyment it brings: e.g., "I do my homework because I enjoy doing my homework"). SRQ-A has been widely used in studies to measure academic self-regulation (Grolnick et al., 1991; Grolnick & Ryan, 1987, 1989; Miserandio, 1996; Patrick, Skinner, & Connell, 1993). Cronbach's alphas for the four scales are .84 for external regulation, .85 for introjected regulation, .85 for identified regulation, and .90 for intrinsic regulation. A high score of a regulatory style represents a stronger endorsement of that style.

Effortful control. Effortful control was measured by the *Early Adolescence Temperament Questionnaire-Revised* (Ellis & Rothbart, 2001). Three subscales were used: attention focusing and shifting (i.e., the capacity to focus and shift attention according to one's desire; 6 items), inhibitory control (i.e., the capacity to plan and to suppress inappropriate responses; 5 items), and activation control (i.e., the capacity to perform an action when there is a strong tendency to avoid it; 5 items). Sample items are "It is easy for me to really concentrate on homework problems" (attention focusing), "I find it hard to shift gears when I go from one class to another at school" (attention shifting, reverse scored), "If I have a hard assignment to do, I get started right away" (activation control), and "When someone tells me to stop doing something, it is easy for me to stop" (inhibitory control). Items were averaged such that higher scores represent greater attention, inhibitory control, and activation control. Cronbach's alpha for effortful control items is .77.

Academic performance. Information about students' academic performance was collected from both the students and the teachers. Students were asked to indicate their performance in four areas: Math, Science, Reading/English/Language Arts, and History/Social Studies. In each area, they were asked to indicate their grade from last semester in each subject (A = 4, B = 3, C = 2, D = 1, F = 0). Additionally, teachers provided grade information in the four subjects. Mean scores were obtained by averaging performance across the four areas. Self-report and teacher ratings were significantly correlated with one another ($r = .78$, $p < .001$).

Disruptive behavior in the classroom. Classroom disruptive behavior was assessed by 5 items in the *Patterns of Adaptive Learning Survey* (Midgley et al., 2000). Sample items include 'I sometimes get into trouble with my teacher during class' and 'I sometimes disturb the lesson that is going on in class.' Responses were given in a 5-point Likert scale – 1 'not at all true,' 3 'somewhat true,' and 5 'very true.' Items were averaged such that higher scores represent more disruptive behavior. Cronbach's alpha for the scale is .83.

Substance use. Substance use was measured by 4 items. Students reported whether and how often they had ever used alcohol, cigarettes, chewing tobacco, and marijuana (0 = never; 1 = once or twice; 2 = occasionally but not regularly; 3 = regularly in the past; 4 = regularly now). Cronbach's alpha for the four items is .79.

Resilience. Resilience is positive adaptation in spite of adverse circumstances (Luthar et al., 2000; Masten, 2001). The majority of students in this study came from a low socioeconomic class. Some students had lower socioeconomic status due to their parents'

background. Two parental characteristics were used to indicate adverse circumstances -- (i) low parental education, i.e., at least one parent did not receive an education beyond high school or (ii) low parental acculturation, i.e., at least one parent could not speak English well. Using the above criteria, 118 students were classified as "high-risk, 80% of whom had parents who worked in local potato farms and factories. In other words, the majority of these students came from a low socio-economic background. Positive adaptation is defined as doing well with regards to age-specific developmental tasks. In this culture, positive adaptation may include reasonably good academic performance and lack of behavioral and psychological problems (Masten, 2001; Masten & Reed, 2002). In this study, I operationalized positive adaptation as good academic performance, little disruptive behavior in classroom, and little substance use. Instead of classifying students as resilient and non-resilient, this study focused on understanding the variables that may predict positive adaptation among high-risk students.

Procedure

Teachers and administrators distributed parental consent letters to students prior to the study. Students whose parents consented to the study received a detailed letter describing the study. Those who agreed to participate filled out several questionnaires. The study took place in classrooms or the cafeteria of the two schools. Research team members were available throughout the study to address any questions that students had. Students were told that they could skip questions or discontinue the study if they were uncomfortable with the questions. It took approximately 45 minutes for students to finish the questionnaires. All students received a small gift for their participation. Their names were also entered into a cash drawing: 10% of the students received a cash prize of $15.

Analytic Plan I analyzed the data by structural equation modeling. Structural equation modeling takes a confirmatory (theory-driven) approach as opposed to an exploratory approach to data analysis (Bollen, 1989; Bryne, 2001). It requires researchers to come up with a theoretical model prior to analyses. The analysis reveals whether the data fit the hypothetical model well or poorly. Structural equation modeling explicitly accounts for measurement error by examining the relationship between latent (unobserved) and observed variables. The technique simultaneously estimates multivariate relations among multiple observed and latent (unobserved) independent and dependent variables.

Model fit was evaluated by the χ^2 goodness-of-fit statistic and three fit indices - Comparative Fit Index (CFI; Bentler, 1990), Tucker Lewis Index (TLI; Tucker & Lewis, 1973), and root mean square of

approximation (RMSEA; Steiger & Lind, 1980). The χ^2 goodness-of-fit statistic evaluates the difference between the data and the fitted covariance matrices, i.e., the hypothetical model (Bentler & Bonnet, 1980). An insignificant value indicates a good fit. However, the χ^2 test becomes overly conservative when sample size increases (Bentler, 1990). Therefore other indices are also used to evaluate model fit. A value of .9 or above on fit indices such as the CFI and TLI indicates a good fit, while a value of .95 above indicates an excellent fit (Hu & Bentler, 1999). Values of .06 or below on the root mean square of approximation (RMSEA) indicates a good fit (Hu & Bentler, 1999).

I analyzed the data following the steps described below. First, I estimated measurement models for the main variables. Second, I tested the structural models -- parenting characteristics and self-regulation were predictors and academic performance, disruptive behavior and substance use were outcomes. I hypothesized that students' effortful control and academic self-regulatory styles mediated the relations between parenting practices and the three outcomes (Figure 1). I carried out mediation analyses using the product of coefficient method (MacKinnon, Fairchild & Fritz, 2007; MacKinnon, Lockwood, Hoffman, West & Sheets, 2002). The significance of the mediator is tested by dividing the estimate of the mediation effect by its standard error $(\dfrac{\alpha\beta}{\sigma_{\alpha\beta}}$ or $\dfrac{\alpha\beta}{\sqrt{\alpha^2\sigma_\beta^2 + \beta^2\sigma_a^2}})$.

This value is then compared to z', a distribution empirically generated by extensive simulations (MacKinnon et al., 2002). If the value exceeds the critical value for the .05 significance level, the mediator variable is considered significant. Traditional methods using $\dfrac{\alpha\beta}{\sigma_{\alpha\beta}}$ to test the significance of the mediator variable compare the value to a normal z distribution (Sobel, 1982). However, these methods have low statistical power because the distribution of $\alpha\beta$ is often not normally distributed (MacKinnon et al., 2002).

To test whether the relations among parenting characteristics, self-regulation and the outcomes were similar in low and high-risk students, I conducted multiple group analyses. For each outcome, I examined two models: one in which the relations among variables were constrained to be equal in the two groups and one in which the relations were allowed to be different. I compared the two models by a χ^2 difference test. When the two models were not significantly differently from one another, the relations among parental involvement, self-regulation and the outcomes were similar in both groups. When the two models were significantly different from one another, the relations were different in the two groups.

RESULTS

Descriptive Statistics

Descriptive statistics and correlations among the major variables are presented in Table 1. Parental involvement and autonomy support were significantly correlated with one another. Self-regulation variables (identified regulation, attention, inhibitory control, activation control) were also positively correlated with one another. Parental involvement had a positive relation with self-regulation variables and academic performance and a negative relation with cigarette use. Parental autonomy support had a positive relation with identified regulation, attention and a negative relation with use of alcohol. Identified regulation was positively correlated with self-reported academic performance and negatively correlated with disruptive behavior and alcohol and cigarette use. The three components of effortful control were positively correlated with academic performance and negatively correlated with disruptive behavior.

Preliminary analyses showed that gender, ethnicity, and age were significantly related to some dependent variables. When compared to boys, girls reported better grades (boys: 2.93 (.88), girls: 3.38 (.75); $t(117.58) = -3.31$, $p < .001$), were less likely to be disruptive in class (boys: 2.57 (.87), girls: 1.98 (.77); $t(159) = 4.59$, $p < .001$), and were less likely to use chewing tobacco (boys: 1.33 (.84), girls: 1.01 (.10); $t(67.41) = 3.07$, $p < .01$). When compared to Caucasian students, Hispanic students had lower grades, as indicated in both self-report (Caucasian: 3.38 (.80), Hispanic: 2.81 (.82); $t(148) = 4.15$, $p < .001$) and teacher report of academic performance (Caucasian: 3.19 (.80), Hispanic: 2.54 (.72); $t(72) = 3.67$, $p < .001$). Younger students performed better at school than older students (self-report: $\beta = -.24$, $p < .01$; teacher report: $\beta = -.29$, $p = .001$). As expected, age was significantly associated with alcohol and other drug use. When compared to younger students, older students more often used alcohol ($\beta = .36$, $p < .001$), smoked cigarettes ($\beta = .28$, $p < .001$), chewed tobacco ($\beta = .26$, $p < .01$) and used marijuana ($\beta = .23$, $p < .01$). Given these results, the effects of gender, ethnicity, and age were statistically controlled for in structural equation modeling analyses.

TABLE 1 Means, SDs and Correlation Matrices of Major Variables

					Variables					
	M	SD	1	2	3	4	5	6	7	8
1. Parental involvement	2.96	.53	--	.36*	.23*	.17	.36*	.21*	.33*	.29*
2. Parental auto support	2.6	.46		--	.23*	.15	.18*	.08	.16	.12
3. Identified Regulation	3.17	.61			--	.27*	.20*	.16*	.40*	.16
4. Activation Control	3.35	.72				--	.48*	.42*	.18*	.20*
5. Attention	3.42	.64					--	.59*	.25*	.16
6. Inhibitory Control	3.66	.65						--	.28*	.24*
7. Academic - self	3.17	.84							--	.75*
8. Academic - teacher	3.01	.81								--
9. Disruptive Behavior	2.24	.86								
10. Alcohol Use	1.72	1.0								
11.Cigarette Use	1.26	.71								
12. Chewing Tobacco	1.14	.56								
13. Marijuana Use	1.17	.57								
14. Gender	.58	.49								
15. Ethnicity	.39	.49								
16. Age	14.1	1.5								

Measurement Models

I examined measurement models of different constructs to find out how well the observed variables measured latent constructs. Preliminary analyses showed significant correlations between maternal and paternal involvement (r (171) = .59, $p < .001$) and between maternal and paternal autonomy support (r (171) = .66, $p < .01$). The measures were combined to form two latent constructs, parental involvement and parental autonomy support. All measurement models showed good to excellent fit to the data, indicating that the observed variables measure the latent constructs well. The fit statistics of each latent construct are as follows – parental involvement (χ^2(24) = 24.20, p = .45, CFI = .99, TLI = .99, RMSEA = .01), parental autonomy support (χ^2 (21) = 28.54, p = .13, CFI = .96, TLI = .94, RMSEA = .05), external regulation (χ^2 (20) = 31.06, p = .05, CFI = .98, TLI = .96, RMSEA = .06), introjected regulation (χ^2

(18) = 15.39, p = .64, CFI = 1.00, TLI = 1.00, RMSEA = .00), identified regulation (χ^2 (13) = 11.28, p = .58, CFI = 1.00, TLI = 1.00, RMSEA = .00), intrinsic motivation (χ^2 (12) = 17.19, p = .14, CFI = .99, TLI = .99, RMSEA = .05), disruptive behavior (χ^2 (4) = 6.41, p = .17, CFI = .99, TLI = .98, RMSEA = .06), substance use (χ^2 (2) = 2.14, p = .34, CFI = 1.00, TLI = .99, RMSEA = .02), effortful control and academic performance (χ^2 (5) = 4.15, p = .53, CFI = 1.00, TLI = 1.00, RMSEA = .00). In order to obtain an overidentified model (i.e., a model with positive degrees of freedom), I combined measurement models of effortful control and academic performance.

TABLE 1 (continued)

| | Variables | | | | | | | |
	9	10	11	12	13	14	15	16
1	-.07	-.12	-.22*	.02	-.12	-.03	-.27*	-.20*
2	-.15	-.17*	-.09	-.02	.01	.18*	-.06	-.05
3	-.44*	-.15*	-.17*	-.01	-.12	.16*	-.03	-.15
4	-.12	-.04	-.07	.02	-.08	.03	-.13	-.09
5	-.22*	-.06	-.12	-.01	-.08	-.18	-.05	-.07
6	-.17*	-.05	-.12	-.03	-.10	.07	.18*	-.13*
7	-.22*	-.20*	-.28*	-.15	-.16	-.27*	-.32*	-.24
8	-.15	-.36*	-.39*	-.37*	.32*	.17	-.38*	.29*
9	--	.29*	.21*	.14	.14	-.34*	.08	.10
10		--	.60*	.39*	.58*	-.15	.15	.36*
11			--	.36*	.77*	.01	.12	.28*
12				--	.45*	-.28*	.07	.26*
13					--	-.01	.07	.23*
14						--	.09	-.20*
15							--	.24*
16								--

Note: Parental involvement was measured by 11 items. Parental autonomy support was measured by 10 items. Identified regulation was measured by 7 items. Disruptive behavior was measured by 5 items. These items were used as observed indicators of the latent constructs in the structural equation modeling analyses. For purpose of clarity, statistics for individual items were not presented here. Significant correlations are indicated by asterisks *p <.05.

Next I tested structural models related to different outcomes (i.e., academic performance, disruptive behavior and substance use). I eliminated constructs that were not directly related to the outcomes. Preliminary analyses showed that only identified regulation was consistently associated with academic performance and disruptive behavior. External regulation, introjected regulation and intrinsic motivation were not associated with any of the outcomes when identified

regulation was in the model. I therefore dropped them from further analyses.

Academic Performance

Controlling for gender, ethnicity and age, parental involvement positively predicted effortful control. Moreover, effortful control significantly mediated the effects of parenting involvement (z' = 1.91, p < .05) on academic performance. Parental involvement did not have a direct effect on academic performance. Parental autonomy support positively predicted identified regulation. Additionally, identified regulation mediated the effect of parental autonomy on academic performance (z' = 2.43, p < .05). Parental autonomy support did not have a direct effect on academic performance (Figure 2). The hypothesized model fit the data well (χ^2 (459) = 499.34, p = .09, CFI = .97, TLI = .97, RMSEA = .02). The model explains 39% of the variance in academic performance (R^2 = .39).
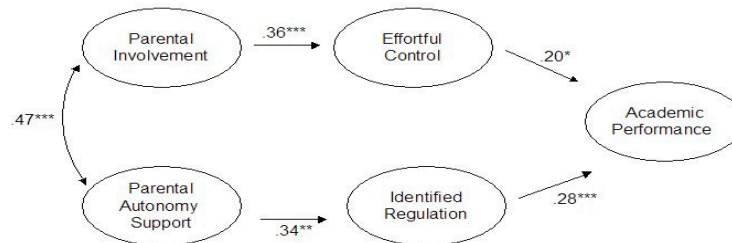

FIGURE 1 Relations Among Parenting Practices, Self-regulation and Academic Performance.
Note: Numbers presented are standardized coefficients. * p < .05, p < .01, p < .001

We examined whether the relations among parenting characteristics, effortful control, identified regulation and academic performance were the same among low and high-risk students. Multiple group analyses showed that the model that constrained the relations to be the same was not significantly different from the model that allowed the relations to be different (χ^2 (4) = 2.62 p = .62). This indicated that the relations among the variables were similar in both groups of students.

Disruptive Behavior in the Classroom

Controlling for gender, ethnicity, and age, parental involvement was associated with disruptive behavior in two ways. First, greater parental involvement was associated with more effortful control, which predicted less classroom disruptive behavior. Effortful control was a significant mediator of the relationship between parental involvement and disruptive behavior (z' = -1.69, $p < .05$). Second, parental involvement had a direct relationship with disruptive behavior – high parental involvement was associated with more disruptive behavior. (We discussed this unexpected finding in the next section.) In addition, greater parental autonomy was associated with greater identified regulation, which in turn predicted less classroom disruptive behavior. The mediating effect of identified regulation was significant (z' = -2.55, $p < .05$). Fit of the model was excellent (χ^2 (517) = 542.10, $p = .21$, CFI = .99, TLI = .98, RMSEA = .02) (Figure2). The model explains 37% of the variance in disruptive behavior.
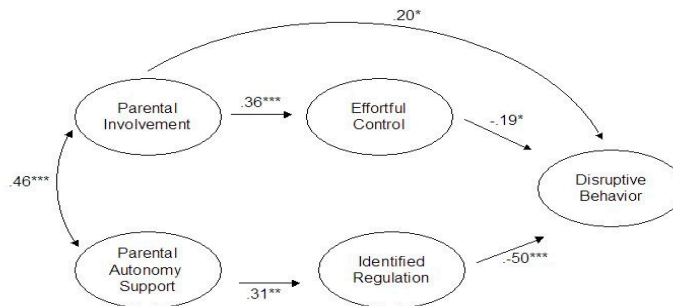

FIGURE 2 The Relations Among Parenting Practices, Self-regulation and Classroom Disruptive Behavior
Note: Numbers presented are standardized coefficients. * $p < .05$, $p < .01$, $p < .001$

I used multiple group analyses to examine whether the above relations were the same among low and high-risk students. The model that constrained the relations to be the same was not significantly different from the model that allowed the relations to be different (χ^2 (5) = 4.34, $p = .50$). This indicated that the relations among parenting characteristics, effortful control, identified regulation and disruptive behavior were similar in both groups of students.

Substance Use Disruptive behavior was included in the model because preliminary regression analyses showed that it had a strong relation with substance use. Similar to the above findings, parental involvement predicted effortful control, which was negatively associated with disruptive behavior. Parental autonomy support was positively associated with identified regulation, which was negatively associated with disruptive behavior. Less disruptive behavior was associated with less substance use. Identified regulation and effortful control did not have a direct relationship with substance use independent of their relationship with disruptive behavior. The model fits the data well (χ^2 (643) = 678.36, p = .16, CFI = .98, TLI = .98, RMSEA = .02) (Figure 4) and it explains 15% of the variance in substance use.

Multiple group analyses indicated that the relations among parenting characteristics, effortful control, identified regulation and substance use were significantly different among low and high-risk students (χ^2 (6) = 14.92, p < .05). Subsequent analyses showed that the relation between disruptive behavior and substance use was different for the two groups (χ^2 (1) = 11.15, p < .001). Among high-risk students, there was a strong positive relation between disruptive behavior and substance use (β = .38, p < .001). No such relation was observed among low- risk students (β = .04, p = .83).

DISCUSSION

This study examined the relations among perception of parental involvement and autonomy support, self-regulation (i.e., effortful control, identified regulation) and several important outcomes in adolescence (i.e., academic performance, classroom disruptive behavior, and substance use). The study also tested whether self-regulation mediated the effects of perception of parenting characteristics on adolescent outcomes. Moreover, the study examined whether the relations among perception of parenting characteristics, self-regulation and outcomes variables were similar in low-risk and high-risk students.

Consistent with previous research, greater perceived parental involvement and autonomy support were related to better academic performance. This study extended past research by showing that greater perceived parental involvement and autonomy support were related to more effortful control and identified regulation, which in turn predicted better academic performance and less classroom disruptive behavior. Among high-risk students only, less classroom disruptive behavior predicted lower frequency of substance use.
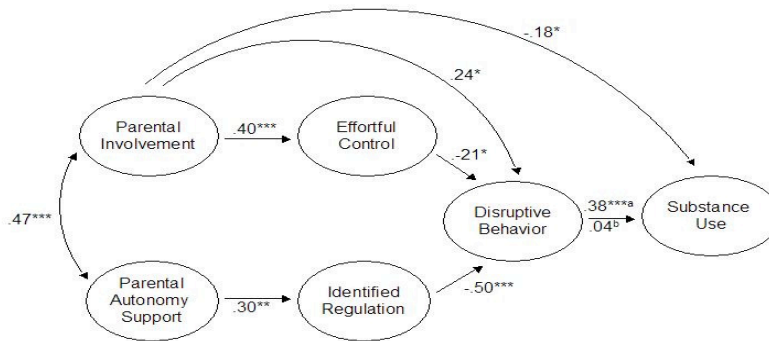
FIGURE 3 The Relations Among Parenting Practices, Self-regulation and Substance Use.
Note: Numbers presented are standardized coefficients. * $p < .05$, $p < .01$, $p < .001$. [a] coefficient for high-risk students. [b] coefficient for low-risk students.

Effortful control significantly mediated the relations between parental involvement and adolescent outcomes. Effortful control involves the ability to focus and shift one's attention, to inhibit behaviors one wants to engage in, and to initiate behaviors one wants to avoid (Rothbart & Bates, 1998; Rothbart et al., 1994). Effortful control is believed to be influenced by both biological factors (e.g., temperament - Rothbart, Ellis, & Posner, 2004) and environmental factors (e.g., parental warmth and support, see Eisenberg et al., 2004 for a review). Parents who are high on involvement are interested in, knowledgeable about, and willing to take an active role in their children's day-to-day activities (Grolnick et al., 1991). They are probably more able to provide opportunities for their children to practice self-control. For instance, without parental supervision, some adolescents may choose to play video games as opposed to doing homework. However, parents who are highly involved are more likely to be aware of such behavior and to be in a position to do something about it. They could demand that adolescents finish their homework first before playing video games. They could also help their children focus on homework by eliminating distractions in the immediate environment, e.g., taking the video game outside of the adolescent's room while he or she does homework.

Identified regulation (i.e., believing that school work was important) significantly mediated the relation between parental autonomy support and adolescent outcomes. An autonomy supportive context has been associated with a more autonomous style of self-regulation (Grolnick et al., 1997). Many adolescents do not believe in the importance of academic work and often just do the minimum to get by (Public Agenda, 1997; Steinberg, 1996). Parents who are high in autonomy support value and use techniques that facilitate independent problem solving, choice, and self-determination in their children (Grolnick et al., 1991). To motivate their children to work hard, these parents are less likely to rely on pressure or punishment. Instead they may provide information on why schoolwork is important and encourage their children to develop their own opinion toward schoolwork. Such practice might have helped adolescents focus less on the controlling aspects of schoolwork and more on how it could be important and meaningful to them.

Effortful control and identified regulation mediated the effect of both parental involvement and autonomy support on academic performance and classroom disruptive behavior for both low- and high-risk students. Thus perceived parental involvement and autonomy support, effortful control and academic identified regulation could be regarded as important protective factors for high risk adolescents, increasing their chance to do well in spite of the challenging circumstances they were in. These results corroborate with past findings that support from caring adults and a high level of self-regulation are associated with resilience, i.e., one's ability to adapt and succeed in adverse circumstances (Luthar & Zelazo, 2003; Masten, 2002). Forty-nine percent of high-risk students are Hispanics and 6% are members of other ethnic minorities. Very little is known about the factors that predict resilience in these ethnic groups. This study added to the existing literature by showing perceived parental involvement and autonomy support are associated with good outcomes among students in these groups. It also extended past research by showing that self-regulation mediated the relationships between perceived parenting characteristics and adolescent outcomes among high-risk students, regardless of their ethnicity.

It may be relatively difficult to alter parental involvement and autonomy support. For instance, some parents may not recognize the need to change; some adolescents may not have a caring parent or guardian who is willing to be involved or support their autonomy. However, teachers, counselors, or other adults can help adolescents develop self-regulation skills. Effortful control involves the ability to sustain and shift attention, inhibit undesirable impulses, and initiate behaviors that are difficult to sustain (e.g., studying regularly). These skills can be cultivated through individual and group programs. In these

programs, adolescents may learn valuable information such as how to decrease distractions while doing homework, avoid procrastinations to study before an exam and inhibit the impulses to use drugs and alcohol. More importantly, adolescents could practice such skills and be coached by counselors or teachers about how to get better at controlling their behavior. Identified regulation involves taking a positive attitude toward schoolwork and holding a firm belief that it is important. Such attitude and belief can also be cultivated among adolescents, especially when they are in a caring and non-judgmental environment.

There was a significant relation between disruptive behavior and substance use among high-risk students. Given the cross sectional design of the study, it is impossible to determine the causal relation between the two. While substance use among adolescents most likely occurs without the presence of adults, classroom disruptive behavior can be easily observed by teachers, school counselors, or school administrators. Among some adolescents, classroom disruptive behaviors may be a sign of serious problems. Parents and teachers need to be aware of the potential relation between classroom disruptive behavior and substance use. Prevention programs of adolescent substance use may want to recruit adolescents who disrupt classes frequently. Some of them may benefit from these programs.

Earlier I stated that greater parental involvement is related to more effortful control, which in turn predicted less classroom disruptive behavior. It is useful to note that parental involvement also had a direct positive relationship with disruptive behavior. Some parents might have become more involved in their children's lives as a result of their children's trouble at school (Grolnick et al., 1991). Teachers might have communicated with parents about such problems and urged the parents to monitor their children's behavior. Longitudinal studies could look at the temporal relationships between parental involvement and disruptive behavior. It is likely that the two variables are related to one another for many different reasons.

This study has several limitations. First, the cross-sectional nature of the data makes it difficult to determine the causal relations among variables. It is important to obtain longitudinal data so that different causal relations among parenting characteristics, self-regulation, and adolescent outcomes can be systematically tested. Moreover, longitudinal data also allow researchers to ascertain the long-term effects of parental involvement and autonomy support on adolescent functioning. The models presented in this paper are consistent with existing theories and data on parenting characteristics and self-regulation (Grolnick et al., 1997). However, it is possible that other relations exist among the variables. For instance, whereas greater parental involvement may lead to

more effortful control in children, a high level of effortful control may encourage parental involvement. Children who show discipline and self-control may elicit parents' positive attention and allow them more opportunities to be nurturing and effective parents (Soenens & Vansteenkiste, 2005). Second, except for teacher ratings of academic performance, all other variables were measured by self-report. It is important to gather data from different sources such as parents and teachers, especially on variables such as effortful control and classroom disruptive behavior. However, students provide valuable information on variables such as perceptions of parenting, academic self-regulatory styles (i.e., reasons for doing academic work), and substance use. Many studies indicated that adolescents' report of parenting characteristics and academic self-regulatory styles are related to important developmental outcomes such as academic performance and perceptions of scholastic and social competence (Grolnick et al., 1991; Grolnick & Slowiaczek, 1994; Soenens & Vansteenkiste, 2005). Third, this study focused only on two dimensions of parenting, i.e., parental involvement and parental autonomy. Future research could explore how these two dimensions are related to other parenting characteristics such as responsiveness, demand and expectation, and provision of structure (Baumrind, 1991; Grolnick et al., 1997). Last but not least, data were analyzed by structural equation modeling analyses (SEM). This method has several strengths, e.g., taking a confirmatory approach to data analysis, explicitly accounts for measurement error by examining the relationship between latent and observed variables, simultaneously estimates multivariate relations among multiple observed and latent variables. However, the method also has many limitations (see Tomarken & Waller, 2003, 2005). Moreover, SEM provides no test for alternative models, which might fit the data equally well (MacCallum & Austin, 2000; Tomarken & Waller, 2005). Although we reported excellent fit indices in most analyses, the results do not allow us to rule out alternative models that may fit the data equally well. More studies, especially those with a longitudinal design are necessary to understand the complex relations among parenting characteristics, self-regulation and adolescent outcomes.

To summarize, perceived parental involvement and autonomy support were positively related to three developmental outcomes in adolescence. Effortful control and identified regulation mediated the effects of perceived parental involvement and autonomy support on academic performance and classroom disruptive behavior for all students. Among high-risk students only, disruptive behavior was associated with substance use. The longitudinal relations among parenting practices, self-regulation and adolescent outcomes remain to be explored. More

research is also necessary to understand the factors that may influence parenting practices and adolescents' self-regulatory skills.

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