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## The Co-Development of Effortful Control and School Behavioral Problems

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### Abstract

Effortful control refers to the propensity to regulate one's impulses and behaviors, to focus and shift attention easily, and to motivate the self towards a goal when there are competing desires. Although it seems likely that these capacities are relevant to successful functioning in the school context, there has been surprisingly little longitudinal research examining whether youth with poor effortful control are more likely to act out in the classroom, get suspended, and skip school. Conversely, there is even less research on whether youth who exhibit these school behavioral problems are more likely to decline over time in effortful control. We used multi-method data from a longitudinal study of Mexican-origin youth ( $N=674$ ), assessed biennially from 5<sup>th</sup> to 11<sup>th</sup> grade, to examine the co-development of effortful control and school behavioral problems. Bivariate latent growth curve models revealed a negative association between the trajectories of effortful control and school behavioral problems, indicating that steeper *decreases* in effortful control were related to steeper *increases* in school behavioral problems. Furthermore, this co-developmental pattern was bidirectional; cross-lagged regression analyses showed that low effortful control was associated with relative increases in school behavioral problems, and school behavioral problems were associated with relative decreases in effortful control. Gender, nativity status, Mexican cultural values, and school-level antisocial behavior had concurrent associations with effortful control and school behavioral problems, but they did not moderate the co-developmental pathways. We discuss the theoretical implications for personality development, as well as the practical implications for reducing school behavioral problems during adolescence.

### Keywords

effortful control; behavioral problems; school; adolescence; longitudinal

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“What is this fascination with truancy? What is it that gets inside of your heads? There are some teachers at this school who look the other way at truants. It's a little game you both play. They pretend they don't see you, and you pretend you don't ditch. Now, in the end, who pays the price? You!” – Mr. Hand, *Fast Times at Ridgemont High*

In the 1982 movie, *Fast Times at Ridgemont High*, the main character, Jeff Spicoli, is known for his unruly and disruptive behavior. Throughout the film, he arrives late to class, gets

suspended for his offensive behavior, and skips school to go to the beach and smoke weed. Although we are left with the caricature of an “endearing” surfer dude, in the real world Spicoli’s behavioral problems are associated with school dropout, substance abuse, unemployment, unwanted pregnancy, and increased risk for incarceration (Barton, 2005; Child Trends Data Bank, 2015; Monahan, VanDerhei, Bechtold, & Cauffman, 2014; Sum, Khatiwada, McLaughlin, & Palma, 2009). Moreover, it is these developmental “snares” that diminish the probability of later success by gradually eliminating opportunities for breaking the vicious cycle of externalizing behavior (Moffitt, 1993). Thus, in order to improve youth adjustment and development, it is necessary to gain a better understanding of the roots of school behavioral problems and related sequelae.

The present research examined the co-development of effortful control—the temperamental core of self-regulation—and school behavioral problems, using data from a longitudinal study of Mexican-origin youth followed from age 10 (5<sup>th</sup> grade) to 16 (11<sup>th</sup> grade). The broad aim of the study was to assess whether behavioral problems are due to a lack of self-regulation; and/or conversely, whether frequent truancies, suspensions, and other misbehaviors will gradually erode one’s capacity to self-regulate. To do this, we used multi-method measures of both effortful control (child report, parent report) and school behavioral problems (school records, teacher-reports, parent-reports), as well as four biennial assessments spanning late childhood and adolescence in a largely understudied ethnic minority group. Moreover, to investigate whether effortful control and school behavioral problems mutually influence each other over time, we used two different longitudinal data analytic techniques – bivariate latent growth curve models and cross-lagged regression models – which provide complementary information about co-developmental processes.

## Effortful Control in the School Environment

Effortful control is one of many constructs embedded within a larger nomological network of self-regulatory traits, including self-control, impulsivity, constraint, ego control, delay of gratification, and conscientiousness. Although empirically related to all of these constructs and often considered an early developmental manifestation of conscientiousness, effortful control is conceptually distinct (Roberts et al., 2014; Rothbart, Ahadi, & Evans, 2000). Effortful control refers to the propensity to regulate one’s impulses and behaviors, to focus and shift attention easily, and to motivate the self towards a goal when there are competing desires (Rothbart & Bates, 2006). Given the definition of effortful control, it is easy to see how a failure to regulate one’s behaviors and emotions may lead to many forms of behavioral problems. Previous research has documented the association between effortful control and general externalizing problems (Franken et al., 2016; Lengua, 2006; Sentse et al., 2009; Zhou et al., 2007). However, we know very little about the relations between effortful control and problems within the school context, more specifically.

The school context is, arguably, one of the most crucial environments for determining whether youth thrive or falter. Youth not only get an education at school, they also learn how to behave responsibly in a structured setting with clear rules and regulations, and how to navigate increasingly complex social relationships with peers and authority figures. In contrast, outside the classroom setting, many neighborhoods are rife with possibilities for

interacting with deviant peers, who contribute to the socialization of a wide range of antisocial activities, values, and norms. Thus, getting suspended from school is likely to have many cascading consequences because the student is not only missing out on all of the benefits of being in the school context, he/she is also selecting into different contexts that may reinforce his/her antisocial tendencies. Although the school context plays a large role in development starting early in childhood, school-related behaviors and outcomes (including school behavioral problems) may be particularly consequential during adolescence. Adolescence is the developmental period when behavioral problems and risky behaviors become increasingly prevalent (Moffitt, 1993); for example, in the school context, a 14-year-old is much more likely to skip school and/or get suspended for classroom misconduct than a 6-year-old is. Additionally, given the many adverse consequences of school problems (Barton, 2005; Child Trends Data Bank, 2015; Monahan, VanDerhei, Bechtold, & Cauffman, 2014; Sum, Khatiwada, McLaughlin, & Palma, 2009), selecting out of the school context could be one of the first in a series of “snares” that set youth on a path toward maladaptive outcomes such as delinquency, drug use, early sexual behavior, and school drop-out (Moffitt, 1993). And, lacking the temperamental ability to regulate one's behavior could be an important underpinning to poor conduct in the school environment, making effortful control particularly consequential for school problems during adolescence.

There has been surprisingly little longitudinal research on the association between effortful control and school behavioral problems, and most of the extant research has been conducted with young children. For example, one study found that preschoolers who scored low on a behavioral self-regulation task at the beginning of the school year had greater teacher-reported problem behaviors in the spring (Montroy, Bowles, Skibbe, & Foster, 2014). Similarly, another study found that preschoolers who increased in self-regulation from age four to six experienced fewer behavioral problems at age six (Sawyer, Searle, Miller-Lewis, & Sawyer, 2015). Furthermore, children in kindergarten through third grade who were taught self-regulatory skills experienced decreases in both referrals and suspensions, compared to a control group of children who were not taught self-regulatory skills (Wyman et al., 2010). However, as youth transition into early adolescence, the empirical evidence becomes even more limited. In a study of middle school students, low self-control at age 11 was associated with truant behavior at age 13.5, and this association was mediated by a lack of positive relationships with parents, teachers, and peers (Veenstra, Lindenberg, Tinga, & Ormel, 2010). Moreover, individuals who were low in self-control at ages three and five had fewer months of education at age 21, due to leaving the school context (Henry et al., 1999). Interestingly, when middle- and high-school students were asked why they were suspended from school, almost half attributed it to their inability to regulate their behaviors and emotions (Costenbader & Markson, 1998).

Thus, the limited research that has been conducted points to a possible association between temperamental differences in self-regulation and school behavioral problems. However, to date, there is no longitudinal research on how effortful control and school behavioral problems mutually influence each other over time. Moreover, previous studies have utilized teacher-ratings of general externalizing problems (not specific to the school context; Montroy, Bowles, Skibbe, & Foster, 2014; Sawyer, Searle, Miller-Lewis, & Sawyer, 2015), or have examined only one aspect of school behavioral problems (e.g., truancy; Veenstra,

Lindenberg, Tinga, & Ormel, 2010; Wyman et al., 2010), which hinders our understanding of school behavioral problems as a whole. Given the dearth of longitudinal research, it is critical to examine the extent to which effortful control serves as a *precursor* to school behavioral problems, especially in early and late adolescence, when these forms of behavioral problems become even more frequent. Furthermore, as we discuss below, it is vital to investigate the reciprocal relationship – whether engaging in school behavioral problems adversely affects the development of effective self-regulatory skills.

## **Bidirectional Pathways between Effortful Control and School Behavioral Problems**

The longitudinal associations between effortful control and school behavioral problems may be driven by several transactional developmental processes, including *selection*, *evocation* and *socialization*. For example, adolescents who have poor self-regulation may be more likely to skip school and be truant, demonstrating a *selection* pathway to school behavioral problems because these adolescents are directly selecting themselves out of the school context. Alternatively, adolescents who are poorly regulated may be disruptive in the classroom and lash out against peers and teachers, and these failures of self-regulation cause teachers to take disciplinary action by reprimanding, suspending, or expelling the student; an *evocation* pathway.

Conversely, the experience of getting suspended from or skipping school, may lead to changes in an individual's ability to regulate his/her impulses and behaviors. In other words, getting in trouble in school may *socialize*, or reinforce, the development of certain temperamental tendencies. For example, youth who skip school and/or get suspended receive less exposure to the adaptive benefits of the school context, which provides a structured, rule-governed environment that can facilitate the development of adaptive self-regulatory behaviors. In other words, school behavioral problems may lead to subsequent declines in effortful control because adolescents are no longer receiving the benefits of being in the structured school environment. In addition, youth who skip school and/or get suspended may experience increased exposure to deviant peers and siblings in the neighborhood and other non-school contexts. When interacting outside the school context, youth are no longer bound by the structure and rules of the school environment, and instead are socialized to engage in various risky, dysregulated forms of behavior such as drug use, delinquency, and early sexual behavior. Thus, engaging in school behavioral problems may lead youth to be in these new deviant environments that subsequently erode their capacity for effortful control.

## **The Role of Gender, Acculturation, and School-level Antisocial Behavior**

As another extension of the present research, we examined how gender, acculturation, and school-level antisocial behavior are associated with effortful control and school behavioral problems. Moreover, to better understand the transactional patterns between effortful control and school behavioral problems, we investigated whether gender, acculturation, and school antisocial behavior moderate (i.e., exacerbate or diminish) the association between effortful control and school behavioral problems.

## Gender

Previous research suggests that boys have lower levels of effortful control than girls (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). However, whether this gender difference holds for boys and girls of Mexican-origin has not been systematically evaluated. Similarly, some previous studies have shown that boys are more likely than girls to be suspended (Costenbader & Markson, 1998) and truant (Veenstra, Lindenberg, Tinga, & Ormel, 2010), but whether this pattern holds for boys and girls of Mexican-origin remains to be seen.

We know of no studies that have examined whether gender moderates the association between effortful control and school behavioral problems. However, prior research has shown that boys are more likely to follow a *life-course persistent antisocial pathway*, where conduct problems first emerge in early childhood and persist throughout the life course. On the other hand, girls are more likely to follow an *adolescence-limited antisocial pathway*, where conduct problems first emerge and desist during adolescence (Moffitt, Caspi, Rutter, & Silva, 2001). Researchers have suggested that the *life-course persistent pathway* is largely driven by stable dispositional factors linked to neurodevelopmental deficits (e.g., effortful control), whereas the *adolescence-limited pathway* is driven by the broader context of social relationships and other social-contextual factors during this developmental period (Moffitt, Caspi, Rutter, & Silva, 2001). Consistent with this theoretical account, prior research has found that genetic factors have a stronger influence on boys' (compared to girls') antisocial behavior and conduct problems (Meier, Slutske, Heath, & Martin, 2011), which suggests that biologically-based temperament dimensions, such as effortful control, may exert a stronger influence on school conduct for boys when compared to girls. Thus, based on these previous theoretical proposals, it seems reasonable to expect that the co-development of effortful control and school behavioral problems may be stronger for boys than for girls.

## Acculturation

Given that we are investigating the longitudinal associations between effortful control and school behavioral problems in Mexican-origin youth, it is crucial to also examine whether there are associations with, or moderation by, cultural factors. In the present study, we examined two aspects of acculturation: nativity status (born in U.S. vs. Mexico) and endorsement of Mexican cultural values (familism, respect for elders, religiosity, and traditional gender roles). Previous research has shown that more acculturated youth experience *more* behavioral problems than less acculturated youth, a pattern referred to as the *Immigrant Paradox* (Garcia-Coll & Marks, 2011; Gonzales et al., 2011; Marsiglia, Kulis, FitzHarris, & Becerra, 2009; Teruya & Bazargan-Hejazi, 2013; Wheeler et al., 2017). Based on the *Immigrant Paradox*, we expect that youth born in the U.S. and those who endorse fewer Mexican cultural values will exhibit more school behavioral problems than those born in Mexico and those who endorse more Mexican cultural values. On the other hand, another literature suggests that less acculturated youth are more likely to experience academic difficulties due to language and other barriers to academic achievement (Bohon, Macpherson, & Atilas, 2005; Consoli et al., 2012), which could contribute to less engagement in school and higher levels of school behavioral problems. Thus, the research literature provides a conflicting message about how acculturation will be associated with school behavioral problems. With regard to effortful control, prior studies have shown that

Latino youth show lower levels of effortful control when compared to non-Latino White youth (Loukas & Roalson, 2006; Sulik et al., 2009), but we know of no studies that have examined how within-cultural variability in acculturation (e.g., based on nativity and endorsement of cultural values) is associated with effortful control.

No research has empirically tested whether acculturation moderates the co-development of effortful control and school behavioral problems, but there are theoretical reasons to believe that the associations may be weaker for less acculturated youth (i.e., youth born in Mexico and youth who endorse more Mexican cultural values). Garcia-Coll's (1996) integrative model provides a framework for understanding the normative development of ethnic minorities in the United States. This model highlights the fact that youth born in Mexico, as well as youth who endorse the cultural values of their Mexican heritage, grow up in a cultural context in which obligations to the family, cultural norms about social harmony and collectivism, and respect for authority play a central role in shaping behavior and other aspects of development. For these less acculturated youth, stronger cultural norms, values, and expectations may add an additional layer to child development, impacting the way that individual differences influence behavior. Specifically, cultural factors may play a stronger role in regulating less acculturated youths' conduct at school than dispositional factors. In contrast, for more acculturated youth, temperamental tendencies such as effortful control may exert a stronger influence on their school conduct, given that less emphasis is placed on collectivistic values and respect for authority with less endorsement of Mexican cultural values.

### **School-level antisocial behavior**

Last, we investigated the role of school-level antisocial behavior. It is possible that some high schools allow and perpetuate more misbehavior than other high schools, making it easier for individuals who have poor effortful control to exhibit school behavioral problems. Over the past few decades, schools in the United States have become increasingly dangerous environments (Musu-Gillette et al., 2017). Empirical work has shown that school-level antisocial behavior has many detrimental effects on youths' conduct and academic success (Cornell & Mayer, 2010; Hawkins, Farrington, & Catalano, 2003).

With the pervasive disadvantages of antisocial school environments, we suspect that youth from schools with higher levels of antisocial behavior may be lower in effortful control and experience more school behavioral problems, when compared to youth who attend schools with lower levels of antisocial behavior (i.e., concurrent associations). Moreover, it is also possible that the co-developmental pathways between effortful control and school behavioral problems may be different for youth in schools that are relatively high (vs. low) in antisocial behavior. Specifically, *selection* and *evocation* pathways may be especially likely for youth in antisocial schools because there are more opportunities to act out against peers and teachers, compared to less antisocial schools, making it more likely that failures of self-regulation will lead to problems in the school context. Similarly, the *socialization* pathway may also be stronger because antisocial schools are more likely to be situated within disordered and problematic neighborhoods and communities. Thus, being suspended or truant from an antisocial school may erode one's capacity to self-regulate even more quickly



because there are many more opportunities in the community to get into trouble and engage in antisocial activities. Consequently, we expect that the association between effortful control and school behavioral problems may be stronger for more (vs. less) antisocial schools.

## The Present Study

In the present study, we used data from a large sample of Mexican-origin youth assessed from age 10 to 16 to address several questions. First, we examined the co-development of effortful control and school behavioral problems from late childhood through adolescence using bivariate latent growth curve models and cross-lagged regression models. Second, we examined whether gender was associated with effortful control and school behavioral problems, as well as whether gender moderated their co-development. Third, we examined whether acculturation (i.e., nativity status, Mexican cultural values) was associated with effortful control and school behavioral problems, as well as the whether acculturation moderated their co-development. Fourth, we examined whether school-level antisocial behavior was associated with effortful control and school behavioral problems, and whether school-level antisocial behavior it moderated their co-development.

The current study extends previous research in several substantive and methodological ways. First, several studies have investigated the cross-sectional association between effortful control and school behavioral problems in adolescence, but little is known about how these constructs are related over time and, in particular, whether there are reciprocal (i.e., bidirectional) associations. Second, we examined developmental change from late childhood through adolescence, a time when behavioral problems tend to peak and school outcomes become especially consequential for longterm development. Third, although researchers have begun to examine the influence of effortful control on externalizing problems, little attention has been dedicated to examining the influence of effortful control on behavioral problems in the school context. Fourth, very little is known about moderating factors that may explain individual differences in effortful control, school behavioral problems, and their co-development. It is both theoretically and practically important to understand the degree to which the associations between effortful control and school behavioral problems generalize across different *subgroups* (e.g., boys & girls; youth born in the U.S. vs. Mexico; youth with high vs. low endorsement of Mexican-cultural values) and *social contexts* (e.g., schools with high vs. low levels of antisocial behavior). Fifth, with the exception of one study involving predominantly African-American youth (Wyman et al., 2010), all previous work has focused on non-Latino, White youths' school behavioral problems. Given that Hispanic/Latino minority groups have a significantly higher risk of school dropout in comparison to non-Latino, White, and African American adolescents (U.S. Department of Education, 2016), there is a dire need for research investigating the developmental precursors of school problems in Hispanic/Latino populations.

The current study addressed these gaps in the literature by utilizing longitudinal data from a sample of Mexican-origin youth with multiple informants (i.e., teacher, school records, and parents), multiple domains of functioning in the school environment (i.e., suspensions, absences, classroom conduct), as well as by examining the associations and moderating



effects of four individual and contextual characteristics (gender, nativity status, Mexican cultural values, school-level antisocial behavior).

## Method

### Participants and Procedures

Data for the study came from the California Families Project, an ongoing, community-based longitudinal study of Mexican-origin youth and their parents ( $N = 674$ ) designed to examine risk and protective factors for drug use and other behavioral problems.<sup>1</sup> Children were drawn at random from rosters of students from the Sacramento and Woodland, CA, school districts. The focal child had to be in the 5<sup>th</sup> grade, of Mexican origin, and living with his or her biological mother, in order to be eligible to participate in the study. 72.6% of the eligible families agreed to participate in the study, which was granted approval by the University of California, Davis Institutional Review Board (Protocol # 217484-21, *Mexican Family Culture and Substance Use Risk and Resilience*). The children (50% female) were assessed annually from 5<sup>th</sup> ( $Mage = 10.86$ ,  $SD = 0.51$ ) through 11<sup>th</sup> grade ( $Mage = 16.79$ ,  $SD = 0.50$ ). Participants were interviewed, by trained staff members, in their homes in Spanish or English, depending on their preference.

The present study used data from when the children were in the 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades, the grades when effortful control was assessed. Retention rates (relative to the original sample) were 86% at 7<sup>th</sup> grade, 91% at 9<sup>th</sup> grade, and 90% at 11<sup>th</sup> grade. To investigate the potential impact of attrition, we compared individuals who did and did not participate in the 11<sup>th</sup> grade assessment on study variables assessed in the 5<sup>th</sup> grade. No significant differences were found in effortful control, school behavioral problems, gender, nativity status, Mexican cultural values, or school-level antisocial behavior, all  $ps > .10$ .

### Measures

**Effortful control**—Children and their mothers completed the Effortful Control scale from the short form of the *Early Adolescent Temperament Questionnaire—Revised* when the child was in the 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades (*EATQ-R*; Ellis & Rothbart, 2001). Self- and informant-reports are the most common methods for assessing temperament during adolescence, and the EATQ-R is the most widely used and well-validated scale (Capaldi & Rothbart, 1992). The Effortful Control scale assesses various aspects of self-control including the capacity to anticipate and suppress inappropriate responses; the capacity to focus attention and shift attention when desired; and the capacity to perform an action when there is a strong tendency to avoid it. This 16-item scale includes items such as, “*When someone tells [you/your child] to stop doing something, it is easy for [you/your child] to stop.*” and “[*You/your child*] pay close attention when someone tells [you/your child] how to do something.” Ratings were made on a 4-point scale ranging from 1 (*not at all true of you/your child*) to 4 (*very true of you/your child*). Child- and mom-reports of effortful

<sup>1</sup>Five papers from the California Families Project have examined effortful control (Atherton, Conger, Ferrer, & Robins, 2016; Atherton, Tackett, Ferrer, & Robins, 2017; Clark, Donnellan, Conger, & Robins, 2015; Robins, Donnellan, Widaman, & Conger, 2010; Taylor, Widaman, & Robins, in press), but none have examined effortful control in relation to behavioral problems in school settings. For a full list of California Families Project publications, see: <https://osf.io/m34p/>.

control correlated between .40 and .45 across grades. We computed a latent factor of ‘effortful control’ using four indicators, which were computed by creating parcels of randomly selected items and then averaging across child and mom reports of those items. The omega reliabilities ( $\omega$ ) of the latent factors ranged from .75 to .87. The loadings of the indicators ranged from .71 to .80 across waves.

**School behavioral problems**—A multi-method measure of the child’s school behavioral problems was created from school records, teacher-reports, and parent-reports. Data about the focal child’s number of absences and suspensions was obtained from the Sacramento and Woodland School Districts. At Wave 1 (5<sup>th</sup> grade), teachers provided reports about the child’s school conduct ( $N = 334$ ).<sup>2</sup> Parents reported on the child’s suspensions, absences, and school conduct in the 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades.

Using these three sources of information, we created a latent variable of ‘school behavioral problems’ when the child was in 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades (see Table 1 for a description of all indicators of the latent variable). To account for the effects of shared method variance, we created item parcels based on the content of the items, instead of by method. We averaged the standardized, content-related items into three parcels: ‘suspensions’ (2 items), ‘absences’ (3 items), and ‘classroom conduct’ (1-3 items). Confirmatory factor analyses demonstrated adequate loadings of the parcels on to the higher-order latent variable of school behavioral problems at each assessment (loadings ranged from .45 to .79). The omega reliabilities ( $\omega$ ) of the latent factors ranged from .65 to .74.

**Nativity status**—Participants reported whether they were born in Mexico (29%) or born in the United States (71%).

**Mexican cultural values**—At ages 10, 12, 14 and 16, the child reported on the extent to which he/she endorsed Mexican cultural values using the Mexican American Cultural Values Scale (MACVS; Knight et al., 2010). The MACVS has 36 items that measure traditional values including respect for elders, gender role attitudes, religiosity, and three forms of familism: support, obligations, and family as referent. Items include, “*Children should always honor their parents and never say bad things about them*” and “*Children should be on their best behavior when visiting the homes of friends or relatives*” and “*Family provides a sense of security because they will always be there for you*”. Response options ranged from 1 (*Not at all*) to 4 (*Very much*). We computed a latent factor of ‘Mexican cultural values’ using four parcels as indicators, which were comprised of randomly selected items. The omega reliabilities ( $\omega$ ) of the latent factors ranged from .82 to .92. The loadings of the indicators ranged from .75 to .91 across waves.

We examined Mexican cultural values as a moderator of the co-development of effortful control and school behavioral problems by estimating univariate latent growth trajectories

<sup>2</sup>Teacher reports were discontinued after the 5<sup>th</sup> grade due to teachers’ low participation rate (50%). We examined whether there were any selection effects for children who did vs. did not have teacher-report data. There were no significant differences for effortful control, school behavioral problems, gender, nativity status, or school-level antisocial behavior at age 10, all  $p$ s > .10. Moreover, when the teacher-report data were removed from the school behavioral problems construct at age 10, the results from the main models to be reported remained comparable in terms of magnitude and the same in terms of statistical significance.

and saving the factor level and factor slope from the best-fitting model. Then, we grouped youth into three categories by identifying the 33<sup>rd</sup> and 66<sup>th</sup> percentile cutoffs for both the level and the slope factors. Thus, youth were grouped into low (-1), medium (0), and high (1) categories of Mexican cultural values at age 10, based on the factor level. Moreover, youth were also grouped into categories of decreasing (bottom third) Mexican cultural (-1), no change (middle third) in Mexican cultural values (0), and increasing (top third) Mexican cultural values (1), based on the factor slope. We examined both the level and the slope of Mexican cultural values as moderators of the co-development of effortful control and school behavioral problems.

**School-level antisocial behavior**—The child reported on school-level antisocial behavior in the 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades using an adapted version of the Neighborhood Criminal Events Scale, which consists of 10 items (9 items only in 5<sup>th</sup> grade) that assess the extent to which there is violence, disorder, and antisocial behavior in the school context (Anashensel & Sucoff, 1996; Bowen & Chapman, 1996; Cutrona et al., 2000; Ross & Jang, 2000; Sampson, Raudenbush, & Earls, 1997). The scale includes items such as, “*How often did violent crimes including stabbings, shootings, and violent assaults happen in your school in the past year?*” and “*How often did kids sell illegal drugs in your school in the past year?*” Ratings were made on a 4-point scale ranging from 1 (*almost never or never*) to 4 (*almost always to always*). We computed a latent factor of ‘school-level antisocial behavior’ using three parcels as indicators, which were comprised of randomly selected items. The omega reliabilities ( $\omega$ ) of the latent factors ranged from .80 to .92. The loadings of the indicators ranged from .68 to .95 across waves.

We examined school-level antisocial behavior as a moderator of the co-development of effortful control and school behavioral problems by estimating univariate latent growth trajectories and saving the factor level and factor slope from the best-fitting model. Then, we grouped youth into three categories by identifying the 33<sup>rd</sup> and 66<sup>th</sup> percentile cutoffs for both the level and the slope factors. Thus, youth were grouped into low (-1), medium (0), and high (1) categories of school-level antisocial behavior at age 10, based on the factor level. Moreover, youth were also grouped into categories of decreasing (bottom third) school-level antisocial behavior (-1), no change (middle third) in school-level antisocial behavior (0), and increasing (top third) school-level antisocial behavior (1), based on the factor slope. We examined both the level and the slope of school-level antisocial behavior as moderators of the co-development of effortful control and school behavioral problems.<sup>3</sup>

## Statistical Analyses

All analyses were conducted using *Mplus* Version 7 (Muthén & Muthén, 1998-2011). We used a robust maximum likelihood estimator (MLR) to account for non-normal distributions

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<sup>3</sup>We used both the level and the slope as moderators because they have different implications. For example, with regard to school antisocial behavior, a moderating effect of level would indicate that youth in more antisocial schools at age 10 show a stronger link between effortful control and school behavioral problems than youth in less antisocial schools. In contrast, the slope factor takes into account that school antisocial behavior changes from elementary school to high school, with schools (on average) becoming increasingly violent as youth get older. Thus, a moderating effect of the slope would indicate that youth who are transitioning into increasingly antisocial schools show a stronger link between effortful control and school behavioral problems than youth who are not transitioning into more antisocial schools.

of observed variables and full information maximum likelihood procedure (FIML) to account for missing data (Allison, 2003; Schafer & Graham, 2002). We used item parcels as indicators for the latent variables because they typically produce more stable solutions, are less likely to share specific sources of variance, and reduce the likelihood of spurious correlations (Little, Cunningham, Shahar & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, 2013).

### Measurement Invariance

Before testing the structural pathways between effortful control and school behavioral problems, we conducted longitudinal measurement invariance tests of all constructs. Longitudinal measurement invariance is evaluated across all of the time-points simultaneously, with the goal of trying to establish strong invariance whenever possible (Widaman, Ferrer, & Conger, 2010). To compute more accurate and less biased fit indices for large sample sizes, we assessed adequate model fit via change in comparative fit index (CFI) less than or equal to .01, change in McDonald's non-centrality index (NCI) less than or equal to .02, and change in chi-square and degrees of freedom (Meade, Johnson, & Braddy, 2008; Cheung & Rensvold, 2002). We also note the CFI and TLI values (for which adequate fit is indicated by values greater than .95), and the root-mean-square error of approximation (RMSEA) (for which adequate fit is indicated by values less than or equal to .06) (Hu & Bentler, 1998; Hu & Bentler, 1999). To evaluate measurement invariance over time, we compared three measurement models: (1) freely estimating the factor loadings for the latent factors at each age of assessment (i.e., configural invariance); (2) constraining the respective factor loadings to be equal at each age of assessment (i.e., weak invariance); and (3) constraining the factor loadings and intercepts to be equal at each age of assessment (i.e., strong invariance). If the more constrained models do not fit worse than the lesser constrained models, then we can conclude that the structure of the latent constructs is the same over time. When the strong invariance model fit significantly worse than the weak invariance model, we compared a "partial" strong invariance model with the weak invariance model (Widaman, Ferrer, & Conger, 2010). Effortful control and school behavioral problems had partially strong (RMSEA=.02, CFI=.99, TLI=.99) and strong invariant (RMSEA=.03, CFI=.99, TLI=.98) measurement models over time, respectively. School-level antisocial behavior was partially strong invariant over time (RMSEA=.07, CFI=.98, TLI=.96), and Mexican cultural values was strong invariant over time (RMSEA=.04, CFI=.99, TLI=.99). Table S1 in the Supplemental Material shows the measurement model comparisons for all constructs.

### Modeling Co-Developmental Processes Over Time

To examine whether effortful control and school behavioral problems co-develop from age 10 to 16, we conducted two sets of analyses that provide complementary information. First, we conducted bivariate latent growth curve models, which tell us the extent to which individual-level trajectories of effortful control are associated with individual-level trajectories of school behavioral problems (via the correlation between the slopes). This helps us to understand whether youth who have steeper *decreases* in effortful control also show steeper *increases* in school behavioral problems from age 10 to 16. Second, we conducted cross-lagged regression models, which provide information about the

*directionality* of co-development (via the lagged paths) and help us to understand *selection*, *evocation*, and *socialization* pathways – that is, whether effortful control predisposes youth to develop school behavioral problems, and/or whether school behavioral problems shape youths' ability to self-regulate. Because all of our model comparisons for these statistical analyses are nested, we conducted *formal* model comparisons by assessing adequate model fit via change in chi-square and degrees of freedom. We also note the CFI, the root-mean-square error of approximation (RMSEA) (Hu & Bentler, 1998; Hu & Bentler, 1999), and AIC/BIC criterion when selecting the most appropriate models.

**Bivariate latent growth curve models**—Second-order bivariate latent growth curve (LGC) models specify the trajectory (i.e., slope) of effortful control and the trajectory of school behavioral problems, as well as the correlations among the levels, slopes, and the levels and slopes (Isordia & Ferrer, 2016). Before running a complete bivariate latent growth curve model, we first conducted *univariate*, second-order latent growth curve (LGC) models to examine the individual trajectories of effortful control, school behavioral problems, and school-level antisocial behavior over time (for a review, see Duncan, Duncan, & Strycker, 2006). To find the best-fitting growth trajectories, we conducted a series of model comparisons and evaluated changes in model fit indices. Specifically, we compared three models: (1) no growth model, where the slope is fixed to be zero over time; (2) linear growth model, where the slope linearly increases by one unit over time, with the first time point centered at '0', the second time point fixed at '2', ..., and the last time point is fixed at '6' and (3) a latent basis model, where the first and last time points of the slope are fixed (at '0' and '6', respectively) and the middle time points are freely estimated to the data. In all models, path coefficients from the intercept to the repeated assessments are fixed to 1, and the intercept and slope are allowed to covary. Tables S2-S5 show the results of the model comparison tests for the univariate trajectories of effortful control, school behavioral problems, school-level antisocial behavior, and Mexican cultural values. In all cases, a linear change trajectory was retained, with the exception of Mexican cultural values where the latent basis trajectory did not fit significantly worse.

After retaining the best-fitting univariate growth curves, we conducted bivariate LGC models to investigate the correlation between the slope of effortful control and the slope of school behavioral problems. This correlation coefficient indicates how individual-level *changes* in effortful control are related to individual-level *changes* in school behavioral problems from 5<sup>th</sup> to 11<sup>th</sup> grade. In addition to this coefficient, bivariate LGC models also output the correlation between the levels, which indicates the concurrent association between effortful control and school behavioral problems in the 5<sup>th</sup> grade. Last, the correlations between the level and slope demonstrate the association between the level of effortful control (or school behavioral problems) in the 5<sup>th</sup> grade and individual-level *changes* in school behavioral problems (or effortful control) from 5<sup>th</sup> to 11<sup>th</sup> grade.

**Latent cross-lagged regression models**—In latent cross-lagged regression (LCLR) models, the lagged paths indicate the prospective effect of effortful control on school behavioral problems (and vice versa), after controlling for their concurrent relations and their stability over time, as well as competing, reciprocal influences. We tested the fit of

three structural models: (1) a model in which all structural coefficients (stability paths and cross-lagged coefficients) are freely estimated; (2) a model where the stability paths were constrained to be equal over time *within* each construct, and the cross-lags are freely estimated; and (3) a model where both the stability and cross-lagged paths were constrained, in their respective directions, to be equal over time. If the model does not fit significantly worse, then we chose the more parsimonious model by retaining the structural constraints. Evidence for a *selection/evocation* pathway would be indicated by a significant lagged effect from effortful control to school behavioral problems over time, whereas evidence for a *socialization* pathway would be indicated by a significant lagged effect from school behavioral problems to effortful control.

Constraining the stability and lagged pathways to be equal did not significantly worsen model fit relative to the freely estimated models (Table S6). Therefore, we concluded that: (1) the stabilities of effortful control and school behavioral problems were consistent in magnitude over time (i.e., constrained *within* construct over time); and, (2) the reciprocal, lagged effects between effortful control and school behavioral problems were similar over time (i.e., the magnitude of the effects did not vary significantly from 5<sup>th</sup> to 11<sup>th</sup> grade).

### Concurrent Associations and Moderating Effects of Gender, Acculturation, and School-Level Antisocial Behavior

First, we examined the concurrent correlations between gender, acculturation, school-level antisocial behavior and effortful control and school behavioral problems in the 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades. Then, for each of the moderating factors (gender, nativity status, Mexican cultural values, school-level antisocial behavior), we conducted multiple-group analyses within the bivariate LGC and LCLR models.<sup>4</sup> For the bivariate LGC models, we compared a model where the correlations between the levels, the slopes, and the levels and slopes were freely estimated across groups to a model where these correlations were constrained to be equal across groups. If constraining the correlations across groups do not fit significantly worse, then we can conclude that the correlation between the trajectories of effortful control and school behavioral problems is the same for: (1) boys vs. girls, (2) youth born in Mexico vs. the U.S, (3) youth who endorse low vs. medium vs. high Mexican cultural values; decreasing vs. no change vs. increasing Mexican cultural values from age 10 to 16, or (4) low vs. medium vs. high school-level antisocial behavior; decreasing vs. no change vs. increasing school-level antisocial behavior from age 10 to 16. For the LCLR models, we tested the fit of a model in which: (1) the lagged pathways were constrained to be the same over time *within* groups, but allowed to differ *across* groups, and (2) the lagged pathways were constrained to be the same over time *within and across* groups. If the more constrained model does not fit significantly worse than the less constrained model, then we concluded that the structural parameters do not vary by gender, nativity, endorsement of Mexican cultural values, or school-level antisocial behavior.

<sup>4</sup>It was not feasible to conduct multilevel modeling with school-level antisocial behavior in the present sample because individuals attended 90+ different schools, so there were relatively few individuals nested within each school.



## Results

Table 2 shows the descriptive statistics for all study variables.

### The Relationship between Individual-Level Trajectories of Effortful Control and School Behavioral Problems

As shown in Figure 1, the effortful control and school behavioral problems slopes were negatively correlated ( $r = -.34, p = .005$ ), indicating that steeper increases in effortful control from 5<sup>th</sup> to 11<sup>th</sup> grade were associated with steeper decreases in school behavioral problems across the same time period. The intercepts (i.e., initial levels) of effortful control and school behavioral problems were also negatively correlated ( $r = -.56, p < .001$ ), indicating that lower levels of effortful control were associated with more school behavioral problems in the 5<sup>th</sup> grade (see Figure S1). For the correlations between the levels and slopes, we found that, on average, *lower* levels of effortful control in the 5<sup>th</sup> grade were related to *decreases* in school behavioral problems over time ( $r = .26, p = .002$ ), although they still remained much higher on school behavioral problems than youth with high effortful control in the 5<sup>th</sup> grade (see Figure S2). Last, on average, *higher* levels of school behavioral problems in the 5<sup>th</sup> grade were related to *decreases* in effortful control over time ( $r = .17, p = .033$ ; see Figure S3).

### The Directionality of the Co-Development of Effortful Control and School Behavioral Problems

Figure 2 shows the standardized coefficients for the bidirectional pathways between effortful control and school behavioral problems, while controlling for prior levels of effortful control and school behavioral problems, as well as their concurrent correlations. Stability over time was moderately high for effortful control (range = .66 to .71) and school behavioral problems (range = .63 to .67). In terms of the reciprocal, lagged pathways, lower effortful control was associated with relative *increases* in school behavioral problems over time ( $\beta_s = -.07, ps = .012$ ). Conversely, more school behavioral problems were associated with relative *decreases* in effortful control across adolescence ( $\beta_s = -.08, ps = .001$ ). In other words, youth with poor self-regulation tended to exhibit progressively more behavioral problems as they went from 5<sup>th</sup> to 7<sup>th</sup> to 9<sup>th</sup> to 11<sup>th</sup> grade, and youth who experienced these behavioral problems tended to decline in their capacity to effectively regulate their impulses and attention.

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### Concurrent Associations and Moderating Effects of Gender

Girls had higher effortful control at all ages ( $rs = .13$  to  $.16, ps = .00-.02$ ), and lower levels of school behavioral problems at age 10 ( $r = -.46, p < .001$ ), 12 ( $r = -.27, p < .001$ ), 14 ( $r = -.10, p = .06$ ), and 16 ( $r = -.23, p < .001$ ).

<sup>5</sup>We conducted follow-up analyses to examine whether the co-developmental patterns of effortful control and school behavioral problems were unique to problems in the school context, or whether they could be accounted for by externalizing problems more broadly (measured by Conduct Disorder symptom counts at each age). For both the bivariate LGC model and LCLR model, the correlation between the slopes and the lagged pathways remained the same in terms of magnitude and significance when we included Conduct Disorder symptoms in the model. This suggests that the present findings are unique to school behavioral problems and not due to overlap with a broader externalizing factor.



For the multiple-group bivariate LGC models, constraining the correlations between levels, between slopes, and between levels and slopes to be equal across gender did not fit significantly worse than allowing these correlations to differ for boys and girls ( CFI=.00, NCI=.01,  $\chi^2/DF = 27.20/4$ , RMSEA=.05). Moreover, for the LCLR models, the model comparison showed that constraining the cross-lagged pathways to be the same across gender did not fit significantly worse than allowing the cross-lagged pathways to differ for boys and girls ( CFI=.00, NCI=.01,  $\chi^2/DF = 16.22/4$ , RMSEA=.04). Thus, these findings indicate that the co-development of effortful control and school behavioral problems from the 5<sup>th</sup> to 11<sup>th</sup> grade did not differ for boys and girls.

### Concurrent Associations and Moderating Effects of Acculturation

Nativity status was not significantly correlated with effortful control ( $r = -.04$  to  $.11$ , all  $ps > .05$ ) or school behavioral problems ( $r = -.01$  to  $.05$ , all  $ps > .05$ ), except that youth born in the U.S. showed significantly more school behavioral problems than youth born in Mexico at age 14 ( $r = .12$ ,  $p = .04$ ). Mexican cultural values were positively correlated with effortful control at age 10 ( $r = .06$ ,  $p = .19$ ), 12 ( $r = .12$ ,  $p = .01$ ), 14 ( $r = .17$ ,  $p < .001$ ), and 16 ( $r = .18$ ,  $p < .001$ ), suggesting that youth who endorsed more Mexican cultural values tended to be higher in effortful control. Contrary to the Immigrant Paradox, Mexican cultural values were not significantly correlated with school behavioral problems ( $r = -.10$  to  $.004$ , all  $ps > .05$ ).

For the multiple-group bivariate LGC models, constraining the correlations between levels, between slopes, and between levels and slopes to be equal across nativity status did not fit significantly worse than allowing these correlations to differ for youth born in the U.S. vs. Mexico ( CFI=.00, NCI=.00,  $\chi^2/DF = 5.05/4$ , RMSEA=.04). Similarly, constraining the correlations between levels, between slopes, and between levels and slopes to be equal across low, medium, and high levels of Mexican cultural values ( CFI=.00, NCI=.00,  $\chi^2/DF = 10.01/8$ , RMSEA=.04), or across decreasing, not changing, and increasing Mexican cultural values from age 10 to 16 ( CFI=.00, NCI=.00,  $\chi^2/DF = 6.09/8$ , RMSEA=.05), did not fit significantly worse than allowing these correlations to vary across the level and slope groupings for Mexican cultural values.

For the LCLR models, the model comparison showed that constraining the cross-lagged pathways to be the same across nativity status did not fit significantly worse than allowing the cross-lagged pathways to differ ( CFI=.00, NCI=.00,  $\chi^2/DF = 3.92/4$ , RMSEA=.04), or for low, medium, and high Mexican cultural values ( CFI=.00, NCI=.01,  $\chi^2/DF = 40.0/14$ , RMSEA=.05), or across decreasing, not changing, and increasing Mexican cultural values from age 10 to 16 ( CFI=.00, NCI=.01,  $\chi^2/DF = 27.61/14$ , RMSEA=.05). Thus, taken together, these findings indicated that the co-development of effortful control and school behavioral problems from the 5<sup>th</sup> to 11<sup>th</sup> grade did not differ for more vs. less acculturated youth.

### Concurrent Associations and Moderating Effects of School-Level Antisocial Behavior

School-level antisocial behavior was negatively correlated with effortful control ( $r = -.23$  to  $-.27$ , all  $ps < .001$ ), indicating that higher levels of school antisocial behavior were

associated with poorer effortful control. School-level antisocial behavior was positively correlated with school behavioral problems ( $r_s = .11$  to  $.19$ ,  $p_s = .00$ -. $03$ ), indicating that higher levels of school antisocial behavior were associated with more school behavioral problems.

For the bivariate LGC models, we found that constraining the level-slope correlations to be equal did not fit significantly worse than allowing these correlations to differ across low, medium, and high antisocial schools at age 10 ( CFI=.01, NCI=.02,  $\chi^2/$  DF = 60.18/8, RMSEA=.06), or across decreasing, not changing, and increasing school-level antisocial behavior ( CFI=.00, NCI=.00,  $\chi^2/$  DF = 15.48/8, RMSEA=.05). For the cross-lagged regression models, the model comparison showed that constraining the cross-lagged pathways to be the same across groups did not fit significantly worse than allowing the cross-lagged pathways to differ for low, medium, and high antisocial schools at age 10 ( CFI=.027, NCI=.04,  $\chi^2/$  DF = 152.01/14, RMSEA=.06), or across decreasing, not changing, and increasing school-level antisocial behavior from age 10 to 16 ( CFI=.01, NCI=.02,  $\chi^2/$  DF = 63.37/14, RMSEA=.05). Thus, contrary to expectations, these findings suggest that the co-development of effortful control and school behavioral problems is similar for youth who attended schools with varying degrees of antisocial behavior.

## Discussion

The present study examined the co-development of effortful control and school behavioral problems using multi-method data from a longitudinal study of 674 Mexican-origin youth assessed in the 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, and 11<sup>th</sup> grades. In general, results showed that effortful control and school behavioral problems co-develop from late childhood through adolescence. Specifically, youths with low effortful control were more likely to experience relative *increases* in school behavioral problems over time. Moreover, more frequent suspensions, truancies, and classroom misconduct earlier in development lead youth to experience relative *decreases* in effortful control over time. We also examined potential moderators that may exacerbate or diminish the co-developmental effects. However, the developmental pathways between effortful control and school behavioral problems did not vary for boys and girls, youth born in the U.S. or Mexico, different levels and trajectories of Mexican cultural values, or different levels and trajectories of school-level antisocial behavior. Below we discuss the theoretical and practical implications of the findings in more detail.

### Effortful Control and School Behavioral Problems Co-Develop Over Time

Consistent with previous cross-sectional findings, we found that lower effortful control is related to higher levels of school-related problems (Costenbader & Markson, 1998; Henry et al., 1999; Veenstra, Lindenberg, Tinga, & Ormel, 2010). Further, we extended previous research in early childhood (Montroy, Bowles, Skibbe, & Foster, 2014; Sawyer, Searle, Miller-Lewis, & Sawyer, 2015; Wyman et al., 2010) by examining transactional, longitudinal associations from late childhood through adolescence and found that the individual-level trajectories of effortful control and school behavioral problems were significantly correlated. Specifically, youth who had steeper *decreases* in effortful control also tended to have steeper *increases* in school behavioral problems from 5<sup>th</sup> to 11<sup>th</sup> grade.

Moreover, when we conducted analyses to examine the *directionality* of co-development, we found empirical support for both *selection/evocation* and *socialization* processes, where low effortful control serves as a precursor to getting in trouble at school; and by engaging in school behavioral problems, youth abilities to self-regulate slowly deteriorate.

These *selection/evocation* and *socialization* pathways between effortful control and school behavioral problems may be driven by several, transactional developmental processes. For example, adolescents who have poor self-regulation may be more likely to skip school or be truant; and thus, are directly selecting themselves out of the school context because their impulses are better served by “rewarding” opportunities outside of the school context. This theoretical explanation suggests that poorly regulated youth may be *self-selecting* into school behavioral problems by virtues of failures to self-regulate. Alternatively, an *evocation* process may also be at play, in that youth who lack the propensity to be self-regulated may act disruptively within the classroom, which may *evoke* classmates to report his/her misbehavior and/or *elicit* teachers to remove the student from the classroom.

On the other hand, we also found that the experience of school behavioral problems leads to changes in individuals' abilities to regulate their impulses and behaviors, a *socialization* effect of school behavioral problems on low effortful control. The school context is critical for giving youth an education and teaching them practical social and life skills, all of which are even more critical for troubled youth. Moreover, the school context provides a training ground for exercising good effortful control because students spend hours in highly structured classrooms in which they are bound by strict rules, regulations, and procedures. In many ways, the kinds of tasks that routinely occur in classroom settings resemble the tasks used in interventions to boost self-control. For example, in Friese et al.'s (2017) meta-analysis, many successful self-control interventions involved training procedures that contained repeated inhibition of dominant responses, which can easily be mapped onto the procedural requirements of the classroom environment (e.g., sitting still, paying attention, not interrupting or distracting others in the classroom setting, etc.). Thus, it may be that engaging in school behavioral problems (by skipping school and/or getting suspended) removes youth from one of the few contexts in which they can develop and maintain their self-control; with reduced exposure to the school environment, youths' poor effortful control tendencies only worsen.

Youth who skip school and/or get suspended are not only removed from an environment that aids in healthy effortful control development, they may be more likely to enter into new environments that impede the development of effortful control. For example, instead of learning how to behave appropriately from other peers and authority figures, adolescents who engage in school behavioral problems may be left at home without adult supervision, spend more time with deviant peers and siblings, and engage in drug use and other forms of antisocial behavior, which further erodes their capacity to regulate their behavior and impulses. In other words, the *presence* of deviance outside of the school context may be another possible mediating factor that explains why school behavioral problems lead to worsening effortful control.

These findings regarding *selection*, *evocation*, and *socialization* pathways have two important implications for future research. First, given that low effortful control puts youth at risk for developing problems within the school context, it is crucial for future work to examine whether interventions to improve self-regulation can help to curb suspensions, classroom misconduct, and truancy among adolescents. We know that low effortful control has a widespread effect on many developmental outcomes (Eisenberg, Smith, & Spinrad, 2004; King, Lengua, & Monahan, 2013; Moffitt et al., 2011), and meta-analytic data have shown that interventions can successfully increase self-control, thereby leading to reductions in adolescent problem behaviors (Friese et al., 2017; Piquero, Jennings, & Farrington, 2010). Thus, if improving effortful control reduces the likelihood of problems within the school context, then this may also reduce the chances of school dropout among troubled youth.

Second, given that experiencing school behavioral problems (suspensions, classroom misconduct, and truancy) leads youth to become even less able to control their behaviors and impulses, future theory and practice should focus on understanding whether removing these problematic students from the school environment is really the most beneficial course of action for them. The school environment not only provides youth with an education, it also teaches them practical social and life skills, which are particularly critical for troubled youth. Our findings suggest that keeping these problematic students in the structured school setting may prevent further exacerbating their dysregulated, maladaptive behaviors (Henry et al., 1999; Mizell, 1978; Polsgrove, 1991; Radin, 1988; Rutherford, 1978).

### **Concurrent Associations and Moderating Effects of Gender, Acculturation, and School-Level Antisocial Behavior**

In addition, we sought to investigate the concurrent associations and moderating influence of three individual (gender, nativity status, Mexican cultural values) and one contextual factor (school-level antisocial behavior) on effortful control and school behavioral problems. The findings have several important implications. First, in terms of gender differences, we found that girls were significantly higher on effortful control than boys, replicating previous research (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). Moreover, boys showed significantly higher levels of school behavioral problems than girls at most ages, replicating previous research on antisocial behavior and conduct problems (Berkout, Young, & Gross, 2011; Chaplin & Aldao, 2013; Costenbader & Markson, 1998; Veenstra, Lindenberg, Tinga, & Ormel, 2010). However, contrary to what some prior work on antisocial behavior would suggest (Meier, Slutske, Heath, & Martin, 2011; Moffitt, Caspi, Rutter, & Silva, 2001), we found that the co-development of effortful control and school behavioral problems was not moderated by gender. In other words, poor effortful control predisposes youth to school behavioral problems, regardless of gender. Likewise, experiencing school behavioral problems influenced the development of effortful control similarly for boys and girls. Given that *selection/evocation* and *socialization* pathways between effortful control and school behavioral problems do not differ for boys and girls, broad efforts to improve effortful control may be beneficial across gender for Mexican-origin youth.

Second, previous theoretical and empirical work has suggested that more acculturated youth are at a higher risk for experiencing behavioral and mental health problems, compared to

less acculturated youth (Garcia-Coll & Marks, 2011; Teruya & Bazargan-Hejazi, 2013). However, contrary to the *Immigrant Paradox*, we did not find that more acculturated youth (i.e., youth born in U.S.; youth who endorse fewer Mexican cultural values) exhibited more school behavioral problems, as evidenced by the non-significant concurrent correlations at each grade. Instead, we found that youth who endorsed more Mexican cultural values had higher levels of effortful control across all grades (except 5<sup>th</sup> grade), which is consistent with the idea that maintaining the values of one's heritage culture can be a source of resilience for ethnic minority youth (Garcia-Coll, 1996). Although we had to reason to suspect that more acculturated youth would show stronger associations between effortful control and school behavioral problems, we did not find any evidence for moderation by nativity status or Mexican cultural values. Similarly, co-developmental patterns between effortful control and school behavioral problem emerged regardless of the adolescent's level of acculturation.

In summary, we did not find clear evidence for co-developmental variation by acculturation in the present study, or clear support for the *Immigrant Paradox*. In the present study, we examined *within-culture* variation in our sample of Mexican-origin adolescents. However, it is possible that there are *between-culture* differences in the co-development of effortful control and school behavioral problems. For example, future research should examine the extent to which Mexican cultural factors play a protective role in the co-development of effortful control and school behavioral problems for Mexican youth, when compared to White or African-American youth. These cross-cultural differences have yet to be explored and may elucidate culture-specific pathways that are critical for Mexican-origin youth compared to youth from other ethnic groups.

Finally, consistent with previous research showing that school-level antisocial behavior is associated with numerous adverse consequences (Cornell & Mayer, 2010; Hawkins et al., 2003), we found that school-level antisocial behavior was associated with lower levels of effortful control and higher levels of school behavioral problems in our sample. This pattern is consistent with the idea that the broader school context can create conditions that foster more adaptive traits and behaviors. However, when we examined school-level antisocial behavior as a moderator, we found that the co-developmental patterns between effortful control and school behavioral problems were similar for youth, regardless of how antisocial the school was. Thus, regardless of the general school environment, youth with poor effortful control are more likely to misbehave in the classroom, get suspended, or skip school. Conversely, engaging in school behavioral problems shapes subsequent levels of effortful control irrespective of whether the school environment provides ample or few opportunities to engage in antisocial behavior. This suggests that dysregulated students are likely seeking out and finding antisocial opportunities that reinforce their poor impulse control in a vast array of school contexts.

Although we did not find evidence for any moderation effects, determining the degree to which the observed co-developmental processes generalize across subpopulations (boys and girls, youth born in the U.S. and Mexico, and youth with different levels and trajectories of Mexican cultural values) and contexts (schools high and low in antisocial behavior) has important implications for theory and practice. Theoretically, a lack of moderation by individual and contextual characteristics suggests that the co-development of effortful

control and school behavioral problems reflects a more general developmental process, rather than a gender-, culture-, or school-specific process. Practically, after replications of the present findings in future work, the lack of moderation may also suggest that broad-based interventions aimed at improving effortful control (and subsequently, school behavioral problems) may prove to be beneficial across these subpopulations.

### Limitations

The current investigation has several limitations that merit attention. First, although we examined trajectories from late childhood to late adolescence, we have no way of knowing what trajectories youth were on prior to age 10 or after age 16. Mapping the trajectories prior to age 10 may be particularly important for school characteristics, given that youth have already been in school for five years prior to age 10. Moreover, looking later in development, we do not yet know which youth in our study will continue to have problems in the school environment and subsequently dropout entirely. With empirical data from childhood to adulthood, researchers could begin to explore how much the adolescent period actually matters for long-term development. It remains an open question whether adolescence is a particularly consequential developmental period that sets the stage for the rest of the life course, or simply an extension of childhood, in which case there is less to be gained from studying adolescence (Schulenberg & Maslowsky, 2015). Second, although the present study is the first to examine the association between effortful control and school behavioral problems, it is important to replicate the present findings in other ethnic groups to establish generalizability of the findings beyond Mexican-origin youth. Third, it is possible that the associations between effortful control and school behavioral problems are due to a third variable. Although this is a plausible, alternative explanation, any potential third variable would need to lead to simultaneous individual *change* in *both* effortful control and school behavioral problems from late childhood to adolescence. Fourth, the co-developmental effects between effortful control and school behavioral problems were relatively small, which is not surprising given that change is determined by a vast array of influences, ranging from genetic to socio-cultural factors. However, even small effects can have large long-term influences. For example, if the cumulative impact of years of worsening effortful control and increasing school behavioral problems eventually leads youth to drop out of school, then intervening to improve effortful control and reduce problems in the school context earlier in development could have widespread consequences for educational attainment and occupational opportunities later in life. Fifth, although we provided empirical evidence for the co-development of effortful control and school behavioral problems, and identified plausible developmental pathways through which these effects may be occurring, we were unable to provide empirical tests of the mediating processes to explain *how* effortful control leads to school behavioral problems (or vice versa). We hope that future research will build on the present study by empirically testing some of the mediating processes we suggest. For example, data on how classroom dynamics might promote the development of effective self-regulatory skills, and how deviant influences outside of the school context can socialize impulsive, dysregulated behaviors, may provide particularly useful avenues for explaining the observed transactional associations between effortful control and school behavioral problems. Last, we utilized a self-report measure of school-level antisocial behavior because objective measures of the



school environment are difficult to obtain. Although self-reports are not immune to biases, our self-report measure was developed to minimize subjective perceptions and used by a previous longitudinal study of Latino families (Proyecto La Familia; Roosa et al., 2005). Nevertheless, future research should obtain objective measures of the school environment to gain a better understanding of the effects of school-level antisocial behavior.

## Conclusion

Our research suggests that there may be a vicious cycle between poor effortful control and school behavioral problems from late childhood through adolescence. Specifically, low effortful control may be one risk factor that leads students to experience an increasing number of suspensions, classroom misconduct, and truancy over time. Moreover, as a result of having these maladaptive school problems, students' effortful control may be gradually eroding away, leading them to be at increased risk for other adverse consequences.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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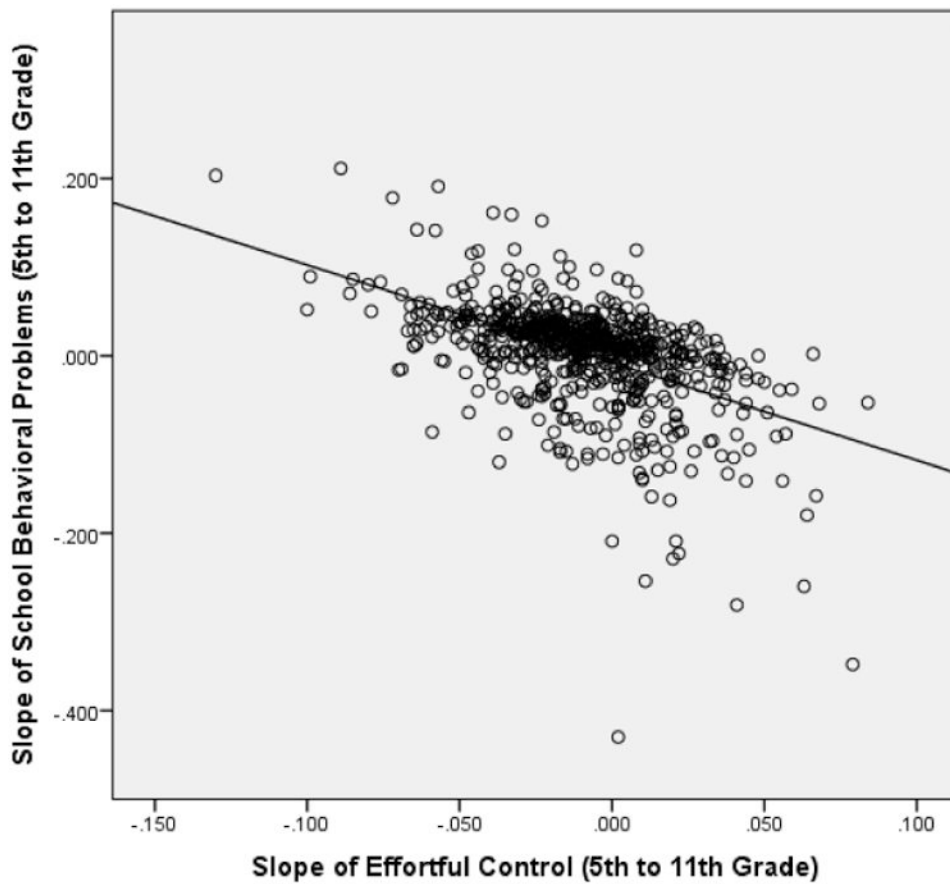
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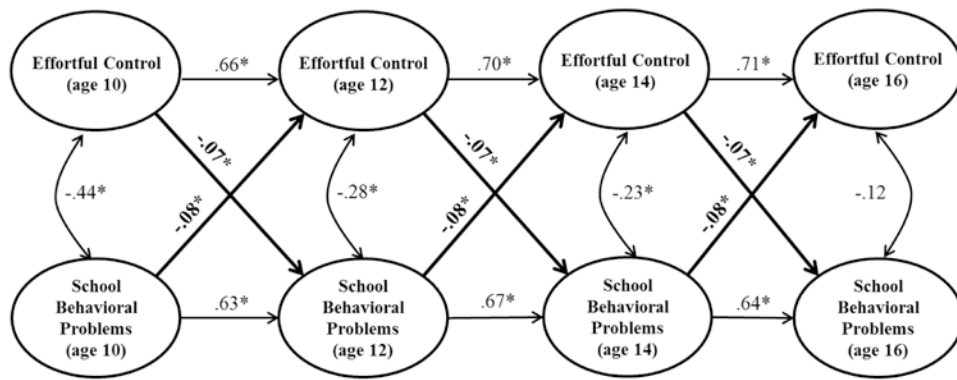
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**Figure 1.**  
Correlation between Changes in Effortful Control and Changes in School Behavioral Problems  
*Note.* This is a visual depiction of the correlation between the slopes from the bivariate latent growth curve model of effortful control and school behavioral problems;  $r = -.34$ .



**Figure 2.**

Cross-lagged regression model of reciprocal associations between effortful control and school behavioral problems from age 10 to 16.

*Note.* Values in the figure indicate the standardized regression coefficients. Asterisks denote values that are significant at  $p < .05$ .

**Table 1**  
**Measures Summary and Descriptive Statistics of School Behavioral Problems**

	Item	Response Scale	Descriptive Statistics			
			Age 10 M (SD), range	Age 12 M (SD), range	Age 14 M (SD), range	Age 16 M (SD), range
Suspensions	Parent-Report	In the past 12 months, has the child been suspended from school? 1=No, 2=Once, 3=Two or more times	1.08 (.33), 1-3	1.13 (.41), 1-3	1.18 (.50), 1-3	1.10 (.38), 1-3
	School Records	Number of 'Suspensions'	.33 (1.15), 0-10	.88 (2.12), 0-16	.73 (1.61), 0-10	.06 (.38), 0-5
Absences	Teacher-Report (age 10 only; N=334)	--	--	--	--	--
	Parent-Report	In the past 12 months, how often has child been in trouble for skipping or not attending school? 1=Never, 2=Seldom, 3=Sometimes, 4=Often	1.19 (.52), 1-4	1.18 (.53), 1-4	1.30 (.67), 1-4	1.40 (.78), 1-4
Absences	School Records	Number of 'Unexcused Absences'	1.97 (3.36), 0-31	2.36 (4.05), 0-29	2.68 (6.42), 0-64	.27 (1.26), 0-20
	Teacher-Report (age 10 only; N=334)	Number of 'Excused Absences'	5.67 (6.09), 0-59	6.32 (7.31), 0-49	6.42 (8.56), 0-72	6.27 (10.14), 0-80
Classroom Misconduct	Parent-Report	In the past 12 months, how frequently has child been in trouble for arguing or fighting at school? 1=Never, 2=Seldom, 3=Sometimes, 4=Often	1.26 (.62), 1-4	1.23 (.58), 1-4	1.25 (.60), 1-4	1.17 (.51), 1-4
	School Records	School Records	--	--	--	--
Classroom Misconduct	Teacher-Report (age 10 only; N=334)	How appropriately does he/she behave (compared to other students)? 1=Much less... 4>About average... 7=Much more	5.01 (1.74), 1-7	--	--	--
	Teacher-Report (age 10 only; N=334)	In terms of classroom behavior, how would you rate this student? 1=Top 1/5 of the class; excellent 5=Bottom 1/5 of the class; far below	2.15 (1.21), 1-5	--	--	--

Note. M=Mean, SD = Standard deviation.



**Table 2**  
**Descriptive Statistics of Observed Study Variables**

	Age 10 M(SD)	Age 12 M(SD)	Age 14 M(SD)	Age 16 M(SD)
Effortful Control	2.96 (.34)	2.99 (.34)	2.94 (.35)	2.94 (.33)
School Behavioral Problems	-.004 (.64)	.002 (.72)	.003 (.75)	-.005 (.57)
School-Level Antisocial Behavior	1.44 (.40)	1.37 (.42)	1.57 (.52)	1.54 (.50)
Mexican Cultural Values	3.46 (.30)	3.35 (.33)	3.24 (.35)	3.18 (.39)

*Note.* Values in the table are the means and standard deviations of the *observed* variable scores. All of the items that comprise school behavioral problems were standardized before averaging into a composite score; all other observed variables are in their original metric.

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