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Childhood Self-regulation as a Mechanism Through Which Early Overcontrolling Parenting is Associated with Adjustment in Preadolescence

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Abstract

We examined longitudinal associations across an 8-year time span between overcontrolling parenting during toddlerhood, self-regulation during early childhood, and social, emotional, and academic adjustment in preadolescence (N=422). Overcontrolling parenting, emotion regulation (ER), and inhibitory control (IC) were observed in the laboratory; preadolescent adjustment was teacher-reported and child self-reported. Results from path analysis indicated that overcontrolling parenting at age 2 was associated negatively with ER and IC at age 5, which, in turn, were associated with more child-reported emotional and school problems, fewer teacher-reported social skills, and less teacher-reported academic productivity at age 10. These effects held even when controlling for prior levels of adjustment at age 5, suggesting that ER and IC in early childhood may be associated with increases and decreases in social, emotional, and academic functioning from childhood to preadolescence. Finally, indirect effects from overcontrolling parenting at age 2 to preadolescent outcomes at age 10 were significant, both through IC and ER at age 5. These results support the notion that parenting during toddlerhood is associated with child adjustment into adolescence through its relation with early developing self-regulatory skills.

Keywords

Adjustment; Inhibitory control; Emotion regulation; Longitudinal; Overcontrol; Parenting; Preadolescence

The ability to self-regulate emotions and behavior in response to changing environmental demands is among the most fundamental skills that children develop in early childhood and these skills underlie successful development in multiple domains across the lifespan (e.g.,

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Vohs & Baumeister, 2011). For example, the regulation of the experience and expression of emotion, and the ability to monitor and modulate behavior are associated with better mental (e.g. Hum, Manassis, & Lewis, 2013) and physical health (e.g., Bub, Robinson, & Curtis, 2016), fewer behavior problems (e.g., Woltering, Lishak, Hodgson, Granic, & Zelazo, 2016), better social relationships (e.g., Blair et al., 2015) and academic adjustment (e.g., Woodward, Lu, Morris, & Healy, 2017). Thus, a strong understanding of what factors facilitate or hinder the development of emotional and behavioral self-regulatory abilities (i.e., parenting behaviors), as well as the long-term implications of specific types of self-regulatory skills to various forms of subsequent adjustment, is critical.

Self-Regulation During Childhood

Self-regulation refers to the ability to modulate arousal and behavior in the context of environmental demands. Self-regulatory functioning has been conceptualized as a system in which adaptive self-control can be observed across multiple levels (i.e., emotional, behavioral, cognitive) (Calkins & Fox, 2002). Self-regulatory processes across these individual levels emerge during infancy, are integrated, and continuously build upon one another, contributing significantly to subsequent adjustment or maladjustment (Calkins & Fox, 2002; Cicchetti & Rogosch, 1996). Thus, the term “self-regulation” is considered a broad umbrella term and general across emotion, behavior, and cognition (Bell & Calkins, 2012; Nigg, 2017). In the current study we aimed to investigate specific core component processes that may be predicted by early caregiving and, in turn, predict subsequent adjustment outcomes. Identifying specific component processes and distinguishing them from general “self-regulation” allows for less confusion regarding domain-specific versus domain-general claims in empirical work (Nigg, 2017). In our view, emotional and behavioral regulation are two critically important component processes that fall underneath the broader dimension of self-regulation. Each of these abilities develop rapidly across the first 5 years of life (Kopp, 1989), and is individually linked with subsequent adjustment across many developmental domains (e.g., Blair et al., 2015; Brumariu, Kerns, & Seibert, 2012; Bub et al., 2016; Woltering et al., 2016). Thus, the regulation of emotion and the ability to inhibit and control behavior (i.e., inhibitory control) are widely studied during the early childhood period.

Emotion regulation (ER) is defined as a set of processes that serve to modulate, maintain, or enhance the intensity and valence of emotional experiences (Calkins & Hill, 2007). These processes play a role in the onset, offset, magnitude, and duration, of an emotional response (Nigg, 2017). Being able to effectively reduce heightened emotional arousal may strengthen a child’s ability to manage frustration in the face of challenging academic tasks, and thus contribute to a successful completion of that task. Effective ER may also allow a child to manage potential anxieties when encountering social challenges and new social groups, thus increasing children’s likelihood of forming friendships and eliciting positive social interactions.

Inhibitory control (IC) is the ability to inhibit a dominant behavioral response in favor of performing a subdominant response (Rothbart, Ellis, Rueda, & Posner, 2003). That is, it involves withholding responses that, although prompted, may not be appropriate for a given

task or a given context (Rueda, Posner, & Rothbart, 2005). Control processes that allow children to withhold incorrect responses translate into important skills, such as raising a hand before speaking in the classroom (Ponitz, McClelland, Matthews, & Morrison, 2009) and inhibiting the urge to act aggressively when frustrated by a peer on the playground (Rhoades, Greenberg, & Domitrovich, 2009).

The Role of Parenting in the Development of Self-Regulatory Skills

Caregiver behaviors are thought to contribute significantly to the development of self-regulation. Children rely on caregivers to regulate their state, arousal, and behavior during infancy and gradually develop self-sufficiency in managing their own actions and emotions into early childhood; it is the regulation provided by caregivers that presents children with increasingly complex social, emotional, and cognitive experiences that allow them to practice self-regulating (Sameroff, 2010).

Theoretical and empirical work have highlighted several ways in which caregiver behaviors may facilitate the development of ER and IC. Parents who are sensitive to children's needs during emotionally challenging situations and respond to children's failed self-regulatory attempts in a supportive and distress-reducing manner, are believed to guide children in developing the skills necessary to down-regulate their arousal and control their behavioral impulses. They teach children which strategies are most effective; in turn, this knowledge is transferred to the larger social world when children act autonomously (Sroufe, 1996).

In contrast, negative parenting behaviors may undermine the development of appropriate behavioral and emotional self-regulatory skills. As infants make the transition to toddlerhood, everyday interactions between parents and children may be more frequently characterized by parental efforts to exert control over the child as they explore their boundaries and seek autonomy and independence (Thompson, 1998). Overcontrolling or intrusive parenting, characterized by parental interventions before children attempt to regulate their emotions or behavior on their own, considerably limits children's ability to practice regulatory strategies (Fox & Calkins, 2003). By restricting exposure to challenging experiences and intervening before the child has failed or struggled on their own, parents reduce opportunities to provide guidance in how to independently manage arousal in difficult situations (Sroufe, 1996). Consequently, fewer regulatory strategies may be internalized and therefore may not be able to be called upon when the child is without caregiver assistance (Kopp, 1982).

There is some empirical work providing support for the longitudinal associations between early overcontrolling parenting and children's later self-regulation. For example, researchers have found that higher maternal restrictiveness in infancy was associated with children's lower IC abilities at 8 years-old (Olson, Bates, Sandy, & Schilling, 2002). Moreover, Taylor and colleagues (Taylor, Eisenberg, Spinrad, & Widaman, 2013) found that intrusive overcontrolling parenting at 18- and 30-months predicted lower levels of effortful control (i.e., the ability to shift attention, modulate behavior, plan, and detect errors) a year later. Importantly, this effect held even when controlling for prior levels of effortful control and parenting, which suggests that changes in intrusive parenting over time was associated

negatively with the development of children's self-regulatory competencies. In an additional study, Stevenson and Crnic (2013) found that father's intrusive and overcontrolling behavior when children were 4.5 years-old was associated with greater observed behavioral dysregulation during a problem-solving task when children were 5 years-old.

Self-Regulation in Childhood and Adjustment in Preadolescence

The extent to which children are capable of regulating their emotions and inhibiting their behavior by the end of early childhood may be particularly important because it is during this time that children transition to the school setting and experience increasingly novel situations. In the school context, greater ER skills may decrease the likelihood that children will act out and behave destructively or internalize negative emotions that could lead to increased anxiety or depression. ER abilities may also assist children in attending to multiple perspectives during challenging social interactions, possibly resulting in better friendship quality and more peer likability. Empirical work demonstrates that children's ability to regulate their emotions in early childhood is associated with later adjustment in multiple domains including social competence (e.g., Blair et al, 2015), lowered behavior problems (e.g., Hill, Degnan, Calkins, & Keane, 2006), and mental health (Woodward, Lu, Morris, & Healey, 2017).

Similarly, greater IC skills may allow children to inhibit their urges to engage in behavior that is counterproductive to classroom management (e.g., playing with blocks during reading time). Thus, children with greater IC likely have better teacher-child relationships because they are generally more easily managed. In contrast, children who are unable to develop effective IC by school entry may find this new environment more frustrating and may be less able to recruit social supports. This, in turn, could lead to decreased social and academic competence and greater psychological difficulties. Indeed, several empirical studies have also linked greater IC abilities during childhood with later adjustment in the realms of academic competence (e.g., Blair & Razza 2007), social adjustment (e.g., Ciairano, Visu-Petra, & Settanni, 2007), and lowered behavior problems (e.g., Utendale & Hastings, 2011).

Although the current literature is not lacking in empirical work linking self-regulation in childhood with later adjustment (e.g., Kim, Nordling, Yoon, Boldt, & Kochanska, 2013; Laible, Carlo, Davis, & Karahuta, 2016; Olson, Choe, & Sameroff, 2017), the longitudinal associations between domain specific self-regulatory skills in early childhood and multiple domains of adjustment in preadolescence need to be better understood. Given that preadolescence is a time when children are encountering increasingly novel situations that force them to navigate very complex social and academic contexts, and their emotions and thoughts are not easily observed during this period, it is important to understand how early regulatory skills may be associated with how preadolescent children perceive their own adjustment and how teachers perceive them.

Self-Regulation as a Potential Mechanism in Parenting-Adjustment Associations

Empirical work with adults' retrospective accounts of early negative parenting highlights significant associations with social and emotional adjustment (e.g., Perry, Cavanaugh, Dunbar, & Leerkes, 2015). Although relatively fewer, studies that test these associations with prospective-longitudinal data spanning multiple developmental periods also find significant associations (Barker, Oliver, Viding, Salekin, & Maughan, 2011; Baumrind, Larzelere, & Owens, 2010). We, along with others (e.g., Chang, Olson, Sameroff, & Sexton, 2011; Eisenberg et al., 2001; Valiente et al., 2006), suggest that one such mechanism that may link early parenting with subsequent adaptive functioning into late childhood and beyond is its role in the development of children's self-regulation. Indeed, there has been some empirical work supporting the associations between negative aspects of parenting and later adjustment through the development of children's self-regulation (e.g., Hofer, Eisenberg, & Reiser, 2010; McEwen & Flouri, 2009). For example, Chang and colleagues (2011) found that frequent corporal punishment at age 3 predicted greater externalizing behaviors at age 6 through its association with children's effortful control at age 3. Thus, there is some evidence that facilitating the development of self-regulatory skills may be one avenue through which parenting is associated with adjustment.

The Current Study

The current study aimed to assess how overcontrolling parenting behaviors during toddlerhood are associated with children's ER and IC at the end of early childhood, and, subsequently, with adjustment across multiple domains in preadolescence. Building on the current literature and testing potential indirect pathways over the longitudinal span of 8 years from toddlerhood to preadolescence helps our understanding of *how* and *why* early caregiving and children's self-regulation may be associated with adaptive functioning that we observe as children mature. Rather than focusing on only one domain of self-regulation, or a broad measure of self-regulatory functioning that cuts across domains, in the current study we considered IC and ER in the context of one another as they relate to changes in social, emotional, and academic adjustment over time. Accounting for the interdependences between domain-specific self-regulatory components and examining them as separate constructs within the same statistical model can help to elucidate whether individual self-regulatory processes have unique effects on adjustment. In the current study, we also accounted for prior levels of adjustment at age 5; by doing so, we were able to test the association between parenting in toddlerhood, self-regulation in early childhood, and potential changes in the skills and behaviors associated with well-being from age 5 to age 10. In addition, our focus on understanding the associations between parental overcontrol during toddlerhood, a period in which there are rapid gains in self-regulatory skills and children are exploring limits and seeking autonomy, and child functioning across developmental domains, is important because parents may try more frequently to exert control during this time. Finally, by including both child-report and teacher-report of adjustment in the current study, we can better understand how both IC and ER may be associated with children's own perceptions of their adjustment, while also considering

teacher's perceptions of classroom behavior, including peer engagement and academic success.

Three primary hypotheses were tested. The first goal of the current study was to assess the association between overcontrolling parenting during toddlerhood and children's emotional and behavioral self-regulation, as indexed by ER and IC, during early childhood. Early childhood is a developmental period during which children attempt to learn and practice controlling their emotions and inhibiting their behavior independently. Overcontrolling parenting during toddlerhood may reduce opportunities for autonomous regulation and therefore hinder the acquisition of these self-regulatory abilities. Thus, we hypothesized that maternal overcontrol at age 2 would be associated negatively with ER and IC at age 5.

The second goal was to examine the association between behavioral and emotional self-regulatory skills during early childhood and changes in social, emotional, and academic adjustment into preadolescence. Self-regulatory skills are imperative during this developmental period such that deficits in self-regulation may set the stage for academic disengagement, risk-taking, and antisocial tendencies into the high school years and beyond (Crockett, Raffaelli, & Shen, 2006; Shortt, Capaldi, Dishion, Bank, & Owen, 2003). We hypothesized that greater ER and IC by age 5 would be associated with greater social, emotional, and academic competencies at age 10, even after controlling for prior levels of adjustment at age 5.

A final goal of this study was to test whether emotional and behavioral self-regulatory skills during early childhood served as a mechanism that links overcontrolling parenting in toddlerhood with changes in children's adjustment eight years later, in preadolescence. We hypothesized that overcontrolling parenting at age 2 would be associated negatively with ER and IC at age 5, which in turn would be associated with lowered social, emotional, and academic adjustment at age 10. Moreover, we expected that the indirect effects statistically testing the mediating role of IC and ER in early childhood would be significant.

Method

Participants

This study utilized data from three cohorts of children who are part of an ongoing longitudinal study of social and emotional development. The Right Track study was approved by the Institutional Review Board at The University of North Carolina at Greensboro (IRB protocol number 07-0194). The goal for recruitment was to obtain a sample of children who were at risk for developing future externalizing behavior problems, and who were representative of the surrounding community in terms of race and socioeconomic status (SES). All cohorts were recruited through child day care centers, the County Health Department, and the local Women, Infants, and Children (WIC) program. Potential participants for cohorts 1 and 2 were recruited at 2-years of age (cohort 1: 1994-1996 and cohort 2: 2000-2001) and screened using the Child Behavior Checklist (CBCL 2-3; Achenbach, 1992), completed by the mother, in order to over-sample for externalizing behavior problems. Efforts were made to obtain approximately equal numbers of boys and girls. This recruitment effort resulted in a total of 307 families who agreed to

participate. Cohort 3 was initially recruited when infants were 6 months of age (in 1998) for their level of frustration, based on laboratory observation and parent report, and were followed through the toddler period (see Calkins, Dedmon, Gill, Lomax, & Johnson, 2002, for more information). Children from Cohort 3 whose mothers completed the CBCL at two-years of age (N = 140) were then included in the larger study. Of the entire sample (N = 447), 37% of children were identified as being at risk for future externalizing problems at age 2. It should be noted, however, that many of these children were not still considered at risk by age 5. There were no significant demographic differences between cohorts with regard to gender, $\chi^2(2, N = 447) = .63$, p = .73, race, $\chi^2(2, N = 447) = 1.13$, p = .57, or two-year SES, $F(2, 444) = .53$, $p = .59$.

Of the 447 originally selected participants, six were dropped because they did not participate in any data collection at 2 years-old. An additional 12 families participated at recruitment, did not participate at two-year, but did participate at later years. Finally, 4 participants were dropped due to developmental delay, resulting in 437 participants total at the 2-year assessment (mean age 27.8 mo; SD =3.4 mo). At age 5, 365 families participated (86% retention rate from age 2; mean age 68.0 mo; SD =3.2 mo). There were no significant differences between families who did and did not participate in terms of gender, χ^2 (1, N = 447) = .76, p = .38, race, χ^2 (1, N = 447) = .14, p = .71, 2-year SES, t (432) = −1.93, p = .06, and 2-year externalizing T score, t (445) = 1.39, p = .17. At age 10, 357 families participated (84% retention rate from age 2; mean age 128.1 mo; SD = 3.6 mo). No significant differences were found between families who did and did not participate in the 10-year assessment in terms of child gender, χ^2 (1, N = 447) = 3.31, p = .07; race, χ^2 (3, N = 447) = 3.12, p = .08; 2-year SES, t(432) = .02, p = .98; or 2-year externalizing T score, t (445) = −.11, p = .91.

The sample for the current study included 422 children (52% girls, 48% boys) who had available mother-child interaction data at the 2-year laboratory assessment; 66% of the sample was European American, 28% African American, 4% biracial, and 2% identified as “other.” In addition, four participants were dropped from the current study due to developmental delays; 80% of the mothers involved in the study were married at the 2-year assessment. Families were economically diverse based on Hollingshead (1975) scores at the 2-year assessment. The Hollingshead scores ranged from 14 to 66 (M = 39.49, SD = 11.13) and therefore represented families from each level of the social strata typically captured by this scale.

Procedures

Children and their mothers participated in an ongoing longitudinal study beginning at age 2. The current analyses include data collected when children were 2, 5, and 10 years of age. Observed measures of maternal behavior at age 2 and self-regulatory process at age 5 (i.e., ER and IC) were utilized. Children were videotaped participating in tasks designed to elicit emotional and behavioral responding (partially derived from the Laboratory Temperament Assessment Battery; Lab-TAB; Goldsmith & Rothbart, 1993). Videotapes were used for behavioral coding. Children self-reported on their emotional and school problems at age 10, and teachers reported on children’s academic productivity and social skills at age 5 and age

10. Thus, adjustment was operationalized as both weaknesses and strengths. Only the measures relevant for the current study are reported here.

Measures

Race—Child race was reported by mothers and coded as 1 = European American, 2 = African American, 3 = mixed, 4 = other. Please see participants section for breakdown within the study sample.

Sex—Child sex was coded as 1 = male and 2 = female. Please see participants section for breakdown within the study sample.

Socioeconomic status (SES)—Family SES was assessed using the Hollingshead (1975). The Hollingshead is a four-factor index that considers social status as a multidimensional concept. The four factors used in the index are: education, occupation, sex, and marital status. The status score of an individual or a two-parent family is estimated by combining information on these four factors. The status score of an individual is calculated by multiplying the scale value for occupation by a weight of five and the scale value for education by a weight of three. Hollingshead scores that range from 40 to 54 reflect minor professional and technical occupations considered to be representative of middle class. The current sample had a range from 14 to 66 (M = 39.49, SD = 11.13), thus representing families from each level of the social strata typically captured by this scale.

Externalizing behaviors at age 2—The Child Behavior Checklist (CBCL) for 2-3 year-olds was completed by mothers at age 2 (Achenbach, 1992). The externalizing subscale was used as an index of parent report of externalizing behavior problems, which includes items measuring aggressive, destructive, and oppositional behaviors. Achenbach and colleagues (e.g., Achenbach, 1992; Achenbach, Edelbrock, & Howell, 1987) have found these scales to be a reliable index of externalizing behavior problems across these developmental periods. The mother indicated how true the statement was of her child on a scale of 0 (*not true*) to 2 (*often true*) for each version. Standardized t-scores of externalizing behaviors were used in analyses.

Maternal overcontrol at age 2—Global codes of maternal overcontrol were adapted from the Early Parenting Coding System (Winslow, Shaw, Bruns, & Kiebler, 1995). Maternal overcontrol was observed during a pretend play (4 min) and clean-up task (2 min) at age 2. During the pretend play task, the mother and child were given an array of toys to play pretend with and the mother was instructed to play with the child as she normally would at home. The clean-up task was a compliance task in which the mother was told to work with the child to clean up toys used during a previous interaction task. Overcontrol was coded once for each episode on a 4-point scale (1-*low* to 4-*high*) and was defined as instances when the parent was too strict or demanding considering the child's behavior. For example, the extent to which the mother exerts her influence towards the completion of an activity, or constantly guiding and creating a structured environment, was considered high in overcontrol. Commands that were repeated frequently and/or accompanied by gestures or physical manipulation were also high on this scale. A team of two coders were trained on

10% of the videotaped sessions and independently coded another 10% for reliability. The adjusted kappas for global codes across both tasks were above .70. An overcontrol composite was created by summing the global overcontrol codes for pretend play and clean-up. The correlation between tasks was $r = .43$, $p < .01$. Maternal overcontrol was highly stable from age 2 to age 5 ($r = .76$, $p < .001$) within our sample.

Emotion regulation at age 5—Children's ER abilities at age 5 were indexed by an observed measure of global regulation during the "I'm Not Sharing" task (Lab-TAB version 2.0; Goldsmith & Rothbart, 1993), a task designed to elicit child frustration. During this task, the experimenter divided candy between herself and the child. The experimenter gave herself more candy than the child and also took the child's candy and ate it. Observed regulation was defined as the use of behavioral skills in an effort to decrease distress. The scale ranged from 0 (*child demonstrates no control of distress to stimuli*) to 4 (*the child seems to completely regulate distress and distracts away from distress most of the time*). Two coders trained by working together on 15% of the videotaped sessions and independently scoring another 15% for reliability purposes. Cohen's kappa was .78.

Inhibitory control at age 5—A Shape Stroop task (adapted from Kochanska, Murray, & Harlan, 2000), consisting of an identification phase and a Stroop phase, was used to measure children's IC. In the identification phase, children were presented with pictures representing large shapes (animals, geometric figures). Experimenters made sure children could correctly identify the shapes. During the Stroop phase, within the larger pictures, smaller shapes were depicted. In half of the trials, the small shapes were consistent with the large shape (e.g., a large cat was made up of identical smaller cats). In the other half, the shapes were inconsistent (e.g., large circle made up of small squares inside the circle). Regardless of whether the shapes were consistent or inconsistent, the child was asked to recognize only the smaller shapes in the pictures presented and to answer as fast as possible. Prior to starting the task, examiners made sure that children understood the task via a practice trial. This is considered an IC task because the child needs to inhibit the urge to name the distracting larger shape (i.e., dominant response) and instead name the relevant small shape (i.e., subdominant response) in order to respond correctly. Children could receive a maximum of 48 points: 2 points for each correct answer, 1 point if they initially got it wrong but corrected themselves, and 0 points for incorrect answers. This total score was used as the measure of IC. This task has been found to be a valid and reliable measure of IC in multiple preschool samples (e.g., Carlson, 2005; Crivello et al., 2016).

Teacher-report of internalizing behaviors at age 5—Teachers used the Teacher Rating Scale (TRS) from the Behavior Assessment System for Child 2nd edition (BASC-2; Reynolds & Kamphaus, 2004) to report on children's internalizing symptoms in Kindergarten. The TRS is a 109-item questionnaire regarding the frequency of perceived emotional states, physical ailments, and behaviors of the child within the last 6 months. Each question uses the same scale of 0 to 3 (0=*never*, 1=*sometimes*, 2=*often*, and 3=*almost always*). The Internalizing Problems composite assesses behavioral problems that are focused inward (e.g., depression) and are not highly disruptive. The internalizing composite includes the anxiety subscale (i.e., a child's frequency and level of perfectionism,

nervousness, and feelings of worry and fear), the depression subscale (i.e., symptoms such as crying easily, loneliness, feeling sad and pessimistic), and the somatization subscale (i.e., physical aches and pains a child has). Normative t-scores that are representative of the U.S population were used in the current analyses. The BASC-2 has been shown to have adequate reliability and validity (Tan, 2007).

Teacher-report of academic productivity at age 5 and age 10—Teachers completed the Academic Performance Rating Scale (DuPaul, Rapport, & Perriello, 1991) when children were in Kindergarten (age 5) and 5th grade (age 10). This 19-item scale was developed to measure teachers' judgements of children's academic performance. Teachers answered each item using a 1 (*never or poor*) to 6 (*very often or excellent*) scale. The academic productivity subscale was used in the current study (12 items; "Estimate the percentage of written math work completed relative to classmates", "Estimate the accuracy of completed written math work"). The composite had good internal reliability at age 5 (α = .91) and age 10 (α = .92).

Teacher-report of social skills at age 5 and age 10—Teachers completed the elementary version of the Social Skills Rating System (SSRS; Gresham & Elliott, 1990) in Kindergarten and 5th grade, which assesses teachers' perceptions of children's behavioral social skills on the basis of how often certain behaviors occur (0 = *never* to 2 = *very often*). The measure includes items such as "Invites others to join in activities" and "Receives criticism well." We used the social skills scale (40 items; α = .74 at age 5, α = .82 at age 10), which is a mean composite of the assertion, cooperation, responsibility, and self-control subscales. There is much reliability and validity evidence for the teacher-report form of the SSRS (e.g., Flanagan, Alfonso, Primavera, Povall, & Higgins, 1996; Pedersen, Worrell, & French, 2001).

Child-report of emotional and school problems at age 10—Children completed the Self-Report of Personality (SRP) child version (8-11) of the BASC-2 (Reynolds & Kamphaus, 2004) at the 10-year assessment. This measure includes 139 items assessing children's perceptions of their behavior, emotions, and personality, and has been shown to be both reliable and valid (Tan, 2007). There are true/false questions and scale items rated on a 4-point scale (0 = *never* to 3 = *almost always*). We utilized the emotional symptoms and school problems sum indices of combined sex t-scores, which are representative of the US population, and categorized by age. The School Problems index includes the *Attitude to School* and *Attitude to Teachers* scales (14 items; α = .89). The *Attitude to School* subscale measures feelings of alienation, disaffection, and hostility toward school. The *Attitude to Teachers* subscale measures feelings of resentment and dislike of teachers, as well as beliefs that teachers are unfair, uncaring, or overly demanding.

The Emotional Symptoms index includes *Social Stress*, *Anxiety*, *Depression*, *Sense of Inadequacy*, *Self-Esteem*, and *Self-Reliance* (42 items; α = .95). The *Social Stress* subscale measures worry or distress related to social situations. The *Anxiety* subscale assesses a child's frequency and level of perfectionism, nervousness, and feelings of worry and fear. The *Depression* subscale assesses depressive symptoms, such as crying easily, loneliness, feeling sad and pessimistic, and having the desire to harm or kill oneself. The *Sense of*

Inadequacy subscale measures the adolescent's perception that he/she is unable to achieve goals, and generally inadequate. The *Self-Esteem* subscale measures feelings of self-esteem, self-respect, and self-acceptance, and the *Self-Reliance* subscale measures the adolescent's confidence in his or her ability to solve problems as well as a belief in his or her own dependability and decisiveness.

Results

Analytic Plan

A path analysis was conducted to examine associations between maternal overcontrol in toddlerhood, children's ER and IC in early childhood, and social, emotional, and academic outcomes in preadolescence. Mplus (Version 7; Muthén & Muthén, 2012) was used to conduct the analyses and Full Information Maximum Likelihood (FIML) was used to handle missing data. Model fit was assessed by examining the comparative fit index (CFI) (Marsh & Hau, 2007), the Tucker-Lewis index (TLI) (Bentler, 1990), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA) (Cole & Maxwell, 2003). Values close to or greater than .95 indicate good model fit for the CFI and TLI, values less than .06 indicated good model fit for RMSEA, and values less than or equal to .08 indicate good model fit for SRMR (Hu & Bentler, 1999). A bias-corrected bootstrapping procedure (10,000 draws) was used to test the indirect effect of maternal overcontrol in toddlerhood on social, emotional, and academic adjustment in preadolescence, through children's emotional and behavioral self-regulatory functioning in early childhood. This approach has been shown to generate the most accurate confidence intervals for indirect effects, reducing Type 1 error rates and increasing power over other similar tests (MacKinnon, Lockwood, & Williams, 2004).

Selection of Covariates

In selecting covariates, we considered that parenting is often associated with child sex, ethnicity, marital status, and income (Hill, 2001; Lytton & Romney, 1991; Nelson, Leerkes, O'Brien, Calkins, & Marcovitch, 2012). We also tested whether there were cohort effects. Because we wanted to make sure that the model fit similarly for boys and girls, we ran a multi-group analysis to test whether structural paths were similar across child sex. There was no evidence that structural paths differed for boys and girls. Thus, both boys and girls were included in analyses. Further, 80% of the mothers were married at the time of assessment and marital status was not correlated with any of the primary study variables. Cohort was also not associated with any of the study variables. Because of this, including marital status and cohort in the model resulted in unchanged structural paths, but weakened model fit. Therefore, marital status and cohort were removed. In addition, because participants for the current study were oversampled for externalizing behaviors at age 2, which, in turn, were correlated with the 10-year outcome variables, we included 2-year externalizing behaviors as a covariate. Age was also included as a covariate because there was variability in participants' age at each assessment.

Finally, we included prior levels of the 10-year outcomes at age 5, with the exception of child-report of school problems. Child-report of school problems was not collected at age 5

and teacher-report of school problems at age 5 assessed specific learning problems rather than the children's attitudes towards teachers and school, which is what was measured in the 10-year child-report version. Thus, including the teacher-reported 5-year measure as an earlier indicator of the child-reported school problems measure would have been inappropriate. Child report of emotional problems was also not collected at age 5. However, child-report of emotional problems at age 10 is primarily a measure of children's perceptions of their anxiety and depression symptoms. Therefore, although not a directly comparable measure, we controlled for teacher-report of internalizing behaviors at age 5; the 5-year teacher-reported internalizing symptoms measure and the 10-year child-reported emotional problems measure were significantly correlated ($r = .24$, $p < .05$). Although measures used to control for prior levels of adjustment often differed in reporter and number of items, and therefore limited our ability to fully measure change in constructs over time, we believe the inclusion of these variables significantly strengthens the study and provides greater insight into developmental processes.

In sum, child race, age, 2-year externalizing behaviors, family socioeconomic status (SES), 5-year teacher-report of internalizing symptoms, 5-year teacher-report of social skills, and 5-year teacher-report of academic productivity were examined as covariates in the model. Covariates were correlated with all other variables collected at the same time point in the analyses. In addition, covariates with significant associations with any of the primary study variables were included in the final model.

Model Results

Descriptive statistics and correlations for study variables are presented in Table 1. As expected, maternal overcontrol at age 2 was correlated negatively with children's ER and IC at age 5. There was no correlation between 5-year ER and 5-year IC. Child-reported and teacher-reported outcome variables at age 10 were significantly associated with one another. The hypothesized model was a good fit to the data, $\chi 2$ (33, $N = 422$) = 54.77 $p = .01$, CFI = .96, TLI = .92, SRMR = .04, RMSEA = .04 [CI = .02, .06] (standardized coefficients are presented in Figure 1). Examination of covariate effects revealed that SES was associated positively with IC ($\beta = .24$ (*.06*), $p < .01$) and academic productivity ($\beta = .13$ (*.06*), $p < .05$), indicating that children from families of higher SES were more likely to have greater IC at age 5 and be more academically productive at age 10. Child age was associated negatively with overcontrolling parenting ($\beta = -.14$ (*.06*), $p < .05$), indicating that as age of the child increased, parental control tended to decrease. Interestingly, externalizing behaviors at age 2 were significantly associated with all outcome variables at age 10. Specifically, age 2 externalizing was associated negatively with academic productivity ($\beta = -.16$ (*.06*), $p < .01$) and social skills ($\beta = -.19$ (*.06*), $p < .01$), and associated positively with emotional problems ($\beta = .13$ (*.06*), $p < .05$) and school problems ($\beta = .16$ (*.06*), $p < .01$). These findings indicate that as externalizing behaviors increase at age 2 children were more likely to have more emotional problems, more school problems, fewer social skills, and be less academically productive when they were 10 years-old.

The first aim of the study was to assess whether maternal overcontrol during toddlerhood was associated with children's ability to regulate their emotions and behaviors during early

childhood. Results indicated that maternal overcontrol at age 2 was associated negatively with children's ER (β = −.20 (.05), p < .01) and IC (β = −.15 (.05), p < .01) at age 5; higher maternal control in toddlerhood, predicted a greater likelihood that children would display difficulties in regulating their emotional expressions and controlling their behavior in early childhood.

The second aim was to assess whether children's ER and IC during early childhood predicted social, emotional, and academic outcomes in preadolescence. Results indicated that children's ER at age 5 was associated negatively with child-reported emotional problems (β = −.13 (.06), p < .05) and child-reported school problems (β = −.13 (.06), p < .05). ER at age 5 was also associated positively with teacher-report of academic productivity (β = .12 (.06), p < .05) and social skills (β = .13 (.06), p < .05) at age 10. Children's IC at age 5 was associated negatively with child report of emotional problems (β = −.21 (.06), p < .01) and school problems (β = −.21 (.06), p < .01), and positively with teacher report of academic productivity (β = .12 (.06), p < .01) at age 10 (see Figure 1). IC was not associated with teacher-report of social skills at age 10 (β = .10 (.06), p = ns). Because we controlled for 5-year measures of children's emotional problems, academic productivity, and social skills, and therefore account for some stability in these constructs from age 5 to age 10, these results suggest that greater self-regulation in early childhood—as indexed by ER and IC—may be associated with changes in various forms of adjustment from childhood to preadolescence. Specifically, children with greater self-regulatory skills at age 5 were more likely to increase in their academic productivity and social skills, and decrease in their emotional and school problems, as they transition to adolescence.

Finally, the indirect effect from maternal overcontrol at age 2 to each of the age 10 outcome variables was significant via children's ER at age 5 (see Table 2 for unstandardized estimates of indirect effects). The indirect effect from maternal overcontrol at age 2 to emotional problems, academic productivity, and academic productivity was also significant via children's IC at age 5 (see Table 2). However, the indirect effect of overcontrol to social skills via IC was not significant. These findings indicate that maternal overcontrol in toddlerhood was associated with changes in teacher- and child-reported social, emotional, and academic adjustment from childhood to preadolescence through its association with children's ability to self-regulate their behavior and emotions in early childhood.

Discussion

We used longitudinal data spanning 8 years and multiple developmental periods, as well as multi-method and multi-reporter measurement techniques, to assess associations between overcontrolling parenting in toddlerhood, self-regulation by the end of early childhood, and adjustment in preadolescence. The current study has multiple strengths and adds to our current understanding regarding the development of self-regulation as a mediating mechanism between caregiving and various forms of adjustment.

To add to the longitudinal work assessing the association between self-regulatory skills in early childhood and functioning in preadolescence, we assessed the association between IC and ER at age 5 and teacher and child reports of children's social, emotional, and academic

adjustment at age 10. As predicted, greater ER at age 5 was associated with fewer child-reported emotional problems, greater teacher-reported social skills, and greater teacher-reported academic productivity at age 10, even after controlling for prior levels of adjustment at age 5. Similarly, after controlling for 5-year adjustment, greater 5-year IC was associated with fewer 10-year child-reported emotional problems and school problems, and more teacher-reported academic productivity. Thus, children who develop the ability to effectively dampen negative arousal in emotionally-charged contexts, and inhibit behavioral responses that are inappropriate for the current situation, appear to have an easier time adjusting to the increasingly difficult environmental demands of the preadolescent school context.

A significant advantage of the current study is that we included earlier measures of our outcome variables, and therefore accounted for some stability in these constructs over time. By controlling for earlier adjustment, we were able to provide stronger support for the association between both aspects of self-regulation, IC and ER, and potential changes in social, emotional, and academic functioning from early childhood through adolescence. Thus, over and above the concurrent associations between IC, ER, and functioning at age 5, children's regulatory abilities by the end of early childhood predict the likelihood children will increase or decrease in multiple aspects of adjustment into preadolescence. This finding underscores the importance of having developed efficient and effective self-regulatory skills by the end of the early childhood period. Importantly, because IC and ER showed unique associations with adjustment, the current findings underscore the importance of developing both regulatory skills and suggest that IC and ER may influence adjustment in different ways.

It could be that self-regulatory skills by the end of early childhood, as children transition to the school environment, are particularly important because it is during this time that children are starting to form attitudes about school and form relationships within the school context. These initial experiences, and the self-regulatory skills associated with them, may then set the stage for a cascade of events leading to adjustment and maladjustment. Thus, intervention and prevention efforts may be most influential if they are able to identify children at risk for self-regulatory difficulties early in life and target the early childhood period as the time to facilitate the development of these skills.

Another strength of the current study is the focus on overcontrolling parenting during toddlerhood as it relates to children's IC and ER in childhood. A greater desire for independence often puts toddlers in situations of increasing emotional challenge and complexity. If parents try to exert too much control over these situations and step in before children try to handle the challenge independently, or physically keep children from these frustrating or fearful contexts all together, they may, unintentionally, hinder the development of children's independent self-regulatory abilities. For example, if an overcontrolling parent removes a young child from a situation where, for a successful peer interaction, she needs to control her emotions/behavior and share a toy, she may not develop the skills to navigate that situation in socially appropriate ways when a parent is not present. Therefore, it is not surprising that, as hypothesized, we found that overcontrolling parenting at age 2 was associated negatively with ER and IC at age 5. Although our finding is correlational in

nature and we were not able to directly test whether overcontrol was associated with changes in self-regulation from toddlerhood to early childhood, this finding has implications for intervention and prevention efforts such that it underscores the importance of educating, often well-intentioned, parents on supporting autonomy and challenge in their young children's lives. Creating increasingly complex, and emotionally and behaviorally challenging situations during toddlerhood, when self-regulatory skills are rapidly developing, in addition to waiting to step in to assist until it is clear the child in incapable of managing the situation on her own, may have positive associations with self-regulatory skills underlying children's adjustment well into adolescence and beyond.

We were also able to link overcontrolling parenting at age 2 to multiple domain specific self-regulatory components. In our model, we assessed ER and IC in the context of one another and provide support for the unique longitudinal associations between overcontrol and both regulatory processes. Thus, future work that can control for prior levels of regulation and examine how changes in overcontrolling parenting may be distinctly associated with each domain of self-regulation is warranted. For example, it is possible that fewer opportunities to model appropriate emotional responses or minimizing emotional experiences when parents step-in too soon are mechanisms for decreased ER, whereas fewer opportunities to teach specific strategies to control behavior and impulse may be mechanisms for decreased IC.

The use of teacher- and child-report measures as distinct constructs in our model was another strength of the current study. By doing so, we were able to provide some evidence that early self-regulatory skills not only predict how children are perceived by people outside of their family, but also how they perceive themselves and their functioning. It is well-documented that how teachers view students, as well as the teacher-child relationship, has significant implications for how teachers interact with children, the opportunities they give them, as well as how much time is invested in their academics (e.g., Baker, 2006; Birch & Ladd, 1997; Buyse, Verschueren, Verachtert, & Van Damme, 2009; Hamre & Pianta, 2001). This may be because the development of effective self-regulatory skills allows children to be more cooperative and engaging in the classroom (i.e., inhibit the urge to speak out of turn or distract away from current classroom activities), thereby increasing teacher likeability and investment. In turn, this may be associated with greater academic productivity, an optimistic view of school, increased self-confidence, and overall better psychological health.

Our finding that early IC and ER predict children's own perceptions of how positively they think of their relationships with their teachers and their peers, as well as their ability to manage emotional distress, is also important. Although likely associated, child-report measures do not reflect observable characteristics like how productive or successful they are in school (i.e., number of assignments completed, length of time to complete assignments, or letter grades), they reflect the child's attitude toward the school setting and the social relationships within that setting. Indeed, researchers have documented the association between children's attitude toward school and their overall adaptation within the academic environment and beyond (e.g., Marchant, Paulson, & Rothlisberg, 2001; Wang & Holcombe, 2010). Thus, early self-regulation may play an important role in the development of positive experiences and attitudes, thereby playing a role in subsequent adjustment.

Finally, we examined whether IC and ER at age 5 were mechanisms that linked overcontrolling parenting at age 2 with social, emotional, and academic adjustment at age 10. The indirect effects from overcontrolling parenting at age 2 to preadolescent adjustment at age 10 through both IC and ER at age 5 were significant, with the exception of the indirect effect between parenting at age 2 and teacher-reported social skills at age 10 through IC at age 5. Existing work has provided some evidence for the mediating role of self-regulation in the association between parenting and child outcomes using longitudinal models (e.g., Chang et al., 2011; Hofer et al., 2010); we build on this work by identifying parental overcontrol as a specific parental behavior associated in unique ways to later IC and ER, and subsequently provide evidence that both IC and ER are associated with adjustment across domains as perceived by both teachers and children in distinct ways. Moreover, we extend the age span in which this specific mediational model has been tested by going from toddlerhood through preadolescence, a developmental period that is particularly important to study given the need for effective self-regulatory skills that can help children manage the difficulties associated with more intense emotions, more complicated relationships, and increased pressure and responsibilities.

Taken together, results of the current study suggest that it is possible that overcontrolling parenting early in life may negatively affect the development of children's ER and IC across early childhood; subsequently, by the end of early childhood, children with overcontrolling parents may be less able to manage the challenging demands that come with entering and navigating through the school environment, leading to greater maladjustment across social, emotional, and academic domains.

Limitations and Future Directions

Despite the many strengths of this study, it is not without limitations. First, the current study examined only two component processes of self-regulation, emotional and behavioral regulation, whereas current perspectives often acknowledge additional important processes such as attentional, biological, and cognitive (e.g., Calkins & Fox, 2002; Calkins, Perry, & Dollar, 2016). Thus, future research is warranted to examine the associations among all components of self-regulation as predictors of various types of adjustment in preadolescence and adolescence. In addition, we were only able to utilize one laboratory behavioral measure of IC and ER in the current study, and the anger eliciting task could be measuring emotionality in addition to regulation. Ideally, future work should incorporate multiple measures that provide greater information about how children regulate their behavior and emotions across family and school settings. Moreover, although a significant strength of our study is that we were able to include earlier 5-year measures of children's adjustment at age 10, these earlier measures differed in reporter and number of items. Thus, although we believe their inclusion in the model significantly strengthens the current study, they are not optimal for assessing change in development across time. We were also not able to include earlier parenting or self-regulation measures and could not assess how changes in parenting or self-regulation were associated with changes in children's social, emotional, and academic functioning from early childhood to adolescence.

In addition, although this study focused on the role of children's emotional and behavioral regulation as a mechanism to explain the association between early overcontrol and children's subsequent social, academic, and psychological adjustment, there are many additional mechanisms that may shed light on the association between early caregiving behavior and children's subsequent adjustment. For instance, early parenting behaviors likely are associated with children's developing social abilities, and in turn, children's social skills may contribute to their adjustment across multiple domains of functioning. There is a vast literature highlighting that sensitive parenting behaviors promote children's social skill development (e.g., Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Zhou, Eisenberg, Losoya, Fabes, Reiser, Guthrie, et al., 2002), possibly through appropriate modeling of parents' own self-control, negotiation, and cooperation. Further, many other aspects of children's development, such as physical health, should be considered by future work to explain the association between the early parenting context and adolescent well-being.

Finally, we examined only one specific aspect of parenting. Measures of harsh discipline and corporal punishment also have been found to be associated with adjustment (Pettit et al., 2009; Weiss, Dodge, Bates, & Pettit, 1992). Because we did not have a measure of harsh discipline to include in our model we cannot be sure how each distinctly associate with IC and ER. It could be that overcontrolling parents in the current study also used increased corporal punishment and this would have been more strongly associated with self-regulation if measured. It is also unknown how additional aspects such as parental rejection, home chaos, child structure/routine would function in the proposed mediational model. Given the salience of the early parent-child relationship on the development of important self-regulatory abilities in early childhood, future work is needed to examine the intricacies of various aspects of parenting behaviors to see if they are differentially associated with children's developmental pathways.

Conclusions

In conclusion, IC and ER abilities in early childhood may be associated with changes in behaviors and skills associated with well-being from childhood to adolescence. Thus, targeting early childhood as a time to facilitate the development of these regulatory skills is important. In addition, controlling parenting in early childhood may be one predictor of childhood regulatory skills. The significant indirect effects found in the current study suggest that children's self-regulatory skills may be one mechanism that links early controlling parenting and preadolescent adjustment. Although many overprotective parents may be trying to protect their child and shield him/her from harm, these parents may be receptive to parent training to afford their child the opportunity to develop appropriate self-regulatory skills and better overall adjustment by preadolescence.

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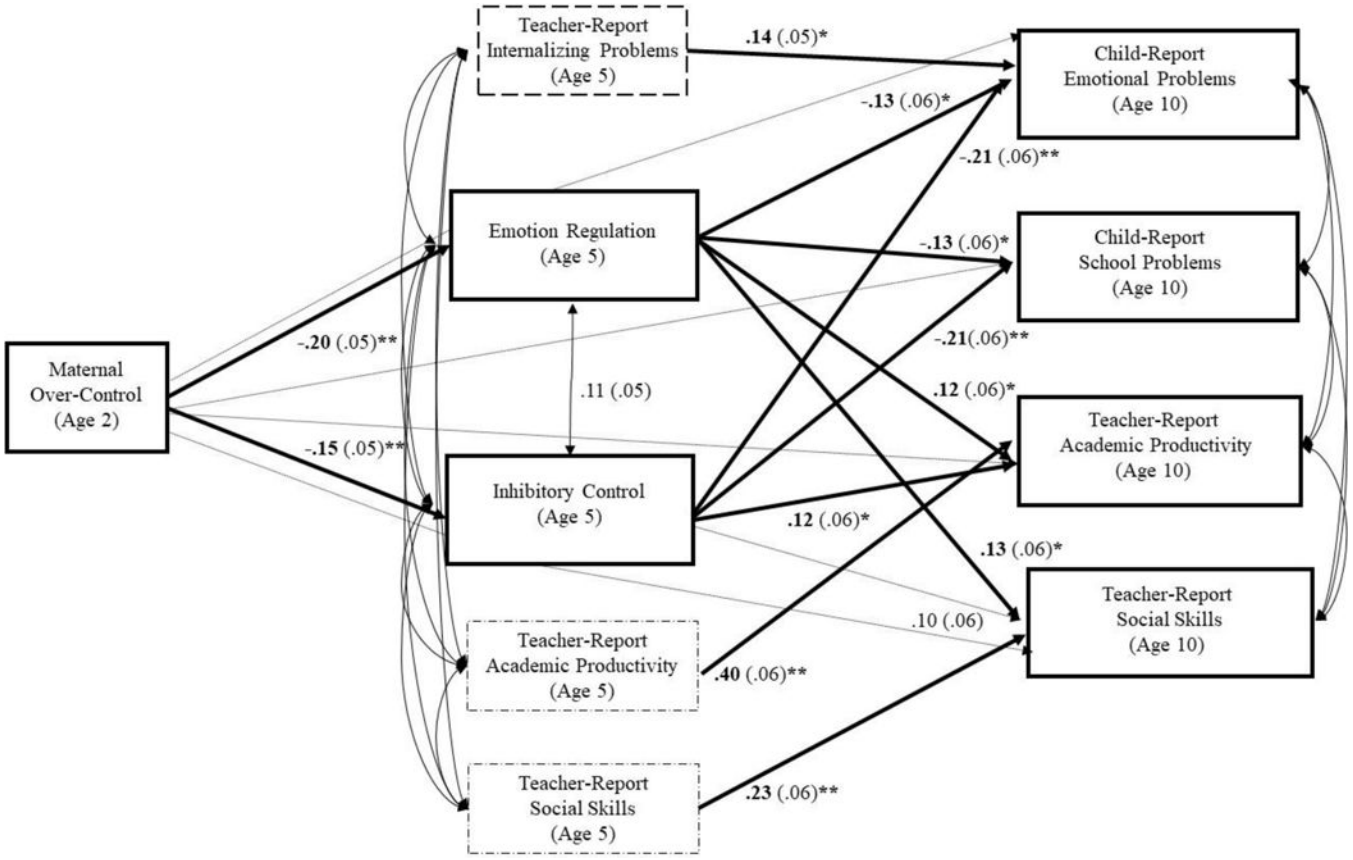

Figure 1. Standardized Model Estimates

Note: Child sex, race, age, 2-yr externalizing behaviors, and SES were used as covariates but are not depicted. Direct effects from maternal overcontrol at age 2 and 10-yr outcomes were also modeled but coefficients are not depicted. No direct effects from maternal overcontrol to any of the 10-yr outcomes were significant. Dashed boxes represent age 5 variables added to the model to control for prior levels of the 10-year outcomes. Significant paths are bolded; * = $p < .05$; ** = $p < .01$. Model Fit: χ^2 (33, $N = 422$) = 54.77 $p = .01$, CFI = .96, TLI = .92, SRMR = .04, RMSEA = .04 [CI = .02, .06].

Table 1

Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Overcontrol (OB) 2yr	–													
2. Emotion regulation (OB) 5yr	−.17**	–												
3. Inhibitory control (OB) 5yr	−.19**	.11	–											
4. Internalizing (TR) 5yr	−.05	−.08	−.07	–										
5. Academic prod (TR) 5yr	−.15*	.16*	.34**	−.43**	–									
6. Social skills (TR) 5yr	−.12	.16*	.29**	−.36**	.70**	–								
7. Emotional prob (CR) 10yr	.12*	−.15*	−.26**	.24**	−.25**	−.17*	–							
8. School prob (CR) 10yr	.05	−.12	−.24**	.19**	−.19**	−.15*	.60**	–						
9. Academic prod (TR) 10yr	−.12*	.16*	.27**	−.26**	.54**	.42**	−.43**	−.34**	–					
10. Social skills (TR) 10yr	−.09	.15*	.16*	−.07	.37**	.37**	−.33**	−.27**	.72**	–				
11. Externalizing (PR) 2yr	.01	−.06	−.11	.18**	−.34**	−.30**	.20**	.20**	−.29**	−.25**	–			
12. Child race	.16**	.02	−.14*	.02	−.06	−.11	.00	−.04	−.04	−.07	.01	–		
13. Child sex	−.08	.12*	.12*	.06	.15*	.18**	.02	−.19**	.11	.17**	−.07	.04	–	
14. SES	−.11	−.10	.24**	−.05	.22**	.11	−.16**	−.17**	.23**	.14*	−.15*	−.18**	−.03	–
Mean	2.41	2.86	42.56	143.39	4.11	1.41	281.66	101.61	4.06	1.44	52.00	N/A	N/A	44.22
Standard deviation	.67	.90	7.37	20.71	.68	.33	41.60	20.29	.75	.34	9.31	N/A	N/A	12.01
N	422	314	324	250	218	257	282	282	260	268	394	422	422	313

Note: OB = observed, CR = child self-report, TR = teacher report, PR = parent report. Note: Child age was also included in the model as a covariate but is not depicted in the table for simplicity; age was not correlated with any of the study variables. Significance levels =

* $p < .05$,

** $p < .01$.

Table 2

Unstandardized Estimates of Indirect Effects, Standard Errors, and 95% Bias-Corrected Bootstrap Confidence Intervals

			Confidence Intervals	
	Estimate	**SE**	**Lower**	**Upper**
OC(2yr) → ER(5yr) → CR Emotional problems (10yr)	**1.65**	**.85**	**.36**	**3.08**
OC(2yr) → ER(5yr) → CR School problems (10yr)	**.77**	**.45**	**.10**	**1.91**
OC(2yr) → ER(5yr) → TR Academic productivity (10yr)	**−.03**	**.02**	**−.07**	**−.003**
OC(2yr) → ER(5yr) → TR Social skills(10yr)	**−.01**	**.01**	**−.03**	**−.003**
OC(2yr) → IC(5yr) → CR Emotional problems (10yr)	**1.83**	**.96**	**.46**	**4.42**
OC(2yr) → IC(5yr) → CR School problems (10yr)	**.91**	**.51**	**.19**	**2.24**
OC(2yr) → IC(5yr) → TR Academic productivity (10yr)	**−.02**	**.01**	**−.05**	**−.001**
OC(2yr) → IC(5yr) → TR Social skills (10yr)	−.01	.01	−.08	.04

Note: OC=Maternal overcontrol; ER= Emotion Regulation; IC= Inhibitory control; CR = Child Report; TR = Teacher Report. Bolded values represent significant indirect effects