

# Child Effortful Control as a Mediator of Parenting Practices on Externalizing Behavior: Evidence for a Sex-Differentiated Pathway across the Transition from Preschool to School

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**Abstract** An explanatory model for children's development of disruptive behavior across the transition from preschool to school was tested. It was hypothesized that child effortful control would mediate the effects of parenting on children's externalizing behavior and that child sex would moderate these relations. Participants were 241 children (123 boys) and their parents and teachers. Three dimensions of parenting, warm responsiveness, induction, and corporal punishment, were assessed via maternal report when children were 3 years old. Child effortful control at age 3 was measured using laboratory tasks and a mother-report questionnaire. Mothers and teachers contributed ratings of child externalizing behavior

at age 6. Results showed that the hypothesized model fit the data well and that the pattern of associations between constructs differed for boys and girls. For boys, parental warm responsiveness and corporal punishment had significant indirect effects on children's externalizing behavior three years later, mediated by child effortful control. Such relations were not observed for girls. These findings support a sex-differentiated pathway to externalizing behavior across the transition from preschool to school.

**Keywords** Corporal punishment · Maternal warmth · Proactive discipline · Effortful control · Externalizing behavior problems · Temperament · Preschool · Sex differences

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Aggressive behavior, noncompliance, and impulsivity are the most commonly observed behavior problems in early childhood (Keenan and Wakschlag 2004). For most preschoolers, heightened levels of disruptive behavior reflect normal struggles in the development of self-regulation and tend to decline with age (Campbell 2002; NICHD ECCRN, 2004). However, for others, these symptoms predict persistent and cascading patterns of maladjustment including peer rejection, conduct problems, and juvenile delinquency (e.g., Broidy et al. 2003; Campbell et al. 2000). Therefore, it is important to explain why and how some young children develop chronic behavior problems whereas others desist and develop normally. Although risk factors that contribute to the development of child disruptive behavior have been identified (e.g., parenting), relatively little is known about the processes that underpin these relations (Hinshaw 2002). In the present study, a mediation model was proposed to understand the

mechanisms through which early parenting practices become associated with later development of children's externalizing behavior. As discussed below, disturbances in a type of child self-regulative temperament, effortful control, have been theorized to mediate this process.

### Child Effortful Control

Early deficits in self-regulation, particularly the child's ability to regulate attention and impulses, have been conceptualized as major contributors to the development of externalizing behavior (Olson et al. 2009; Rothbart and Bates 2006). The construct of effortful control (EC) refers to a temperament-based, higher-order cognitive system underlying the child's ability to organize attention and regulate emotions and behaviors according to immediate and long-term goals (Posner and Rothbart 2000). In prior studies, low levels of EC have shown concurrent and longitudinal associations with relatively high levels of disruptive behavior (e.g., Eisenberg et al. 2005; Hill et al. 2006; Olson et al. 2005).

Consistent with the conceptualization of effortful control as a temperament construct, individual differences in EC have been found to be moderately stable across early and middle childhood (Kochanska et al. 2000). Although child EC has a heritable component, it also reflects variations in the child's caregiving experiences (Olson and Lunkenheimer 2009). Indeed, diverse parental socialization strategies have been linked with individual differences in children's early regulatory capacities (Spinrad et al. 2004). Specifically, parents' responsiveness (Kochanska et al. 2000) and inductive discipline (Lengua et al. 2007) have shown to promote child EC, whereas use of power-assertive discipline has been linked with impaired regulatory skills (Kochanska and Knaack 2003). Furthermore, as discussed below, child effortful control has been shown to mediate the effects of these parenting behaviors on children's behavioral adjustment.

### Explaining Associations Between Parenting Practices, Effortful Control, and Externalizing Behavior

The same dimensions of parental behavior that have been linked with the development of effortful control also have been shown to contribute to children's externalizing problems. For example, high levels of parental warmth and use of inductive discipline strategies such as reasoning and discussing prosocial alternatives have been associated with positive behavioral adjustment (Caspi et al. 2004; Denham et al. 2000). Conversely, parents' frequent use of corporal punishment (e.g., spanking, swatting) has been

associated with elevated levels of child disruptive behavior (e.g., Gershoff 2002). Thus, in separate literatures, child effortful control, disruptive behavior, and quality of parental socialization have shown associations with one another (e.g., Lengua et al. 2007; Olson et al. 2005). However, relatively little is known about *how* early parenting practices and child effortful control temperament contribute to the development of behavioral adjustment across the preschool years. Given that the preschool period is a time when individual differences in children's behavioral adjustment stabilize and predict later functioning (Olson et al. 2009), this issue has important implications for theory and prevention.

In research with school-age children, Eisenberg and her colleagues found that parenting behaviors were linked with disruptive behavior through their effects on children's effortful control skills (Eisenberg et al. 2001; Valiente et al. 2006). Conceptual support for this mediation model was drawn from theoretical arguments linking different parental socialization strategies with children's ability to organize attention and impulses. The quality of children's regulatory abilities, in turn, has been theorized to directly affect expressions of disruptive problem behavior. For example, parental warmth may foster adaptive regulatory skills by increasing children's motivation to attend to parents' messages; in turn, children who internalize appropriate regulatory skills are able to respond adaptively to a wide range of challenging situations (Cunningham et al. 2009; Dix, 1991). Conversely, parents' frequent use of harsh punishment may disrupt the acquisition of adaptive regulatory skills through many possible mechanisms, including stimulation of high levels of negative arousal which interfere with social learning, as well as direct modeling of poor regulatory skills (Bandura and Walters 1959; Hoffman 2000; Power 2004). Children who fail to develop adequate regulatory skills are at high risk for responding to challenging social situations with heightened aggressive and/or impulsive behavior. The model linking parenting with externalizing behavior through its effects on children's effortful control skills has received considerable empirical support with school-age children (Eisenberg et al. 2001; Valiente et al. 2006). However, an important gap in the literature concerns generalization of the model to the early childhood period. In addition, there is a need for clarification of the qualities of adverse parenting that are most strongly associated with the development of poor effortful control skills. As shown above, both low levels of warmth and high levels of corporal punishment have been associated with the development of impaired regulatory skills. Although these qualities of adverse parenting have been found to be intercorrelated, typically they have not been examined simultaneously to determine their unique contributions to children's adjustment

status. Finally, as discussed below, there are reasons to question whether child sex may play a moderating role in the development of associations between child effortful control temperament, parenting, and the development of externalizing behavior.

### Child Sex

Child sex has been identified as a potentially important moderator of relations between early risk factors and children's behavioral adjustment (Keenan and Shaw 2003; NICHD ECCRN, 2004). Sex differences have been documented for all constructs in the proposed mediation model. First, as children mature into the preschool years, boys have been found to show higher levels of disruptive behavior than girls (e.g., Card et al. 2008). Additionally, as early as the toddler period, girls have shown to manifest more advanced effortful control skills compared to boys (Kochanska et al. 1997; Olson et al. 2005). Furthermore, it has been suggested that boys and girls may be exposed to different levels of risky and promotive parental behaviors. For instance, mothers have been observed to be more harsh and controlling (McKee et al. 2008) and less warm (Zhou et al. 2004) with boys than with girls. These combined studies suggest that girls and boys may develop behavioral problems through different pathways.

### The Present Study

In the present study, we examined mechanisms by which parenting practices influenced later disruptive behavior problems, highlighting child effortful control as a mediator and child sex as a moderator of these processes. Although individual differences in effortful control have been found to mediate associations between parenting behavior and children's externalizing problems in school-age children (Eisenberg et al. 2001; Valiente et al. 2006), relatively little is known about these patterns in early childhood, a period that is critical for understanding self-regulatory foundations of children's behavioral adjustment (Posner and Rothbart 2000; Olson et al. 2009) as well as emerging sex differences (Keenan and Shaw 2003). Identifying processes in early childhood that predict children's disruptive behavior at school entry has important implications for theory and prevention. By examining potential explanatory mechanisms in a community sample of preschoolers who varied widely in their initial adjustment levels, and who were followed across a period of rapid developmental change, we hoped to elucidate processes that differentiated normal variations in early self-regulation from those that signaled elevated risk.

## Method

### Participants and Procedures

Participants were 241 children (123 boys) who were part of a longitudinal study on the development of school-age conduct problems (Olson and Sameroff 1997). In order to recruit children with a range of behavioral adjustment levels, two different ads were periodically placed in local and regional newspapers and child care centers, one focusing on hard-to-manage toddlers, and the other on normally developing toddlers. The child's attendance in a formal preschool program was not an absolute requirement for family enrollment. Once a parent indicated interest, a screening questionnaire and brief follow-up telephone interview were used to determine the family's appropriateness for participation and willingness to engage in a longitudinal study. Children with serious chronic health problems, mental retardation, and/or pervasive developmental disorders were excluded. Most families (95%) were recruited from newspaper announcements and advertisements sent to day care centers and preschools; others were individually referred from pediatricians and teachers. At recruitment, children represented the full range of externalizing symptom severity on the Child Behavior Checklist (CBCL/2-3; Achenbach 1992), with oversampling of toddlers in the medium to high range on the Externalizing Problems ( $T > 60 = 44\%$ ). The remaining sample was split relatively evenly between children whose Externalizing Problems T-scores exceeded 50 but were below 60, and those whose T-scores were below 50.

Families were representative of the local population. Most children were of European American heritage (91%); others were African American (5.5%), Hispanic American (2.5%), and Asian American (1%). The majority of children resided in two-parent families (87.9%), with the remaining families identifying themselves as never married (5.3%), living with a partner (3.3%), or separated/divorced (3.3%). Fifty-five percent of mothers worked outside the home. Nineteen percent of mothers and 24% of fathers had completed high school education; 46% of mothers and 34% of fathers had completed four years of college; 35% of mothers and 42% of fathers had continued their education beyond college in graduate or professional training. The median family income was \$52,000 with the range from \$20,000 to over \$100,000. Families had a mean score of 7.58 ( $SD = 1.59$ , range = 2–9) on Hollingshead's (1975) occupational scale, indicating that most parents' occupations fell into the minor professional category.

Data were collected across two time points, at age 3 ( $M = 41.45$ ,  $SD = 2.10$ , range = 32–49 months) and age 6 ( $M = 68.87$ ,  $SD = 3.84$ , range = 60–81 months). Of the 241 families assessed initially, we have retained 210 (88%)

who participated in all aspects of data collection and 96% who have provided partial data. Twenty families moved out of state but continued to provide questionnaire data. Of the 10 families no longer in the study only 2 have refused participation (too busy). The other 8 withdrew due to family or child illness. Attrition was not selective based on our comparisons of major sociodemographic or study characteristics. For this study, only children for whom there was at least one adult report of externalizing behavior at age 6 were included. The reduced sample consisted of 228 participants (120 boys) which did not differ from the full sample in demographic qualities as well as age 3 measures.

At ages 3 and 6, mothers were interviewed at homes by a female social worker. They responded to a set of questions including demographic information and disciplinary strategies. Mothers then completed a packet of questionnaires about their child's temperament and adjustment. Families were paid for their participation. Kindergarten teachers also contributed ratings of children's behavior and were given gift certificates for their participation. Most children (97%) participated in a 3-hour laboratory assessment at age 3. A few children did not participate because of scheduling problems or intense difficulty with parental separation. After rapport-building with children, graduate student examiners administered a series of self-regulatory tasks. Children received small gifts for their participation.

## Measures

**Parenting behaviors at age 3** Parenting behaviors that constituted the latent factors of warm responsiveness, inductive discipline, and corporal punishment were assessed via mother-report. Mothers completed the Parenting Dimensions Inventory (PDI; Power et al. 1992). They rated their personal views or behaviors regarding parenting practices on a 6-point scale (1=*not at all descriptive of me*; 6=*highly descriptive of me*) for items on the subscales that comprised the warm responsiveness factor: Nurturance (e.g., "My child and I have warm intimate moments together";  $\alpha=0.74$ ) and Responsiveness (e.g., "I encourage my child to express his/her opinion";  $\alpha=0.36$ ). The Reasoning ( $\alpha=0.73$ ) and Reminding ( $\alpha=0.66$ ) subscales, which were used to measure a latent construct of inductive discipline, were derived from mothers' responses to five hypothetical situations that frequently occur in childhood (e.g., "After arguing over toys, your child strikes a playmate"). Mothers rated how likely they would be to remind (e.g., "remind your child of the rule or repeat the direction") and reason (e.g., "talk to the child (e.g., discuss alternatives)") in each situation on a 4-point scale (0=*very unlikely to do*; 3=*very likely to do*). Corporal punishment was assessed during the interview using the Harshness of Discipline Scale (Dodge et al. 1994). Mothers reported the

frequency with which each parent had physically punished their child during the last 3 months on a 5-point scale (0=*never*; 4=*several times a day*). Parents' use of physical punishment was relatively low in frequency ( $M=1.06$ ,  $SD=0.87$ , range=0–4 for mother's report of her own use of physical discipline;  $M=0.69$ ,  $SD=0.81$ , range=0–3 for mother's report of the father's use of physical discipline). According to mothers, 58 children had never received physical discipline from either parent in the past 3 months; 16 children were physically punished every day or several times a day by at least one parent. The frequency of physical discipline by each parent was summed ( $\alpha=0.82$ ).

**Effortful control at age 3** During a laboratory visit, children were administered six tasks from Kochanska's toddler-age behavioral battery, in the following order: Turtle and Rabbit, Tower Task, Snack Delay, Whisper Task, Tongue Task, and Lab Gift (Kochanska et al. 1996). Each behavioral task was designed to tap Rothbart's (1989) construct of effortful control (suppressing a dominant response and initiating a subdominant response according to task demands). All tasks were introduced as "games" and children were reminded of the rules midway through each task. To provide a check on accuracy of recording, 15 test administrations were videotaped and independently scored. Reliability was excellent ( $\kappa=0.95$ ). Individual tasks have been described in detail elsewhere (Kochanska et al., 1996; Olson et al. 2005). As recommended by Kochanska et al. (1996), a total score was computed by summing individual subtest scores ( $\alpha=0.70$ ).

Mothers also contributed ratings of their child's effortful control. An abbreviated version of Rothbart's Child Behavior Questionnaire (CBQ; Ahadi et al. 1993) was administered to measure mothers' perceptions of child temperament. Mothers rated items that describe children's responses in given situations within the past 6 months on a 7-point scale (1=*extremely untrue*; 7=*extremely true*). Attentional Focusing ( $\alpha=0.85$ ) and Inhibitory Control ( $\alpha=0.82$ ), the two most theoretically and empirically relevant subscales to the construct of EC (Posner and Rothbart 2000), were used in the analysis. Attentional Focusing assessed the child's ability to concentrate on tasks (e.g., "When drawing or coloring a book, shows strong concentration") and Inhibitory Control assessed the ability to suppress dominant responses according to demands (e.g., "Can wait before entering into new activities if s/he is asked to"). These two subscales and the total score from the lab assessment were used as indicators for the child effortful control latent factor. Although the three manifest variables correlated with one another to varying degrees ( $r=0.17$ – $0.42$ ), they were all included in analysis as they likely reflected variability in child behavior across contexts and informants.



*Externalizing behavior at age 6* Mothers and kindergarten teachers completed the CBCL/6–18 (Achenbach 2001) and the C-TRF/6-18 (Achenbach 2001), respectively. Respondents rated the child on 112 items that described the child’s behavior within the past 6 months on 3-point scales (0=*not true*; 2=*very/often true*). For both the CBCL/6-18 and the C-TRF/6-18, an index of total externalizing problems was created by compositing children’s scores on the Aggressive Behavior, Rule-Breaking Behavior, and Attention Problems subscales. Compared with their status at age 3 years, fewer children were rated relatively high on Externalizing Problems at age 6: 12 children on mother-report and 18 children on teacher-report had scores in the borderline range ( $T \geq 60$ ), and 8 children on mother-report and 5 children on teacher-report had scores in the clinical range ( $T \geq 70$ ). Correlations among Aggressive Behavior, Rule-Breaking Behavior, and Attention Problems subscales ranged from 0.54 to 0.62 (all  $ps < 0.01$ ) on the CBCL and 0.66 to 0.75 (all  $ps < 0.01$ ) on the C-TRF. Mother- and teacher-reports were used as indicators of the externalizing problems latent factor, reflecting a growing consensus that discrepant reports of child adjustment by informants are likely to result from true differences across contexts rather than unreliability of measurement procedures (e.g., Kerr et al. 2007).

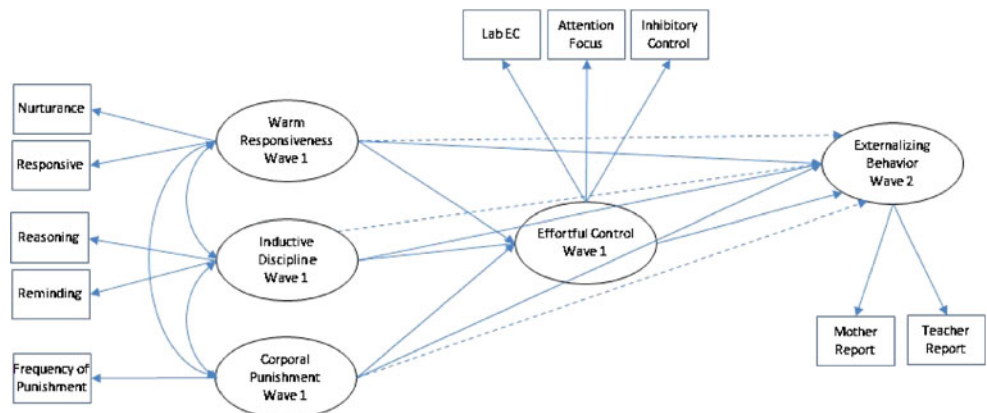
*Maternal education and family income.* Each latent construct in the model was regressed onto maternal education and family income to prevent the results from reflecting any spurious associations. Maternal education was assessed on a 7-point scale (1=*less than seventh grade*; 7=*graduate or professional training*). The average level of maternal education was 6.15 ( $SD = 0.83$ , range=3-7). Family income was rated on a 13-point scale (1=*less than 10,000*; 13=*more than 100,000*). The mean family income was 9.34 ( $SD = 2.96$ , range=2–13) which translates to a little over \$60,000.

Analysis Plan

Following preliminary analyses, substantive research questions were addressed using structural equation models (SEM; Kline 2005). There were multiple reasons for using SEM over a more traditional evaluation of mediation through linear regression. It allows for the use of latent variables created from multiple measures which leads to greater model specificity, such as parceling measurement error from overall model error. We also could examine both direct and indirect pathways between parenting variables through effortful control to externalizing behavior (Bollen 1987). Furthermore, many of the current SEM programs employ estimation techniques that take missing data into account, such as full-information maximum likelihood estimation (FIML; Arbuckle 1996; Enders and Bandalos 2001). For all models in this analysis, Mplus 5.2 with FIML estimation was used (Muthén and Muthén 2007).

The proposed mediation model is presented in Fig. 1. Because our theoretical prediction was that boys and girls would demonstrate different mediational pathways through child effortful control, multiple group analysis was performed through a series of chi-square difference test of a less constrained model and a nested, more constrained model (Kline 2005). If the chi-square difference value was significant, it indicated that restraining the parameter of the nested model to be equal across groups significantly worsened the fit. For all models, multiple fit indices were used to see how well the specified models approximated the observed covariance structure, through comparison with a model in which all constructs are assumed to be unrelated (Bollen 1989). Good-fitting models are traditionally indicated by non-significant chi-squares; however, with larger samples, it is possible to get significant chi-squares even for models that fit the data well. The chi-square ratio ( $\chi^2 / df$ ) provides a better assessment of the chi-square by correcting for sample size with its values between 1 and 3 suggesting

**Fig. 1** Hypothesized mediation model of parenting, effortful control, and externalizing behavior



*Note.* Direct paths are represented by solid lines, indirect paths are represented by dashed lines, and covariances are represented by double-headed curved lines.

acceptable fit. The comparative fit index (CFI; >0.90 for good fit) and the root mean square error of approximation (RMSEA; <0.05 for good fit) are also commonly used (McDonald and Ho 2002).

## Results

### Preliminary Analyses

Descriptive statistics and correlations between all manifest variables are presented in Tables 1 and 2. As originally reported in Olson et al. (2005), 3 year old girls demonstrated more advanced abilities than boys on the behavioral and maternal report measures of child effortful control. Additionally, preschool-age boys were more frequently physically punished than girls. However, there were no significant differences between boys and girls on measures of maternal warmth and inductive discipline. Finally, teachers rated boys more highly than girls on total externalizing problems at age 6 years. Results of *r*-to-*z* transformation tests indicated that the strength of associations between study variables did not differ significantly for boys and girls, despite the appearance of differences (Table 2). Finally, individual variables that constituted latent factors correlated significantly with one another (all  $ps < 0.01$ ) with one exception: the lab measure of EC and mother-report of attention focusing did not show significant association for boys at age 3. Intercorrelations between latent variables in the study are presented in Table 3.

### Multiple Group Analysis

Multiple group analysis was performed to determine whether the proposed mediation model differed for boys

and girls. As the first step, a model with all parameters restrained to be equal for both groups was estimated,  $\chi^2(92) = 147.59$ ,  $\chi^2/df = 1.60$ , CFI = .89, RMSEA = 0.07. In this fully constrained model, warm responsiveness (boys:  $\beta = 0.38$ ; girls:  $\beta = 0.36$ ,  $ps < 0.01$ ) and corporal punishment (boys:  $\beta = -0.26$ ; girls:  $\beta = -0.24$ ,  $ps < 0.05$ ) had significant associations with child effortful control, which in turn predicted externalizing behavior three years later (boys:  $\beta = -0.47$ ; girls:  $\beta = -0.51$ ,  $ps < 0.01$ ). One indirect path from warm responsiveness to age 6 externalizing behavior was significant (boys:  $\beta = -0.18$ ; girls:  $\beta = -0.18$ ,  $ps < 0.05$ ), indicating that this association was mediated by child effortful control. Next, a fully unconstrained model in which all paths were allowed to vary across groups was specified,  $\chi^2(82) = 128.19$ ,  $\chi^2/df = 1.56$ , CFI = 0.91, RMSEA = 0.07. The chi-square difference between the fully constrained model and the fully unconstrained model was 19.40. This value exceeded the significant chi-square difference value of 18.31 for the difference of 10 degrees of freedom between the two models, indicating that freely estimating paths for each group significantly improved the model's fit to the data.

In order to identify which path(s) significantly differed between girls and boys, the fully unconstrained model was used as a baseline to which a more constrained, nested model with one of the parameters equated across the two groups was compared. The path from inductive discipline to externalizing behavior was first constrained as it appeared most similar across the groups (boys:  $\beta = 0.04$ ; girls:  $\beta = -0.03$ ). The chi-square difference test between the resulting model,  $\chi^2(83) = 128.24$ , and the baseline model showed that equating this path did not significantly worsen the model fit. We then proceeded to constrain another path and performed the chi-square difference test between the more restrictive model and the less restrictive model. This procedure was repeated until

**Table 1** Descriptive Statistics by Child Sex

Variable	Male ( <i>N</i> =120)		Female ( <i>N</i> =108)		df	T-test
	Mean	SD	Mean	SD		
W2 Externalizing–Mother	9.96	8.39	8.23	6.77	213	1.65
W2 Externalizing–Teacher	13.20	16.92	6.75	10.51	188	3.19**
W1 Lab Effortful Control	−0.13	0.54	0.17	0.53	219	−4.21***
W1 Attention Focusing	4.61	0.85	4.78	0.85	224	−1.48
W1 Inhibitory Control	4.51	0.74	4.72	0.68	223	−2.23*
W1 Nurturance	5.31	0.58	5.45	0.51	224	−1.85
W1 Responsiveness	5.50	0.53	5.48	0.52	224	0.21
W1 Reasoning	2.03	0.50	1.96	0.42	224	1.11
W1 Reminding of Rules	1.97	0.45	1.97	0.36	224	0.02
W1 Frequency of Punishment	1.96	1.66	1.48	1.40	214	2.26*
W1 Maternal Education	6.13	0.82	6.18	0.85	226	−0.07
W1 Family Income	9.68	2.74	8.97	3.27	221	1.80

W1 Wave 1, W2 Wave 2. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 2** Correlations for Manifest Variables in the Model by Child Sex

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 W2 Ext. (M)	-	0.52**	0.03	0.01	-0.18	0.08	-0.04	-0.02	-0.01	0.15	-0.01	-0.30**
2 W2 Ext. (T)	0.49**	-	-0.15	0.04	-0.15	-0.03	-0.16	-0.09	-0.19	0.24*	-0.26*	-0.19
3 W1 Effortful Cont.	-0.14	-0.19	-	0.33**	0.33**	0.07	0.12	0.13	0.12	-0.19	0.16	0.01
4 W1 Attention Focus	-0.36**	-0.15	0.17	-	0.40**	0.11	0.26**	0.02	0.03	-0.08	0.16	0.02
5 W1 Inhibitory Cont.	-0.42**	-0.28**	0.27**	0.42**	-	0.19	0.32**	0.14	0.14	-0.24*	0.17	0.08
6 W1 Nurture	-0.17	0.11	0.11	0.31**	0.30**	-	0.39**	0.17	0.09	-0.19	0.12	0.03
7 W1 Responsiveness	-0.20*	-0.03	-0.03	0.31**	0.08	0.53**	-	0.12	0.18	-0.25*	0.08	0.07
8 W1 Reasoning	-0.28**	0.15	0.15	0.23*	0.30**	0.33**	0.30**	-	0.81**	-0.28**	0.13	0.16
9 W1 Reminding of R.	-0.17	-0.05	-0.05	0.19*	0.33**	0.32**	0.31**	0.56**	-	-0.36**	0.12	0.20*
10 W1 Freq. of Punish.	0.26**	-0.17	-0.17	-0.21*	-0.34**	-0.17	-0.17	-0.32**	-0.29**	-	-0.27**	-0.23*
11 W1 Maternal Edu.	-0.11	-0.11	0.13	0.22*	0.02	-0.03	0.08	0.05	-0.14	-0.24**	-	0.46**
12 W1 Family Income	-0.14	-0.33**	0.08	0.21*	0.10	0.03	-0.02	-0.03	-0.09	-0.11	0.40**	-

Correlations for boys are on the bottom half and those for girls are on the top half. There were no significant sex differences. W1 Wave 1, W2 Wave 2, Ext. Externalizing Behavior, M Mother-report, T Teacher-report, Effortful cont. Effortful Control; Inhibitory Cont. Inhibitory Control, Reminding of R. Reminding of Rules, Freq. of Punish. Frequency of Punishment, Maternal Edu. Maternal Education

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

we reached the best-fitting model in which equating additional paths significantly worsened the model (i.e., the chi-square difference value exceeded the criteria). This model, presented in Fig. 2, was the one with two parameters unconstrained across boys and girls: the direct path from effortful control to externalizing behavior and the covariance between warm responsiveness and inductive discipline.

As shown in Fig. 2, the pattern of relationships among the latent parenting variables differed by child sex. The association between warm responsiveness and inductive discipline was significant for boys ( $r=0.58, p<0.001$ ) but not for girls ( $r=0.22, ns$ ). Boys and girls did not differ in the magnitude of association between warm responsiveness and corporal punishment or between inductive discipline and corporal punishment. With respect to the structural paths, the direct paths from warm responsiveness to child EC (boys:  $\beta=0.43, p<0.001$ ; girls:  $\beta=0.33, p<0.01$ ), and from corporal punishment to EC (boys:  $\beta= -0.26, p<0.05$ ; girls:  $\beta= -0.22, p<0.05$ ) were significant for both groups. The relationship between inductive discipline and EC were not significant for either sex. There were no significant direct relationships between parenting and externalizing behavior for both groups. Finally, the path from child effortful control to externalizing behavior was negative and significant for boys only ( $\beta= -0.76, p<0.001$ ). Additionally, boys and girls showed different indirect pathways from the parenting predictors to externalizing behavior through the mediator of effortful control. For boys, there were significant indirect effects of warm responsiveness ( $\beta= -0.33, p<0.05, 95\%$  bootstrapped CI  $[-0.73, 0.08]$ ), and corporal punishment ( $\beta=0.19, p<0.05, 95\%$  bootstrapped CI  $[-0.07, 0.46]$ ), on child externalizing behavior, mediated by child EC. In contrast, no indirect effects were evident for girls. Lastly, the proportions of variance in effortful control (boys:  $r^2=0.43$ ; girls:  $r^2=0.28$ ) and externalizing behavior (boys:  $r^2=0.62$ ; girls:  $r^2=0.23$ ) that were explained by the model differed across the groups.<sup>1</sup>

<sup>1</sup> Additional models were estimated to examine if results differed by method and informant. As 38 children did not have teacher-report of externalizing behavior at age 6, the model with mother-report of externalizing behavior only was compared with the model with both mother- and teacher-report. Despite slight differences in the coefficients, the pattern of results was the same for both models. Next, the models with the latent construct of EC assessed differently were compared (mother-report only vs. lab assessment only). The association between EC and externalizing behavior was weaker for lab EC ( $\beta= -0.14, p<0.10$ ) than mother-report EC ( $\beta= -0.79, p<0.001$ ). The pattern of relationship between parenting and EC also differed. Warm responsiveness predicted mother-report EC ( $\beta= 0.48, p<0.001$ ) whereas corporal punishment predicted lab EC ( $\beta= -0.24, p<0.05$ ). The findings imply that different measures of EC may be associated with different predictors and outcomes. However, because the manifest variables were generally good indicators of the specified latent construct (all factor loadings  $> 0.40$ ), the multi-method, multi-informant model was retained with a focus on common variance across measures.

**Table 3** Correlations for Latent Variables in the Model by Child Sex

Variable	1	2	3	4	5
1 W2 Externalizing Behavior	–	–0.33*	–0.03	–0.11	0.28*
2 W1 Child Effortful Control	–0.72***	–	0.50**	0.18	–0.30*
3 W1 Warm Responsiveness	–0.34**	0.44**	–	0.25	–0.37**
4 W1 Inductive Discipline	–0.35**	0.52***	0.58***	–	–0.41***
5 W1 Corporal Punishment	0.41***	–0.52***	–0.26*	–0.46***	–

Correlations for boys are on the bottom half and those for girls are on the top half. *W1* Wave 1, *W2* Wave 2. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

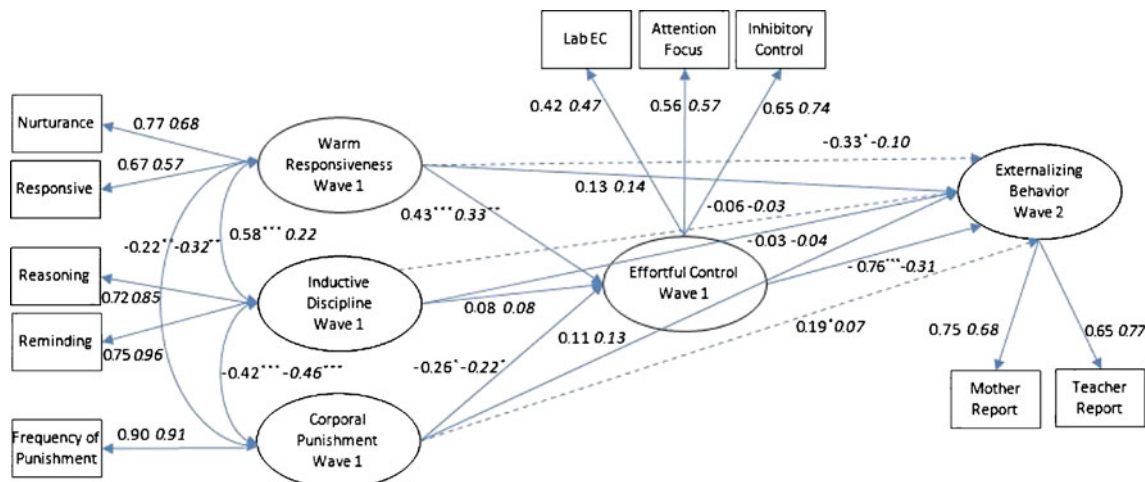
**Discussion**

Our primary goal was to examine processes through which parenting practices become associated with children’s externalizing problems across the transition from preschool to school. It was hypothesized that relations between adverse parenting and child behavior problems would be mediated by child effortful control and moderated by child sex. Multiple group SEM analyses revealed that the proposed mediation model explained boys’ but not girls’ adjustment outcomes across the transition from preschool to school. Significant indirect paths from parenting variables to boys’ disruptive behavior indicated that low levels of warm responsiveness and frequent corporal punishment predicted relatively high levels of externalizing behavior, a process mediated by deficits in child effortful control. These findings converged with a large body of research showing aversive effects of frequent and harsh corporal punishment on children’s behavioral adjustment (e.g., Gershoff 2002; Mulvaney and Mebert 2007), although the field is not without controversies on this topic (Larzelere and Kuhn 2005).

Contrary to expectation, maternal use of positive discipline (i.e., induction) did not show significant associ-

ations with either child effortful control or externalizing behavior for boys. Given that positive and negative forms of discipline were considered simultaneously, it is plausible that the effects of the latter may have overridden those of the former. However, these results contradicted a recent study showing that positive parenting uniquely contributed to child outcomes even after controlling for the effects of negative parenting (e.g., Gardner et al. 2007). This inconsistency may in part reflect inter-sample differences in levels of sociodemographic and family risk. For example, in our predominantly middle-class sample, extreme variations in parenting behavior were relatively rare. Greater variability in adverse parenting behavior may be found in high-risk samples.

Confirming our hypothesis that child sex would moderate associations between early effortful control temperament, disruptive behavior and parenting, a different predictive pattern was found for girls. As with boys, relatively low levels of warm responsiveness and frequent corporal punishment were significantly associated with low levels of child effortful control in girls. However, effortful control temperament was not a significant mediator in channeling the effects of parenting on girls’ problem behavior. In fact, the direct path from child EC to later



*Note.* All variables are controlled for maternal education and family income. Parameters in italics are for girls. For all factor loadings,  $p < .001$ . Standardized coefficients are presented.  $\chi^2(90) = 132.12, \chi^2/df = 1.47, CFI = .92, RMSEA = .06$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

**Fig. 2** Multiple group analysis of direct and indirect effects of the mediation model by child sex



disruptive behavior was not significant for girls. These findings were inconsistent with our earlier study showing significant *concurrent* links between early regulatory abilities and externalizing behavior for both sexes (Olson et al. 2005). Affirming Keenan and Shaw's (1997) hypothesis, our results suggested that complex patterns of behavioral adjustment may become increasingly sex-differentiated across the transition from preschool to school entry. Indeed, according to teachers, at school entry girls showed lower levels of and less variability in externalizing behavior than boys. Furthermore, our findings supported prior research suggesting that girls and boys may differ in the antecedents, pathways, and mechanisms involved in the development of externalizing problems (e.g., Zahn-Waxler et al. 2006). Girls' disruptive behavior appears to develop through mechanisms other than the mediation process examined in this study. In addition, it is plausible that deficits in regulatory abilities may lead to different types of adverse outcomes for boys and girls. For example, the construct of relational aggression has been proposed as the most salient form of aggression for girls (Crick and Zahn-Waxler 2003). Thus, expanding our model to include relational aggression may contribute to a better understanding of pathways to behavior problems for both sexes.

#### Limitations and Future Directions

Our study had limitations that may affect the generalizability of findings to other groups of children and families. First, participants were primarily from two-parent, middle class families. Thus, our findings may not generalize to children in other family constellations or to those whose families are experiencing severe economic hardship. Additionally, most children were of European American heritage, potentially limiting the generalizability of the findings to more racially and ethnically diverse groups. There is evidence that the effects of parenting on children's adjustment may vary across race and ethnicity (e.g., Deater-Deckard and Dodge 1997). Finally, despite our recruitment of children at high-risk for disruptive behavior, few children had externalizing problem scores in the clinical range. As a result, our findings may not be generalizable to clinically referred samples of young children.

We also wish to note several methodological issues. Although children's effortful control and behavioral outcomes were assessed using multiple measures that spanned different settings, parenting behaviors were solely evaluated using maternal report. Incorporating other sources of information, particularly observational data and fathers' reports, may provide a more detailed and comprehensive understanding of parents' early contributions to children's disruptive behavior. Additionally, although the use of multiple measures of child effortful control was a strength

of our study (e.g., Kagan et al. 2002), maternal reports of EC carried more weight as a predictor of child externalizing behavior than did the behavioral index. In further studies, it may be desirable to examine the possibility of differentially weighting separate components of complex composite measures.

Finally, our mediation model was based on theoretical evidence that supported the direction of effects from parenting behavior to child regulatory abilities. However, it is clear that impulsive, disruptive child behavior elicits upper limit controls and negative affect from parents (Sameroff 2009). In fact, evidence has supported a conceptualization of the early development of disruptive behavior as reflecting reciprocal relations between child and parent behaviors (e.g., Combs-Ronto et al. 2009; Scaramella and Leve 2004). Thus, we caution that our findings should not be used to draw causal inferences concerning the directionality of parent-child influences.

#### Conclusions

The current study extended prior research by testing a mediation model explaining mechanisms through which early adverse parenting predicted children's later disruptive behavior. Our findings supported a sex-differentiated pathway to externalizing behavior across the transition from preschool to school entry. The findings for boys were consistent with the proposed mediation model wherein low warm responsiveness and frequent corporal punishment predicted increased child externalizing behavior three years later through deficits in child regulatory abilities. Incorporating multiple dimensions of parenting behavior allowed us to evaluate their independent contributions to children's adjustment in the context of co-occurring parenting behaviors. An expanded model examining intrachild contributions beyond effortful control will be necessary to explain girls' pathways to school-age behavior problems. The preschool period has been considered as a critical window for prevention of later behavior problems (Connell et al. 2008). Our findings suggest that resources should be invested in promoting parental behaviors that facilitate early regulatory competencies that protect children from developing disruptive behaviors across the transition from preschool to school.

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