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## Relations Among Positive Parenting, Children's Effortful Control, and Externalizing Problems: A Three-Wave Longitudinal Study

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### Abstract

In a 3-wave longitudinal study (with assessments 2 years apart) involving 186 early adolescents (*M* ages of approximately 9.3, 11.4, and 13.4), the hypothesis that parental warmth/positive expressivity predicts children's effortful control (EC) (a temperamental characteristic contributing to emotion regulation) 2 years later, which in turn predicts low levels of externalizing problems another 2 years later, was examined. The hypothesis that children's EC predicts parenting over time was also examined. Parents were observed interacting with their children; parents and teachers reported children's EC and externalizing problems; and children's persistence was assessed behaviorally. Children's EC mediated the relation between positive parenting and low levels of externalizing problems (whereas there was no evidence that children's EC predicted parenting).

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The development of externalizing problems has been linked to both heredity and environmental factors (Dodge, Coie, & Lynam, in press). In regard to the latter set of influences, one of the more consistent findings is that parental warmth and support are associated with relatively low levels of children's externalizing problems (Caspi et al., 2004; Rothbaum & Weisz, 1994; see Dodge et al., in press). Similarly, parental expressions of positive emotions in the home and in children's presence (albeit not necessarily directed at the child) have been related to low levels of externalizing problems (Eisenberg et al., 2001b; see Halberstadt, Crisp, & Eaton, 1999).

Some investigators (Eisenberg, Cumberland, & Spinrad, 1998; Gottman, Katz, & Hooven, 1997) have suggested that one reason for the association between parental warmth/positive expressivity and children's externalizing behavior is through its effects on children's emotion-related regulation, which includes the modulation of emotion-related physiological responses, motivational states, felt experience, and associated behaviors. According to this view, warm, positive parents rear better-regulated children, who are, in turn, less likely to experience anger or frustration or display externalizing problems such as aggression that stem from these emotional responses.

Effortful control (EC), an aspect of temperament defined as "the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors," is believed to play a fundamental role in the regulation of emotion (Rothbart & Bates, in press) and often is used as an index of this capacity (Eisenberg, Fabes, Guthrie, & Reiser, 2000). EC includes the abilities to voluntarily focus and shift attention and to inhibit or initiate behavior—processes used to modulate both internal emotion-related experience and the overt expression of emotion. The purpose of this study was to

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This study is part of a longitudinal study. Several papers have been published on the first two assessments (see Eisenberg 1996, 2000).

examine the hypothesis that EC mediates the relation between parental positive expressivity and children's externalizing problems using a prospective 3-wave longitudinal design in which parenting, children's EC, and children's externalizing problems were assessed at three time points (with 2-year intervals).

Although EC is believed to have a temperamental, and hence, partly genetic and constitutional basis, most theorists believe that EC, and emotion regulation more generally, are shaped by experience in the social world, including interactions with parents (Campos, Campos, & Barrett, 1989; Gottman et al., 1997; Rothbart & Bates, in press). Consistent with this view, Goldsmith, Buss, and Lemery (1997) found that the environment contributed the majority of the variance in three 8-year-old twins' EC.

Warm, supportive parenting, in contrast to harsh parenting, is likely to foster EC, and hence broader emotion-related self-regulation, in multiple ways. Hoffman (2000) has argued that parents' hostile or punitive negative expressivity is likely to produce affective overarousal in their children, which could undercut regulation and learning in the specific context. When children are overaroused, they are likely to have difficulties focusing and/or shifting their attention as needed, and their developing attentional and behavioral self-regulation skills may be compromised. For example, negatively aroused children are less likely to take advantage of parental attempts to scaffold their emerging attentional and behavioral regulatory skills (e.g., through joint attention in the early years; Raver & Leadbeater, 1995). Similarly, parental negativity is likely to elicit negative emotions in children, and as Blair (2002, p. 119) has argued, "young children characterized by negative emotionality are likely to experience difficulty in the application of higher order cognitive processes simply because their emotional responses do not call for reflective planning and problem solving, and these skills are underused and consequently under-developed" (also see Raver, 1996). In contrast, when parents are warm and supportive, children are unlikely to be overaroused and are better able to respond to parental efforts to focus their attention and guide their behavior. This view is consistent with Vygotsky's (1978) view that cognitive skills are socially constructed through interactions with supportive, responsive adults.

Secondly, consistent with the arguments of Dix (1991) and Grusec and Goodnow (1994), children are likely to be more disposed to process their parents' messages, internalize parents' requests for desirable behavior (e.g., inhibiting undesirable behavior and paying attention), and control their emotions and behaviors when their parents are positive and supportive rather than negative. Thus, they may be more *motivated*, as well as better able, to attend to and learn from interactions with, and scaffolding provided by, warm parents. Moreover, warm, positive parents are likely to evoke positive emotion in their children. Because positive mood promotes creativity and flexibility in thinking and problem solving (Fredrickson, 2001; Isen & Daubman, 1984; Isen, Daubman, & Nowicki, 1987), it is likely to foster EC (which is viewed as flexible in its use and as involving higher order cognitive abilities) and active attempts to regulate. In addition, because positive affect facilitates the processing of self-relevant information (Trope & Pomerantz, 1998) and broadens attention (Derryberry & Tucker, 1994; Fredrickson, 2001), positive affect induced by positive parents may enhance children's capacity to modulate their own behavior and affect.

In addition, parents who express relatively high levels of positive emotion and are supportive are likely to model constructive ways to manage stress and relationships, including the regulation of emotional responses to stress (Power, 2004) and inappropriate behavior (Halberstadt et al., 1999). Moreover, they may facilitate children's regulation by promoting the predictability of the environment (Brody & Ge, 2001) and by protecting children from exposure to potentially stressful events (Power, 2004).

Parents' warmth and positive expressivity may also be linked to children's regulation and externalizing behavior because of its effects on the quality of the parent-child relationship. Parental warmth and positive expressivity have been linked to a secure attachment (Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000), and this security is believed to foster regulated behavior (Cummings & Davies, 1996), in part because the child has greater psychological resources for dealing with negative emotions and events. In addition, children with more secure attachments are likely to be better at understanding others' emotions (e.g., Laible & Thompson, 1998, 2002), are less prone to negative emotion than insecurely attached children (Kochanska, 2001), and are relatively mature in the development of conscience (Laible & Thompson, 2002), all of which could result in greater EC of behavior and lower levels of antisocial behavior.

There is some initial evidence consistent with the suggestion that children's regulation (including EC) at least partially mediates the relation of parental emotional expressivity in the family to children's adjustment. Researchers have found an association between maternal responsivity to infants' emotional cues and infants' use of self-regulatory behaviors (Cohn & Tronick, 1983; Gable & Isabella, 1992), mothers' reported positive expressivity in the family and higher levels of toddlers' self-soothing behavior (Garner, 1995), and maternal acceptance/support and children's successful coping (Hardy, Power, & Jaedicke, 1993; Kliewer, Fearnow, & Miller, 1996) or self-regulation (Brody & Ge, 2001). Moreover, parents who are accepting of children's emotions and are supportive in regard to encouraging them to talk about emotions tend to rear children who are relatively able to modulate their internal arousal and down-regulate as required (Gottman et al., 1997). Furthermore, a composite index of adult-reported and observed regulation has been related to parents' positive expression of emotion in the family and with their child (Eisenberg, Gershoff, et al., 2001, Eisenberg, Valiente, et al., 2003).

Also consistent with the mediation hypothesis (i.e., parenting → children's EC → children's externalizing problems), investigators frequently have found that better regulated children (including those higher in EC) are better adjusted than their less regulated peers (e.g., Eisenberg, Cumberland, et al., 2001; Kochanska & Knaack, 2003; NICHD, 2003; see Rothbart & Bates, in press). Children who can modulate their negative emotions and inhibit the behaviors associated with those emotions would be expected to be less emotionally aroused and more appropriate in their expression of negative emotions, as well as more likely to comply with adults' expectations.

Only a few investigators have explicitly examined regulation as a mediator between parental warmth or positive expressivity and children's adjustment. Brody and Ge (2001) assessed parental nurturance/support versus negativity and found that supportive parenting predicted children's self-control at two points in time; children's self-control, in turn, was negatively related to children's problems with adjustment (hostility, depression, and low self-esteem). The data did not support the possibility that children's self-regulation predicted later parenting. Although not assessing family expressivity per se, Gottman et al. (1997) found that parents who were supportive in regard to encouraging the appropriate expression of emotion and coaching children about their emotions had children who were relatively high in regulation and, in turn, low in aggression. Gottman et al. did not, however, find a relation between children's regulation and parental scaffolding/praising (at least when other variables were controlled in a structural model). Although the NICHD Childcare Network (2003) found that impulsivity (errors of commission on a reaction test) mediated the relation of family environment (including quality of the home environment, maternal sensitivity, and maternal cognitive stimulation) to externalizing problems, they did not find support for sustained attention (low levels of errors of omission, which likely tap regulation) as a mediator (although they were significantly correlated with low levels of externalizing problems). Eisenberg et al.

(Eisenberg, Gershoff, et al., 2001, Eisenberg, Valiente, et al. 2003), using both concurrent data and data from two time points that were 2 years apart, found a pattern of results consistent with the hypothesis that children's EC mediated the negative relation between parental positive expressivity (with the child and in the family) and children's externalizing problems. However, in the second assessment, those findings were nonsignificant when controlling for prior levels of the variables in structural equation modeling and were significant only in regression analyses (when controlling for initial levels of externalizing problems). Moreover, this analysis involved only two time points, so some variables in the mediational sequence were assessed concurrently, and thus the estimation of mediated effect may be biased (Cole & Maxwell, 2003).

Brody and Ge's (2001) study was the only study that we located in which two of the three variables (parenting and regulation, but not adjustment) were assessed at three different times (1 year apart). However, in this study, indicators of adjustment included depression, low self-esteem, and hostility or indices of alcohol use, not externalizing problems, and initial levels of adjustment were not controlled in the analyses. It is possible that findings vary for different indices of adjustment; indeed, EC seems to be more strongly related to low levels of externalizing problems than internalizing problems (Eisenberg, Cumberland, et al., 2001). Moreover, bidirectional, across-time relations between parenting and children's regulation were not tested simultaneously. Cole and Maxwell (2003) suggested that the optimal way to test mediation is to use at least three points in time and to include omitted paths (e.g., the child-driven paths in a socialization model) in one version of the model. In addition, the participants in the Brody and Ge study were in early adolescence; we know of no study assessing bidirectional relations (across time) among parents' warmth/positivity, children's regulation, and children externalizing problems in younger children. It is possible that regulation is a more important mediator of parenting in adolescence than in middle childhood because of heightened negative conflict between parent and children in adolescence (Collins & Steinberg, in press) and/or because of the emergence of externalizing problems in adolescence for some youth (see Dodge et al., in press). Alternatively, because EC develops at a relatively fast pace in the earlier years and is fairly well established by age 4 (Posner & Rothbart, 1998), parental effects on regulation may be relatively stable by age 5. Moreover, parents' positivity may have a stronger influence on children's regulation at a younger than at an older school age because of a decline of interactions between parent and child with age.

In the present study, we examined whether children's emotion-related regulation mediated the relation between parental warmth/positive expressivity and externalizing problems using three points in time, each two years apart. The sample in this study was different from the sample used in two prior tests of the relation of parental positive expressivity to children's regulation and adjustment (Eisenberg, Gershoff, et al., 2001, Eisenberg, Valiente, et al., 2003). We hoped to replicate the relations of parental positive expressivity to EC and adjustment obtained with that sample, but using both an older and more normative sample than the at-risk sample (for externalizing and internalizing problems) in the other studies and 3 waves of data (rather than concurrent or 2-wave data). It is quite possible that parental warmth/positive expressivity has effects on children's EC and social functioning in the preschool and elementary school years, but not in adolescence (e.g., because of habituating to the level of these variables or because of the heightened importance of other influences such as peers). Alternatively, the influence of parental warmth/positive expressivity on adolescents' regulation and adjustment may be because of either the consistency of its effects on youth at younger ages or the continuing (as well as past) influence of this aspect of parenting on adolescents' regulation and adjustment.

We examined not only the hypothesized role of regulation as a mediator of the relation between parenting and externalizing behavior, but also if regulation predicted parenting across time. We expected positive parenting to predict higher regulation; we also thought that regulation

might predict positive parenting across time (as it has for punitive parenting; Eisenberg et al., 1999). We expected to obtain these relations despite considerable stability in each of the three major constructs (i.e., parenting, regulation, and externalizing problems) over time. Such a pattern of relations would suggest that associations among these variables are not thoroughly established in early childhood. Although we recognize that even structural equation modeling cannot prove causality, it can be used to test the plausibility of causal associations, especially when the data are longitudinal and when the key variables are tested at three or more time points.

Finally, we examined whether children's sex, age, and family socioeconomic status (SES) moderated the pattern of relations. The direct relation of family or parental expressiveness to child outcomes often varies with the sex of the child and the dependent measure (e.g., Boyum & Parke, 1995). However, sex did not moderate the pattern of relations in previous studies (Eisenberg, Gershoff, et al., 2001, Eisenberg, Valiente, 2003) and parental positivity is expected to foster regulation for both sexes.

Although EC increases in the school years (Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999), we did not expect the relations of interest to vary in strength for children varying only a few years in age (tests of moderation by age assess differences in patterns because of the age of the child at a given assessment, not across assessments), and no moderation was found for children in early elementary school in another study of parental expressivity, children's regulation, and children's adjustment (Eisenberg, Gershoff, et al., 2001, Eisenberg, Valiente, et al., 2003). Finally, SES was examined as a moderator. SES was not expected to affect the pattern of relations between the parenting and child variables because relations among socialization, children's regulation, and their adjustment in lower SES samples often have been similar to those found in higher SES samples (Raver, 2002). Nonetheless, relations of parenting to regulation occasionally have been found to be stronger in more disadvantaged populations, particularly in studies of young children (see Dodge et al., in press; Raver, 2004), and relations between parenting and externalizing problems sometimes vary across SES or racial groups (Dodge et al., in press).

## Methods

### Participants

Participants were from an ongoing study of emotional and social development (Eisenberg et al., 1996, Eisenberg, Losoya, et al., 2001; Zhou et al., 2002). At Time 1 (T1), 199 children (49% girls, age range = 64 – 125 months, mean age = 89.5 months,  $SD = 13.9$ ) and their parents recruited from four public schools participated in a laboratory visit. Seventy-nine percent of the T1 sample were European American, 4% were African American, 10% were Hispanic American, .5% were Asian American, 2% were American Indian, and 4.5% were classified as other. The participants were mostly from working and middle-class families (mean family income at T1 = \$46,000,  $SD = \$24,000$ , mean years of education = 14.60 and 14.99 for mothers and fathers, respectively,  $SDs = 2.00$  and  $2.55$ ). Of those who participated in the T1 study, 169 were assessed 2 years later (T2), 169 participated 4 years later (T3), and 159 had data from parent reports, teacher reports and/or laboratory assessments 6 years later (T4; and another 7 had only very limited data from fathers).

The present study used data from T2 to T4; relevant measures of parenting were not available at T1. The sample used included 186 participants (51% girls) who had data from at least 1 of the 3 waves (T2, T3, and T4; we continue to use these designations rather than labeling the three assessments as T1, T2, and T3 to be consistent with terminology in prior articles). Sample characteristics at T2 and T3 were reported elsewhere (Eisenberg, Losoya, et al., 2001; Zhou, et al., 2002). The children's mean age at T4 was 13.4 years (range = 11.3–16.4 years,  $SD =$



1.2). At T4, the sample was 78% European American, 13% Hispanic, 3% American Indian, 2% Asian American, .5% African American, and 2% others; 72% lived in two-parent households. At T4, 88.4% of mothers and 85.4% of fathers had at least some college education. Family yearly income was coded into 1 of 6 levels: 1 = “less than \$20,000” (6.0%), 2 = “\$20,000–\$40,000” (13.3%), 3 = “\$40,000–\$60,000” (28.0%), 4 = “\$60,000–\$80,000” (20.7%), 5 = “\$80,000–\$100,000” (17.3%), and 6 = “more than \$100,000” (13.3%).

We compared the individuals who dropped out after the T1 assessment with those who were included in the current sample on the demographic variables, as well as on the other variables used in this study that were also available at T1 (i.e., parents’ and teachers’ reports of children’s attention focusing and shifting and externalizing problems, and children’s persistence on puzzle box task). Families who attrited from T1 assessment and were not involved in any subsequent assessment ( $N = 13$ ), as compared with those who were included in the current sample, had a higher proportion of African Americans, Pearson  $\chi^2(5) = 43.21, p < .001$ , and lower maternal and paternal education and family income,  $t_s(195, 180, 186) = 2.58, 2.61, \text{ and } 2.53, p_s = .012, .011, \text{ and } .013$ . Children who attrited were rated as higher in externalizing problems by teachers and were less persistent on the puzzle box task at T1 than those in the current sample,  $t_s(197, 196) = -2.18 \text{ and } 2.01, p_s < .032 \text{ and } .047$ . Thus, attrition may have introduced some bias into the sample.

## Procedures

At each wave, the primary caregiving parent and child came to the laboratory (155 at T2, 152 at T3, and 140 at T4); all but 9 at T2, 14 at T3, and 15 at T4 were mothers. For families that moved out of town after T1 and a few other families that could not come in, and parent and child questionnaire data were collected through mail ( $N_s = 16, 17, \text{ and } 22$  at T2, T3, and T3, respectively). Parents completed several questionnaires assessing children’s EC and externalizing problems. Children participated in a behavioral task designed primarily to measure EC (the puzzle box task at T2 and T3, and the origami task at T4). Moreover, the parent and child participated in one of the two interactive tasks (the parent–child watching emotion-evocative slides at T2 and T3; and the parent–adolescent origami task at T4). Of the parents who filled out the questionnaires ( $N_s = 165, 167, \text{ and } 157$  at T2, T3, and T4, respectively), all but 9 at T2, 10 at T3, and 6 at T4 were mothers. Parents, children, and teachers provided written consent and were paid for participation. At each wave, teachers completed similar measures of children’s EC and externalizing problems after the lab session, near the end of the semester (the return rates were 95%, 91%, and 93% at T2, T3, and T4, respectively).

## Measures

### Parental Warmth and Positive Expressivity

**Parental positive expressivity and warmth during the slide interactions (T2 and T3):** The child and the primary caregiving parent viewed a series of eight slides (using a procedure similar to Buck, Losow, Murphy, & Costanzo, 1992), including four pleasant and four unpleasant slides. Details regarding this task were reported in Eisenberg, Losoya, et al. (2001), and Zhou et al. (2002). Parents were told to look at each slide and to explain to the child what was happening in it (for up to 45 s). Parents’ positive facial expressivity was operationalized as the intensity of the parent’s facial emotional responses when viewing the slides with the child, but not talking with the child. Only parents’ positive facial expressivity when viewing the four pleasant slides was used. As in procedures used by Buck et al. (1992) to assess encoding of emotion, undergraduates (8 at T2 and 6 at T3) used a 9-point scale (ranging from *unpleasant* [from 1 to 3] to *neutral* [4–6] to *pleasant* [7–9]) to indicate how they thought each slide made the parent feel. Parents’ facial reactions to the slides during the first 8 s of the procedure or until the parent turned from the slide to the child were rated (after this

time, parents were likely to be interacting with their children). Therefore, these scores reflected positive versus negative facial expressivity in view of, but not directed toward, the child and likely reflected, in part, the emotional atmosphere that the parent wished to maintain. The volume was turned off during coding to keep the observers naïve to the content of the slides. Ratings across raters and across the four pleasant slides were averaged to create the composite for parental positive expressivity to pleasant slides. Another seven observers at T2 and six at T3 coded the parents' facial reactions for reliability. The interrater reliabilities ( $r_s$ ) between the two groups of coders (based on coding all participants) were .83 at T2 and .92 at T3.

At both T2 and T3, parents' overall warmth directed at the child (i.e., the degree of smiling, laughing, positive voice of tone, and verbal and physical affection) during the parent-child slide discussion (not when the parent was initially viewing the slide) also was rated by a coder who had no other part in the study. The rater viewed the videotape of all eight slides and then made one global rating on a 7-point scale (1 = *very low warm* to 7 = *very high warm*). A reliability coder coded 26% of the data at T2 and 19% at T3 (interrater  $r_s$  = .86 and .89 at T2 and T3, respectively). The above measures of parental positive expressivity/warmth were moderately, positively correlated within time ( $r_s$  = .40 and .50 at T2 and T3, respectively) (Eisenberg et al., 2001c, 2003b).

**Parental positive expressivity and warmth during the origami puzzle interaction (T4):**

At T4, the adolescent and the parent were asked to complete an origami task following guidelines in an instruction sheet. Parents were told that they could help their children as much or as little as they wanted on the task. Adolescents were told that they would receive points toward a prize if they completed this task in the allotted time (4½ min).

The interaction was videotaped and coded by two graduate students for parental global warmth and positive expressivity. Parental warmth was rated on a 7-point scale from a low to a very high degree of warmth. Warmth included displays of closeness, friendliness, encouragement, and positive affect (smiling and laughing). In addition, warmth reflected the degree of physical affection and quality of the conversation. The interrater reliability, computed with a correlation for 48 participants, was .71. In addition, intensity and duration of parents' positive expressivity (smiling and laughing) was rated every 30 s on a 5-point scale (from 1 = *no positive affect* to 5 = *smiling and laughing for a majority of the time*). A composite score was constructed by averaging the scores for positive affect during each 30 s (interrater reliability  $r$  for 49 participants = .74).

**Children's EC**—At each wave, children's EC was assessed with the inhibitory control, attention shifting, and attention focusing subscales of the Child Behavioral Questionnaire (Rothbart, Ahadi, & Hershey, 1994; Rothbart, Ahadi, Hershey, & Fisher, 2001) and with a behavioral measure. Parents and teachers rated each item on a 7-point scale (1 = *extremely untrue of my/this child*; 7 = *extremely true of my/this child*). The inhibitory control subscale consisted of 13 items assessing the child's ability to regulate his or her behavior (e.g., "Can lower his/her voice when asked to do so"). Four items from the teacher-reported inhibitory control subscale (i.e., "Is good at games like "Simon Says", "Mother, May I," and "Red Light, Green Light", "Prepares for trips and outings by planning things s/he will need", "Approaches places s/he has been told are dangerous slowly and cautiously," and "Is not very careful and cautious in crossing streets and other potentially dangerous situations") were dropped because more than 25% of the teachers at T2, 30% at T3, and 50% at T4 failed to respond to these items. The  $\alpha$ s for the final 9-item teacher-reported inhibitory control scale at T2, T3, and T4 were .90, .90, and .82, respectively; the  $\alpha$ s for the 13-item parent-reported scale were .81, .86, and .85.

The attention shifting subscale consisted of 10 items assessing children's ability to move attention from one activity to the next (e.g., "Has an easy time leaving play to come inside for school work");  $\alpha$ s for teachers' and parents' reports = .87 and .78 for T2, .88 and .83 for T3, and .83 and .78 for T4, respectively. The attention focusing subscale included 11 items assessing the ability to concentrate on a task when needed (e.g., "When drawing or reading a book, shows strong concentration");  $\alpha$ s for teachers' and parents' reports = .89 and .82 for T2, .86 and .86 for T3, and .90 and .84 for T4, respectively).

For both parents' and teachers' reports, the concurrent scale scores of inhibitory control, attention shifting, and attention focusing were positively correlated (within-time and within-reporter  $r$ s ranged from .50 to .83 for teachers, and from .26 to .69 for parents). To reduce the number of variables, two composite scores—parents' and teachers' reports of children's EC—were created within each wave by averaging the scores on the 3 scales.

**Behavioral measure of EC:** At T2 and T3, children's regulation was also assessed with a puzzle box task. Children were instructed to try to assemble a wooden puzzle in a large box without looking at it. A cloth covered the front; children slipped their arms through sleeves to get into the box. The cloth could be lifted up so that a child could cheat by looking. Children were told that if they finished the puzzle within 5 min, they would receive an attractive prize and that they could call the experimenter back by ringing a bell if they finished in less than 5 min. An unseen observer timed children's persistence on the puzzle box (i.e., working on the puzzle without cheating) when alone. A second observer timed 76 children at T1 and 78 children at T2; interrater reliabilities ( $r$ s) were .99 and .98. An index reflecting the degree of children's persistence on a task was calculated as the proportion of time spent persisting on the puzzle (i.e., the number of seconds persisting divided by the total time spent with the task).

At T4, the behavioral measure of children's regulation was a child-alone origami task (which occurred before the origami task with the parent). During the experiment session, children were asked to complete an origami task—folding a frog from a piece of paper following the directions in the instruction sheet. They were given 3 min to complete the task and were told they would get an attractive prize if they finished. Research assistants timed children's total persistence during the times they were allowed to work (interrater  $r$  for 67 children = .99). An index reflecting the degree of children's persistence on the task was calculated as the proportion of time working on the origami task divided by the total amount of time spent with the task.

**Children's Externalizing Problems**—At T2, T3, and T4, children's externalizing problems were assessed with the 24-item Child Behavioral Checklist (Lochman et al., 1995; e.g., "lies", "aggressive to adults"). Parents and teachers rated each item from 1 = *never* to 4 = *often*. One item ("set fires") was dropped because it might be offensive to parents and was also low frequency. The  $\alpha$ s for teachers' and parents' reports were .97 and .91 for T2, .96 and .93 for T3, and .96 and .92 for T4, respectively.

## Results

After examining the relations of child age and gender to the T4 variables, we computed the zero-order correlations among the variables from T2 to T4. Following Cole and Maxwell's (2003) suggestions, several steps were taken to examine our hypotheses. First, the measurement models were tested with confirmatory factor analyses, which examine whether the manifest variables relate to one another in the ways prescribed by the theory. Next, we tested a longitudinal model (Figure 1a) in which parental warmth/positive expressivity at earlier waves predicted children's higher EC (controlling for the prior level of EC), which in turn predicted lower externalizing problems at later waves (controlling for the prior level of externalizing



problems). Finally, we tested a longitudinal model (Figure 1b) with the child-driven paths (i.e., the paths from prior levels of child EC to later parental warmth/expressivity) added.

### Age, Sex, and Family SES Differences on T4 (Adolescence) Variables

Because age and sex differences on T2 and T3 variables were reported elsewhere (e.g., Eisenberg, Zhou, et al., 2003; Zhou et al., 2002), only analyses for T4 variables are presented. To examine sex differences on T4 variables, three single-factor (sex) MANOVAs were computed for (1) parental warmth and positive expressivity in the parent-adolescent origami interaction; (2) parents' and teachers' reports of adolescents' EC and adolescents' persistence on origami task; and (3) parents' and teachers' ratings of adolescents' externalizing problems.

Significant sex differences were found on T4 measures of adolescents' EC, multivariate  $F(3, 119) = 6.80, p < .001$ . Both parents and teachers rated adolescent girls as higher on EC than adolescent boys, the univariate  $F_s(1, 121) = 12.91$  and  $14.23, p_s < .001$ , although no sex difference was found on adolescents' persistence (see means in Table 1). There were also sex differences on adults' reports of adolescents' externalizing problems, multivariate  $F(2, 143) = 12.28, p < .001$ . Both parents and teachers rated adolescent girls as lower in externalizing problems than adolescent boys, univariate  $F_s(1, 144) = 5.72$  and  $24.39, p_s < .01$ . No sex differences were found for parental warmth and positive expressivity at T4.

We also calculated the zero-order correlations between child age and family SES and the T4 variables. The family SES variable was created by first averaging maternal and paternal education levels (at T2), and then averaging the standardized scores for parental education and family income (at T2). Only one significant correlation was found between family SES and teachers' reports of adolescent regulation,  $r(132) = .21, p = .02$ .

### Correlation Analyses

Because many of the correlations among the T2 and T3 (but not T4) variables were presented elsewhere (Eisenberg, Valiente, et al., 2003; Eisenberg, Zhou, et al. 2003; Zhou, et al., 2002), we only report in text the correlations among T4 variables and between T4 variables and T2 or T3 variables (although the full correlation matrix is presented in Table 2). Within T4, parental warmth and positive expressivity during the parent-adolescent origami interaction were positively correlated, and both were negatively associated with parents' and/or teachers' reports of adolescent externalizing problems (although they were unrelated to adults' reports of adolescents' concurrent EC).

Positive cross-time correlations were found among measures of parental warmth and positive expressivity (especially at consecutive time points), among parents' and teachers' reports of children's EC, and among measures of externalizing problems. However, children's persistence on the puzzle task at T2 and T3 was unrelated to their persistence at T4. There were some significant correlations between parenting at T2 or T3 and measures of children's EC at T4: T2 parental warmth (but not positive expressivity) was positively related to T4 parents' and teachers' reports of children's EC, whereas T3 parental warmth and positive expressivity were positively related to parents' (but not teachers') reports of EC. Moreover, T2 and T3 (especially the latter) parental warmth and positive expressivity were negatively related to T4 reports of externalizing problems. In general, parental warmth and negative expressivity related similarly to other variables. Finally, both within- and across-reporter associations were found between adults' reports of children's EC at T2 and T3 and their reports of externalizing problems at T4; children's behavioral persistence at T2 and T3 were negatively related to mothers' (but not teachers') reports of T4 externalizing problems.

## Testing the Measurement Models for Parental Warmth/Positive Expressivity, Children's EC, and Externalizing Problems: Confirmatory Factor Analyses

Confirmatory factor analyses were used to examine the factor structures for measures of parenting, children's EC, and children's externalizing problems from T2 to T4. Before conducting the factor analyses, the variables were screened for normality and outliers. No variables exceeded the cutoff values of 2 for skewness and 7 for kurtosis (West, Finch, & Curran, 1995) and no outliers were identified with Cook's (1977) test using the cutoff point of 1 (Stevens, 1984). We also calculated Box's *M* statistics (Winer, 1971) to test the homogeneity of the variance-covariance matrices among all variables included in the SEM analyses across boys and girls, between older and younger children (classified based on a median-split of age), and between children from higher and lower SES families (classified based on a median-split of the continuous SES variable). The Box's *M* tests for sex and SES were nonsignificant. Because the Box's *M* is a sensitive test of the group differences in the variance-covariance matrices (Tabachnick & Fidell, 1996), this result suggested that sex and SES did not moderate the relations among variables in the larger models. In contrast, the Box's *M* for age differences was significant, Box's *M* = 385.3  $p = .03$ . Therefore, moderation by child's age was further tested using multiple-group SEM.

In the first model (Figure 2a), the latent factors for parental warmth/positive expressivity at T2 and T3 were each indicated by parental positive expressivity to pleasant slides and parental warmth during parent-child slide discussion; parental warmth/positive expressivity at T4 was indicated by the ratings of parental positive expressivity (affect) and warmth during the parent-youth origami interaction. In the second model (Figure 2b), the latent factors for EC were each indicated by parents' and teachers' reports as well as children's observed persistence on the behavioral task. In the third model (Figure 2c), children's externalizing problems at T2-T4 were each indicated by parents' and teachers' reports. In all these models, the latent factors were allowed to correlate with each other. Moreover, as suggested by Cole and Maxwell (2003), the measurement errors of the same measures from the same reporter/index at different time points (e.g., mothers' reports of externalizing problems at T2, T3, and T4, or parental positive expressivity during slide discussions at T2 and T3) were allowed to correlate with each other if doing so significantly improved the overall model fit. The models were tested using Mplus 2.10 (Muthen & Muthen, 2001).

The measurement model for parental warmth/positive expressivity fit the data marginally,  $\chi^2(df = 5, N = 171) = 11.5, p = .04$ , comparative fit index (CFI) = .98, root-mean-square error of approximation (RMSEA) = .087, and standardized root-mean-square residual (SRMR) = .027 (Figure 2a). Hu and Bentler (1999) recommended the values close to .95 for CFI, .08 for SRMR, and .06 for RMSEA as cutoff criteria for a relatively good fit between the hypothesized model and the observed data. However, the RMSEA criterion is less preferable at small sample sizes (e.g.,  $N \leq 250$ ) because it tends to overreject true-population models (Hu & Bentler, 1999). The original measurement model for child emotion-related regulation fit the data adequately,  $\chi^2(df = 20, N = 186) = 33.42, p = .03$ , CFI = .98, RMSEA = .060, and SRMR = .051. All the model-estimated loadings were significant in a positive direction except for the loading of adolescent persistence at T4. Thus, this indicator was dropped and the model was re-estimated. The revised model fit the data fairly well,  $\chi^2(df = 13, N = 186) = 20.16, p = .09$ , CFI = .99, RMSEA = .054, and SRMR = .040 (Figure 2b). Finally, the measurement model for Child Externalizing Problems fit the data adequately,  $\chi^2(df = 3, N = 186) = 5.08, p = .16$ , CFI = 1.00, RMSEA = .061, SRMR = .014. All the model-estimated loadings were significant and positive (and the latent constructs were each correlated across time).

For these models, we also examined the invariance in factor loadings across waves by testing the model in which the factor loadings of the corresponding manifest variables were constrained to be equal across time and comparing the chi-square difference between the model

with and without the invariance constraint. The difference in chi-square was significant for all three models,  $\Delta\chi^2(2, 4, \text{ and } 2) = 14.76, 18.95, \text{ and } 9.39$  for parental warmth/positive expressivity, child EC, and child externalizing problems, respectively,  $ps < .01$ , suggesting that the hypothesis of an invariant pattern of factor loadings was untenable and that the meanings of either the latent variables or the indicators may have changed with age (Cole & Maxwell, 2003). Thus, any comparisons in relations across age are somewhat difficult to interpret because of the lack of strict comparability of the various indicators of variables.

### Structural Equation Modeling

As tests of measurement models suggested that the manifest variables related to the latent factors as we expected, we then tested the longitudinal model (Figure 3) in which parental warmth/positive expressivity at prior waves was hypothesized to predict children's EC at later waves, which, in turn, predicts later externalizing problems, above and beyond the autoregressive effects. As shown in Figure 3, in addition to the measurement models, we included the autoregressive paths (i.e., paths predicting a latent construct from its prior level), as well as the cross-time paths from the latent factors of parenting to child EC, and then to child externalizing problems. The within-time latent constructs (at T2) were included and their disturbances (at T3 or T4) were allowed to correlate with each other if they significantly improved the model fit. As recommended by Cole and Maxwell (2003), to control for shared method variance, we allowed the error variance of the indicators assessed by the same reporter either within or across time (e.g., parents' reports of EC at T2 with parents' reports of externalizing at T3) to be correlated.

The hypothesized longitudinal model fit the data adequately,  $\chi^2(df = 141, N = 186) = 227.441$ ,  $p < .01$ , CFI = .96, RMSEA = .052, and SRMR = .090. All the auto-regressive paths but one were significant and positive (the path from T3 Child Externalizing to T4 Child Externalizing was positive and marginal), indicating cross-time consistency of these latent constructs. As predicted, controlling for the autoregressive paths, Parental Warmth/Positive Expressivity at T2 predicted higher Child EC at T3, which, in turn, predicted lower Externalizing Problems at T4. Analyses were conducted to test whether the indirect (mediated) effect of Parental Warmth/Positive Expressivity at T2 on Child Externalizing Problems at T4 through EC at T3 was significant. The conventional approach to test an indirect effect is by dividing the estimate of the indirect effect by its standard error and comparing the resulting  $z$  statistic with a critical value from the standard normal distribution. Because the distribution of the indirect effect is rarely normal, this method is usually inaccurate. To accommodate the non-normal distribution of the indirect effect, MacKinnon, Lockwood, Hoffman, West, and Sheets (2002), MacKinnon, Lockwood, and Williams (2004) developed a method to calculate the confidence interval (CI) of the indirect effect based on the distribution of the product of two normal random variables. If the CI does not include zero, the intervening variable effect is significant. The CI for the indirect effect of T2 parental warmth/positive expressivity on T4 child externalizing problems through T3 child EC at  $p = .05$  was  $[-.0441, -.0004]$ , indicating that this effect was significant. In addition, to examine the possible impact of missing data on the above results, we recomputed this model by including only the children with data at all three time points ( $n = 141$ ); the model fit was good and the same significant paths were found.

To test the hypothesis that prior child EC predicts later parental warmth/positive expressivity, we computed the hypothesized model in which the two cross-time paths from child EC to parenting were added (see Figure 1b). The chi-square difference between the models with and without the two child-driven paths was not significant; the model-estimated path coefficients for the two child-driven paths were also not significant. Similarly, when we added paths from externalizing problems to subsequent parenting in the model in Figure 1b, the new paths were not significant. Finally, we computed another longitudinal model with the two cross-time paths

from externalizing to parenting (i.e., T2 externalizing → T3 parenting, T3 externalizing → T4 parenting) added. Although this model fit the data adequately,  $\chi^2(df = 139, N = 186) = 211.79$ ,  $p < .001$ , RMSEA = .053, CFI = .96, neither of the two cross-time child-driven paths was significant. Therefore, no evidence was found for the child-driven paths.

### Testing for Moderation

Finally, because the Box's  $M$  test indicated that the variance–covariance matrix among the variables in the analyses differed between the younger and older age groups, moderation by age was tested for both the measurement models and the longitudinal structural model. Each measurement model in Figure 2 was fitted to the younger and older groups simultaneously. The loadings of the manifest variables were constrained to be equal across groups. The measurement models for parenting, child EC, and child externalizing problems did not differ across the two age groups, all  $\chi^2$ s were nonsignificant, all CFIs were .99 or higher; all RMSEAs  $< .057$ , all SRMRs  $< .069$ . Because of our sample size constraint, we could not test moderation by age group in the full longitudinal model (in Figure 3). Therefore, we created a composite for each latent factor by aggregating its indicators using the loadings estimated from the measurement models, and tested moderation by child age group in the reduced longitudinal model (in which each latent factor had one single indicator). In the multiple-group analysis by child age group, the model was fitted to the younger and older groups simultaneously, and the path coefficients were constrained to be invariant across groups. The model assuming invariance in path coefficients linking the latent factors across age groups fit the data adequately,  $\chi^2(df = 42, Ns = 74 \text{ and } 86 \text{ for younger and older children, respectively}) = 56.61$ ,  $p = .07$ , CFI = .96, RMSEA = .066, SRMR = .09, suggesting that the relations among the latent factors did not differ across age group. Thus, although the Box's  $M$  test identified a significant age difference in the variance–covariance matrix, there was no evidence for moderation in the multiple-group analyses. This was not surprising because the Box's  $M$  is a relatively sensitive test (Tabachnick & Fidell, 1996).

### Discussion

The findings in this study provide perhaps the strongest support yet for the hypothesis that children's EC or regulation mediates the relation of parental (primarily maternal) warmth and positive expressivity to children's externalizing problems. Observed parental warmth/positive expressivity in mid-elementary school predicted children's EC 2 years later, which in turn predicted low externalizing problems in adolescence. This pattern of findings was obtained despite controlling for the relatively strong stability of all three constructs over time. In addition, there was no evidence that the causal relation between parental warmth/expressivity and children's EC might be reversed in the model. This pattern of findings is, in general, consistent with those of Brody and Ge (2001) in regard to the prediction of internalizing problems and alcohol-related problems.

Support for the mediating role of children's EC in the relation between parental warmth/positive expressivity and level of children's externalizing behavior is fairly strong for several reasons. First, this mediated path was significant even when controlling for the stability of relations over time. Second, the fact that the predictor, mediating variable, and outcome variables were assessed at three time points increases the likelihood that causal processes are in play (Cole & Maxwell, 2003). Although mediation was supported for the T2 parenting → T3 EC → T4 externalizing problems sequence, in the SEM model, T2 EC did not predict T3 externalizing. Moreover, T3 parenting did not predict T4 EC. Thus, support for mediation was only partial. However, this pattern of findings should be interpreted with the often strong autoregressive paths in mind. In fact, correlations supported these relations even if they were not significant in the model: T2 EC was consistently significantly negatively correlated with

T3 externalizing problems, whereas T3 parenting was significantly correlated with one indicator of T4 EC. These significant relations were lost in the model when controlling for the consistency of these variables as the path from T3 parenting to T4 EC reflected the unique effect of T3 parenting on T4 EC above and beyond the effect of T3 EC, and the path from T2 EC to T3 externalizing reflected the unique effect of EC above and beyond the effect of T2 externalizing. It is possible that the relation of EC to externalizing problems increases with age; however, the pattern of correlations between EC and externalizing problems was similar for the T2–T3 and the T3–T4 relations. A more likely explanation for the lack of a unique relation between T3 EC and T4 externalizing problems is that the consistency of externalizing problems over time was greater from T2 to T3 than from T3 to T4, so there was more variance in T4 than T3 externalizing problems to be accounted for by EC above and beyond the prior level of externalizing. Similarly, the finding that T3 parenting had no unique effect on T4 EC (controlling for prior level of EC) may also be because of the greater consistency of EC from T3 to T4 than from T2 to T3. Consistent with this interpretation, in a study examining developmental trajectories of EC from ages 5 to 10 years (which included the T1–T3 sample from the present one), we found that EC (attention focusing and behavioral persistence) tended to become stabilized by middle childhood (Zhou et al., 2005). It is also possible that the effects of positive parenting are especially strong in the earlier years when children are more vulnerable and parents are highly salient socializers compared with other socialization influences such as peers, and that later relations between parenting and EC may be because of earlier relations between these variables.

The three measures of children's EC (teacher-reported, parent-reported, and the behavioral task) at the initial assessment in this paper (T2) did correlate (at  $p < .10$  or better) with parental expressivity (but not warmth) at the middle (T3) assessment. Thus, children's EC could have some weak effect on parents' positive expressivity that was masked by combining warmth and parental positive expressivity. In addition, because of the relatively small sample size and the stability of the constructs, it was relatively difficult to identify paths across constructs (e.g., from parenting to EC), much less paths going in both directions across time. Thus, it is possible that bidirectional relations between parental warmth/positive expressivity and children's EC would be identified if the sample were larger and the time gaps were larger (which might decrease stability of the three variables). Nonetheless, our findings are consistent with the conclusion that the prediction of children's EC from parenting is considerably stronger than the over-time child effect on this association. This finding argues against a genetic explanation in which hereditary child characteristics merely evoke parenting behavior (although heredity might still partly account for the pattern of relations). Moreover, the findings indicate that the relation of children's EC to externalizing problems continues to emerge in the elementary school years, despite the stability of these constructs at a younger age.

As already mentioned, children's EC was found to mediate the relation of parental warmth/positive expressivity to children's externalizing problems in another longitudinal sample (Eisenberg, Valiente, et al., 2003). However, in that study, the mediator and outcome variables were assessed at the same time. In addition, the sample in that study was selected by oversampling children with adjustment problems. Thus, the mediated relation in that study may have been because of the relatively large variability in participants' externalizing problems and may not have been observed in a sample of typical school children. Because the present sample was recruited from schools without selecting children for any specific characteristics, we can be more confident that any effects of positive parenting are not confined to comparisons involving a relatively large number of children with significant problems. In addition, the other study involved children first assessed in early to mid-elementary school and 2 years later, not at age 11–14 years. Thus, the present findings indicate that youths' regulation is still a mediator of the relation between parenting and externalizing problems as they move through early adolescence.



The pattern of findings in the present study was not moderated by children's sex, age, or family SES. This is not surprising: positive parenting would be expected to relate to optimal outcomes for children of both sexes and the relation between high regulation and low externalizing problems appears to hold for both sexes (e.g., Eisenberg et al., 1996). Moreover, the 4-year age span of children at each assessment may not have been sufficient to produce any significant variation in the pattern of relations (recall the moderation taps variation within the sample in age at an assessment). In addition, no evidence was found for moderation by family SES in this study, which might be partly because of the fact that the sample included primarily working- to middle-class Caucasian families. The lack of moderation suggests that the associations examined are relatively robust, although moderation may have been found if the sample size were larger or if the variability in age or SES were greater.

The findings also provide evidence that parental warmth/positive expressivity and children's EC, as well as their externalizing problems, were relatively stable from mid-elementary school into late elementary school or middle school. The findings in regard to the stability of EC are consistent with those of Murphy et al. (1999) using children of similar age. However, the consistency of EC may have been underestimated because the behavioral measure of persistence at T4 (on the origami task) differed from those at T2 and T3 (on a puzzle task). Indeed, the behavioral persistence measure did not load on the latent construct at T4, perhaps because there was little variability in persistence at T4 (most youth persisted the entire time).

The consistency in parents' positive expressivity over 4 years has not, to our knowledge, been demonstrated. Again, the degree of consistency may have been attenuated to some degree because parental warmth was assessed in a somewhat different situation at T4 than at T2 and T3. Nonetheless, this consistency, combined with the concurrent relations of parental warmth/expressivity with EC and low externalizing problems at the initial assessment in this paper, suggests that many of the potential effects of parental positivity may be in place by mid-elementary school. Nonetheless, as already noted, the data are consistent with the existence of additional effects of parenting (e.g., at T3) on EC over time.

In summary, the findings suggest that effortful regulatory processes may mediate the relation between warm, positive parenting and children's externalizing problems. These findings are important for prevention research because they suggest the possibility to foster children's regulation and decrease externalizing or antisocial behaviors by promoting parental warmth and positive expressivity. The strengths of this study include the use of a prospective longitudinal design and multiple measures (multiple reporters and/or observed measures) of all constructs. A limitation of the study was the fact that the measure of warmth was not identical at all assessments, although the difference between the T4 measure of parenting and that at T2 and T3 was not crucial to the model because T4 parental warmth/expressivity was not used to predict other variables. Another limitation is that children with problem behaviors and those from low income and minority families were somewhat more likely to drop from the sample (which also was not a representative community sample). In addition, the number of extremely low-income families was small and the percent of participants from ethnic minority families was not large. Thus, the findings in this study may not generalize to samples of low-income or ethnic minority families. This is an important issue to examine in future work.

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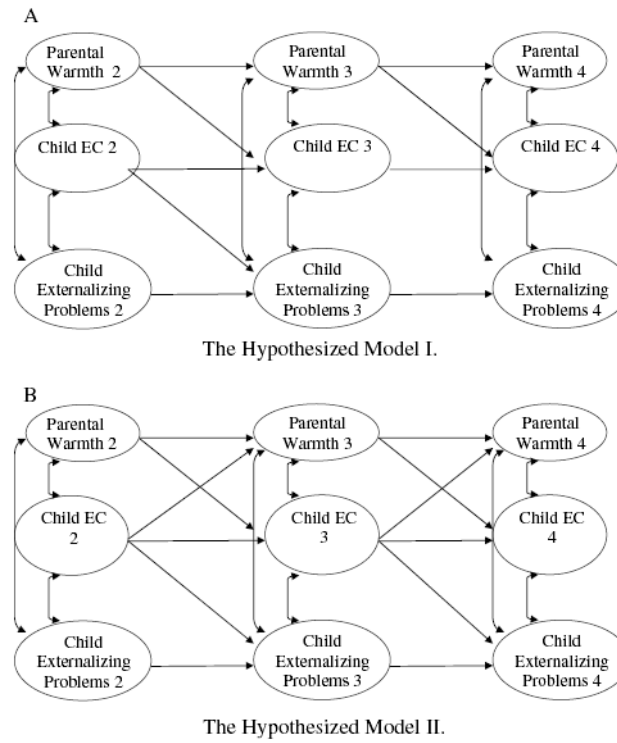
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## References

- Blair C. School readiness: Integrating cognition and emotion in a neurobiological conception of children's functioning at school entry. *American Psychologist* 2002;57:111–127. [PubMed: 11899554]
- Boyum LA, Parke RD. The role of family emotional expressiveness in the development of children's social competence. *Journal of Marriage and the Family* 1995;57:593–608.
- Brody GH, Ge X. Linking parenting processes and self-regulation to psychological functioning and alcohol use during early adolescence. *Journal of Family Psychology* 2001;15:82–94. [PubMed: 11322087]
- Buck R, Losow JI, Murphy MM, Costanzo P. Social facilitation and inhibition of emotional expression and communication. *Journal of Personality and Social Psychology* 1992;63:962–968. [PubMed: 1460562]
- Campos JJ, Campos RG, Barrett KC. Emergent themes in the study of emotional development and emotion regulation. *Developmental Psychology* 1989;25:394–402.
- Caspi A, Moffitt TE, Morgan J, Rutter M, Taylor A, Arseneault L, et al. Maternal expressed emotion predicts children's antisocial behavior problems: Using monozygotic-twin differences to identify environmental effects on behavioral development. *Developmental Psychology* 2004;40:149–161. [PubMed: 14979757]
- Cohn JF, Tronick EZ. Three-month-old infants' reaction to simulated maternal depression. *Child Development* 1983;54:185–193. [PubMed: 6831986]
- Cole DA, Maxwell SE. Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology* 2003;112:558–577. [PubMed: 14674869]
- Collins, W. A., & Steinberg, L. (in press). Adolescence. In W. Damon & R. M. Lerner (Series Ed.) and N. Eisenberg (Vol. Ed.), *Handbook of child psychology. Vol. 3. Social, emotional, and personality development* (6th ed.). New York: Wiley.
- Contreras J, Kerns KA, Weimer BL, Gentzler AL, Tomich PL. Emotion regulation as a mediator of associations between mother–child attachment and peer relationships in middle childhood. *Journal of Family Psychology* 2000;14:111–124. [PubMed: 10740686]
- Cook RD. Detection of influential observation in linear regression. *Technometrics* 1977;19:15–19.
- Cummings EM, Davies P. Emotional security as a regulatory process in normal development and the development of psychopathology. *Development and Psychopathology* 1996;8:123–139.
- Derryberry, D., & Tucker, D. M. (1994). Motivating the focus of attention. In P. M. Neiderthal & S. Kitayama (Eds.), *The heart's eye: Emotional influences in perception and attention* (pp. 167–196). San Diego, CA: Academic Press.
- Dix T. The affective organization of parenting: Adaptive and maladaptive processes. *Psychological Bulletin* 1991;110:3–25. [PubMed: 1891517]
- Dodge, K. A., Coie, J. D., & Lynam, D. (in press). Aggression and antisocial behavior in youth. In W. Damon & R. M. Lerner (Series Ed.) and N. Eisenberg (Vol. Ed.), *Handbook of child psychology. Vol. 3. Social, emotional, and personality development* (6th ed.). New York: Wiley.
- Eisenberg N, Cumberland A, Spinrad TL. Parental socialization of emotion. *Psychological Inquiry* 1998;9:241–273. [PubMed: 16865170]
- Eisenberg N, Cumberland A, Spinrad TL, Fabes RA, Shepard SA, Reiser M, et al. The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development* 2001;72:1112–1134. [PubMed: 11480937]
- Eisenberg N, Fabes RA, Guthrie IK, Murphy BC, Maszk P, Holmgren R, et al. The relations of regulation and emotionality to problem behavior in elementary school children. *Development and Psychopathology* 1996;8:141–162.
- Eisenberg N, Fabes RA, Guthrie IK, Reiser M. Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology* 2000;78:136–157. [PubMed: 10653511]
- Eisenberg N, Fabes RA, Shepard SA, Guthrie IK, Murphy BC, Reiser M. Parental reactions to children's negative emotions: Longitudinal relations to quality of children's social functioning. *Child Development* 1999;70:513–534. [PubMed: 10218267]

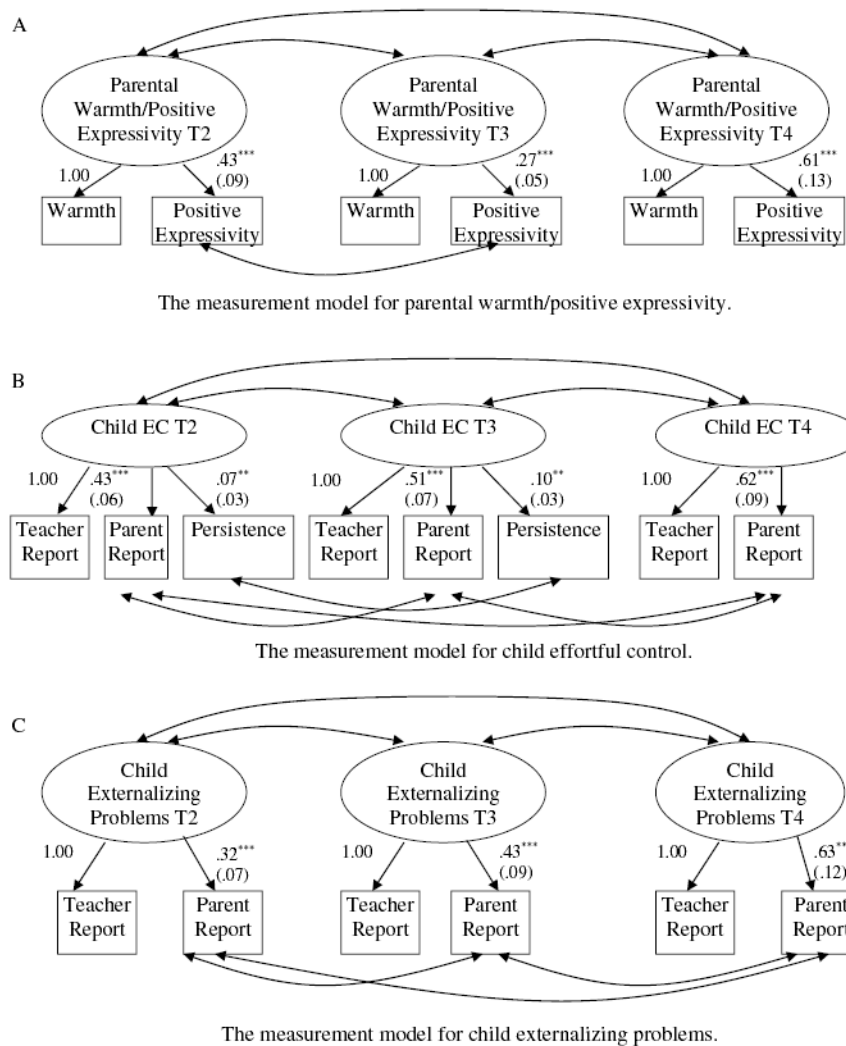
- Eisenberg N, Gershoff ET, Fabes RA, Shepard SA, Cumberland AJ, Losoya SH, et al. Mothers' emotional expressivity and children's behavior problems and social competence: Mediation through children's regulation. *Developmental Psychology* 2001;37:475–490. [PubMed: 11444484]
- Eisenberg N, Losoya S, Fabes RA, Guthrie IK, Reiser M, Murphy BC, et al. Parental socialization of children's dysregulated expression of emotion and externalizing problems. *Journal of Family Psychology* 2001;15:183–205. [PubMed: 11458628]
- Eisenberg N, Valiente C, Morris AS, Fabes RA, Cumberland A, Reiser M, et al. Longitudinal relations among parental emotional expressivity, children's regulation, and quality of socioemotional functioning. *Developmental Psychology* 2003;39:2–19.
- Eisenberg N, Zhou Q, Losoya S, Fabes RA, Shepard SA, Murphy BC, et al. The relations of parenting, effortful control, and ego control to children's unregulated expression of emotion. *Child Development* 2003;74:875–895. [PubMed: 12795395]
- Fredrickson BL. The role of positive emotions in positive psychology. *American Psychologist* 2001;56:218–226. [PubMed: 11315248]
- Gable S, Isabella RA. Maternal contributions to infant regulation of arousal. *Infant Behavior and Development* 1992;15:95–107.
- Garner PW. Toddlers' emotion regulation behaviors: The roles of social context and family expressiveness. *Journal of Genetic Psychology* 1995;156:417–430. [PubMed: 8543929]
- Goldsmith HH, Buss KA, Lemery KS. Toddler and childhood temperament: Expanded content, stronger genetic evidence, new evidence for the importance of environment. *Developmental Psychology* 1997;33:891–905. [PubMed: 9383612]
- Gottman, J. M., Katz, L. F., & Hooven, C. (1997). *Metaemotion: How families communicate emotionally* Mahwah, NJ: Erlbaum.
- Grusec JE, Goodnow JJ. Impact of discipline methods on the child's internalization of values: A reconceptualization of current points of view. *Developmental Psychology* 1994;30:4–19.
- Halberstadt, A. G., Crisp, V. W., & Eaton, K. L. (1999). Family expressiveness: A retrospective and new directions for research. In P. Philippot, R. S. Feldman, & E. Coats (Eds.), *The social context of nonverbal behavior* (pp. 109–155). New York: Cambridge University Press.
- Hardy DF, Power TG, Jaedicke S. Examining the relation of parenting to children's coping with everyday stress. *Child Development* 1993;64:1829–1841. [PubMed: 8112121]
- Hoffman, M. L. (2000). *Empathy and moral development: Implications for caring and justice* Cambridge, UK: Cambridge University Press.
- Hu L, Benter PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling* 1999;6:1–55.
- Isen AM, Daubman KA. The influence of affect on categorization. *Journal of Personality and Social Psychology* 1984;47:1206–1217.
- Isen AM, Daubman KA, Nowicki GP. Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology* 1987;52:1122–1131. [PubMed: 3598858]
- Kliewer W, Fearnow MD, Miller PA. Coping socialization in middle childhood: Tests of maternal and paternal influences. *Child Development* 1996;67:2339–2357. [PubMed: 9022245]
- Kochanska G. Emotional development in children with different attachment histories: The first three years. *Child Development* 2001;72:474–490. [PubMed: 11333079]
- Kochanska G, Knaack A. Effortful control as a personality characteristic of young children: Antecedents, correlates, and consequences. *Journal of Personality* 2003;71:1087–1112. [PubMed: 14633059]
- Laible DJ, Thompson R. Mother-child conflict in the toddler years: Lessons in emotion, morality, and relationships. *Child Development* 2002;73:1187–1203. [PubMed: 12146742]
- Laible DJ, Thompson RA. Attachment and emotional understanding in preschool children. *Developmental Psychology* 1998;34:1038–1045. [PubMed: 9779749]
- Lochman JE, Conduct Problems Prevention Research Group. Screening of child behavior problems for prevention programs at school entry. *Journal of Consulting and Clinical Psychology* 1995;63:549–559. [PubMed: 7673532]

- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods* 2002;7:83–104. [PubMed: 11928892]
- MacKinnon DP, Lockwood CM, Williams J. Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research* 2004;39:99–128.
- Murphy BC, Eisenberg N, Fabes RA, Shepard S, Guthrie IK. Consistency and change in children's emotionality and regulation: A longitudinal study. *Merrill – Palmer Quarterly* 1999;45:413–444.
- Muthen, L. K., & Muthen, B. O. (2001). *Mplus 2.01* Los Angeles, CA: Muthen & Muthen.
- NICHD Early Child Care Research Network. Do children's attention processes mediate the link between family predictors and school readiness? *Developmental Psychology* 2003;39:581–593. [PubMed: 12760525]
- Posner MI, Rothbart MK. Attention, self-regulation, and consciousness. *Transactions of the Philosophical Society of London* 1998;B:1915–1927.
- Power TG. Stress and coping in childhood: The parents' role. *Parenting* 2004;4:271–317.
- Raver C. Relations between social contingency in mother-child interaction and 2-year-olds' social competence. *Developmental Psychology* 1996;32:850–859.
- Raver CC. Emotions matter: Making the case for the role of children's emotional adjustment for their early school readiness. *Social Policy Report* 2002;16:3–24.
- Raver CC. Placing emotional self-regulation in sociocultural and socioeconomic contexts. *Child Development* 2004;75:346–353. [PubMed: 15056189]
- Raver, C. C., & Leadbeater, B. J. (1995). Factors influencing joint attention between socio-economically disadvantaged adolescent mothers and their infants. In C. Moore & P. Dunham (Eds.), *Joint attention: Its origins and role in development* Hillsdale, NJ: Earlbaum.
- Rothbart MK, Ahadi SA, Hershey KL. Temperament and social behavior in childhood. *Merrill-Palmer Quarterly* 1994;40:21–39.
- Rothbart MK, Ahadi SA, Hershey K, Fisher P. Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development* 2001;72:1287–1604. [PubMed: 11699671]
- Rothbart, M. K., & Bates, J. E. (in press). Temperament. In W. Damon & R. M. Lerner (Series Ed.) and N. Eisenberg, (Vol. Ed.), *Handbook of child psychology, Vol. 3. Social, emotional, and personality development* (6th ed.). New York: Wiley.
- Rothbaum F, Weisz JR. Parental caregiving and child externalizing behavior in nonclinical samples: A meta-analysis. *Psychological Bulletin* 1994;116:55–74. [PubMed: 8078975]
- Stevens JP. Outliers and influential data points in regression analysis. *Psychological Bulletin* 1984;95:334–344.
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* New York: HarperCollins.
- Trope Y, Pomerantz EM. Resolving conflicts among self-evaluative motives: Positive experiences as a resource for overcoming defensiveness. *Motivation and Emotion* 1998;22:53–72.
- Vygotsky, L. S. (1978). *Mind in society* Cambridge, MA: Harvard University Press.
- West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues and applications* (pp. 56–75). Thousand Oaks, CA: Sage.
- Winer, B. J. (1971). *Statistical principles in experimental design* New York: McGraw-Hill.
- Zhou Q, Eisenberg N, Losoya S, Fabes RA, Reiser M, Guthrie IK, et al. The relations of parental warmth and positive expressiveness to children's empathy-related responding and social functioning: A longitudinal study. *Child Development* 2002;73:893–915. [PubMed: 12038559]
- Zhou, Q., Hofer, C., Eisenberg, N., Reiser, M., Spinrad, T. L., & Fabes, R. A. (2005). The developmental trajectories of attention focusing, behavioral persistence, and externalizing problems during school age years. Manuscript under review.

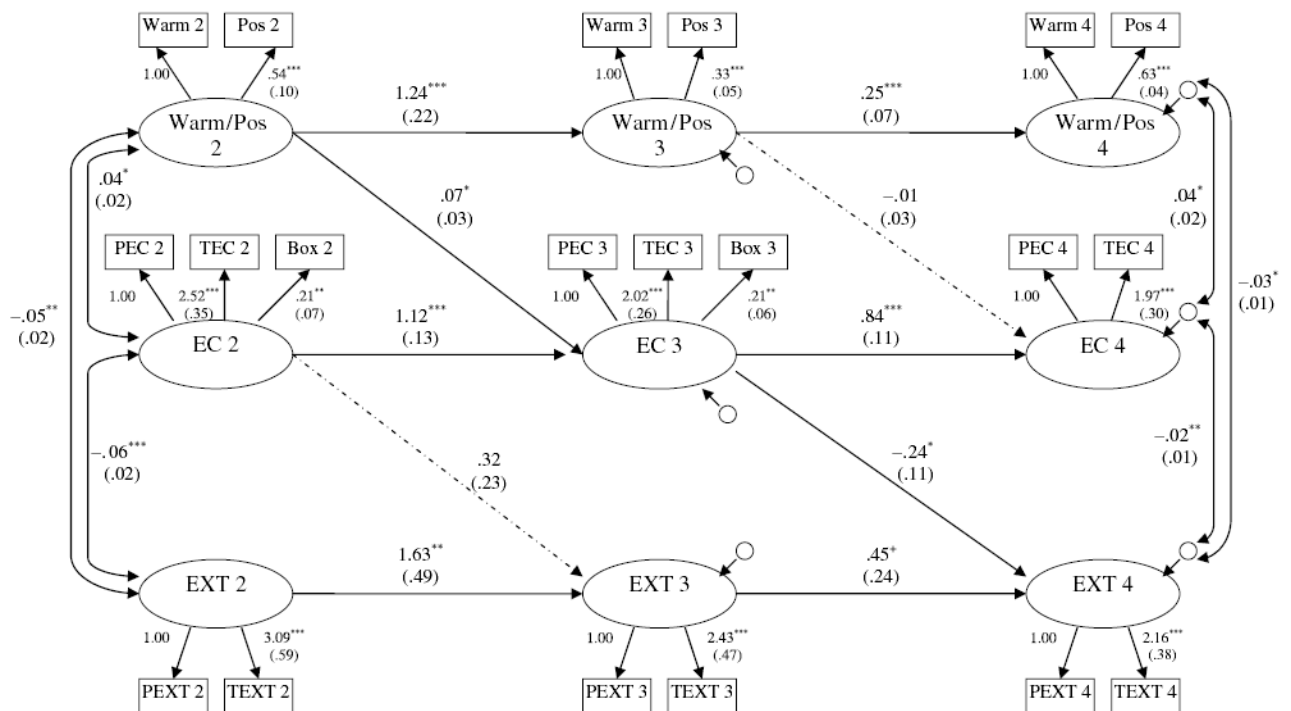


**Figure 1.** The hypothesized cross-time relations among parental warmth/positive expressivity, child effortful control and child externalizing problems.





**Figure 2.** Cross-time measurement models for parental warmth/positive expressivity, child effortful control, and child externalizing problems: confirmatory factor analyses. The coefficients above parentheses are unstandardized loadings; the coefficients in parentheses are standard errors for the model-estimated loadings. \*\*\* $p < .001$ , \*\* $p < .01$ .



**Figure 3.**

The longitudinal relations among parental warmth, child effortful control, and child externalizing problems: structural equation modeling. The numbers above parentheses are unstandardized path coefficients; the numbers in parentheses are standard errors for model-estimated parameters. All the model-estimated loadings for the indicators in the measurement model were significant. The error terms of the indicators assessed by the same measure or reported by the same reporter were allowed to be correlated (within or across-time). For reasons of simplification, these numbers were not reported in the figure. \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

Table 1

Means and Standard Deviations of Major Variables

	Total		Girls		Boys	
	M	SD	M	SD	M	SD
Parental positive expressivity—T2	5.69	0.81	5.84	0.84	5.54	0.74
Parental warmth—T2	4.15	1.53	4.44	1.69	3.86	1.29
Child EC (parent report)—T2	4.73	0.73	4.86	0.69	4.60	0.74
Child EC (teacher report)—T2	4.83	1.02	5.22	0.85	4.45	1.03
Child persistence—T2	0.74	0.27	0.77	0.27	0.71	0.28
Child externalizing (parent report)—T2	2.13	0.45	2.09	0.43	2.17	0.47
Child externalizing (teacher report)—T2	1.75	0.69	1.47	0.52	2.01	0.73
Parental positive expressivity—T3	5.57	0.58	5.61	0.59	5.52	0.57
Parental warmth—T3	3.60	1.55	3.77	1.65	3.44	1.44
Child EC (parent report)—T3	4.79	0.77	4.96	0.71	4.62	0.78
Child EC (teacher report)—T3	5.17	1.09	5.60	0.84	4.75	1.15
Child persistence—T3	0.66	0.33	0.68	0.34	0.65	0.32
Child externalizing (parent report)—T3	2.08	0.47	2.02	0.42	2.14	0.51
Child externalizing (teacher report)—T4	1.58	0.60	1.37	0.46	1.78	0.65
Parental positive expressivity—T4	2.41	0.50	2.44	0.54	2.38	0.44
Parental warmth—T4	5.41	1.02	5.43	1.12	5.38	0.91
Child EC (parent report)—T4	4.80	0.73	4.98	0.75	4.79	1.08
Child EC (teacher report)—T4	5.11	0.96	5.40	0.74	4.63	0.68
Child EC (persistence)—T4	0.95	0.07	0.95	0.07	0.95	0.07
Child externalizing (parent report)—T4	2.00	0.46	1.93	0.43	2.07	0.49
Child externalizing (teacher report)—T4	1.46	0.55	1.26	0.41	1.68	0.59

Note. EC, effortful control.

Table 2

Correlations Among Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Parental warmth	—																		
2. Parental PE-2	.40***	—																	
3. Child EC/P T2	.20*	.14 <sup>+</sup>	—																
4. Child EC/T T2	.14 <sup>+</sup>	.18*	.47***	—															
5. Child PERS T2	.17*	.05	.20*	.22**	—														
6. Child EXT/T T2	-.21*	-.25**	.62***	.31***	.28**	—													
7. Child EXT/T T2	-.14 <sup>+</sup>	.24**	.30***	.69***	.34***	.32***	—												
8. Parental warmth T3	.53***	.42***	.11	.10	.15 <sup>+</sup>	-.15 <sup>+</sup>	-.13	—											
9. Parental PE T3	.34***	.50***	.18*	.18*	.14 <sup>+</sup>	.26**	.22**	.50***	—										
10. Child EC/P T3	.21*	.19*	.76***	.51***	.24**	.46***	.44***	.16 <sup>+</sup>	.25**	—									
11. Child EC/T T3	.23**	.17 <sup>+</sup>	.43***	.69***	.33***	.33***	.60***	.11	.21*	.52***	—								
12. Child PERS T3	.15 <sup>+</sup>	.01	.29***	.24**	.58***	.36***	-.20*	.00	.12	.23**	.25**	—							
13. Child EXT/P T3	.31***	.26**	.57***	.28**	.29***	.78***	.35***	.26**	.31***	.58***	.30***	.30***	—						
14. Child EXT/T T3	.23**	.23**	.37***	.58***	.28**	.37***	.62***	-.17 <sup>+</sup>	.26**	.44***	.79***	-.18*	.33***	—					
15. Parental warmth T4	.29**	.26**	.32***	.26**	-.07	.29**	-.10	.35***	.18*	.22*	.09	.09	.25**	-.08	—				

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
16. Parental PE T4	.28***	.32***	.23***	.20*	.01	-.21*	-.10	.30**	.21*	.17+	.02	.08	-.30***	-.18*	77***	—	—	—
17. Child EC/P T4	.30***	.11	.31***	.60***	.00	-.23*	-.44***	.13	.08	.38***	.57***	.14	-.20*	-.50***	.09	.12	—	—
18. Child ECT T4	.25**	.13	.67***	.48***	.12	-.43***	-.42***	.26**	.17*	.76***	.46***	.11	-.48***	-.45***	.16+	.15+	.40***	—
19. Child PERS T4	-.08	-.00	.01	-.05	.06	.01	.20*	-.05	-.03	-.16+	-.18+	.10	.11	.24*	.13	-.01	-.17+	-.05
20. Child EXT/T4	-.28**	-.17+	.54***	.37***	.25**	.69***	.40***	.24**	.28**	.53***	.32***	.30***	.77***	.34***	-.16+	.20*	.24**	-.65***
21. Child EXT/T4	-.28**	-.22*	.31***	.54***	-.17+	.27**	.50***	.24**	.26**	.38***	.55***	-.13	.35***	.51***	-.17*	.21*	.70***	-.41*

Notes. Parental PE, parental positive expressivity; child EC/P, child effortful control: parent reports; child ECT, child effortful control: teacher reports; child PERS, child behavioral persistence; child EXT/P, child externalizing problems: parent reports; child EXT/T, child externalizing problems: teacher reports.

+  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

TRs ranged from 123 to 153.