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ORIGINAL ARTICLE

The Longitudinal Link Between Parenting and Child Aggression: The Moderating Effect of Attachment Security

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Abstract This study examined whether infant attachment security moderates the association between parenting in preschool and later aggressive behavior among a sample of children at high risk for developing conduct problems. Participants were 82 adolescent mother–child dyads recruited from the community. Infant attachment status at age 1 year was measured using the Strange Situation. When children were aged 4.5 years, mothers reported on their self-efficacy in regards to parenting, and mothers' positive parenting and criticism were coded from direct observations of parent–child interactions. In grade 1, mothers reported on their children's aggressive behavior. Infant secure attachment significantly moderated the association between observed maternal criticism and child aggression. That is, among insecurely attached children, higher levels of maternal criticism were associated with more severe aggression. This longitudinal finding suggests that a secure attachment may buffer the deleterious effects of harsh parenting on child aggression.

Keywords Attachment · Conduct problems · Parenting · Socialization

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Introduction

Conduct problems are a collection of disruptive, antisocial behaviors that vary considerably in terms of severity (e.g., simple noncompliance to extreme physical aggression) as well as type (e.g., overt vs. covert) [1]. Children with conduct problems are at higher risk for various negative outcomes in adolescence and adulthood, including substance use, mental health problems, adverse interpersonal relationships, and criminality [2, 3]. For this reason, clinical efforts aimed at preventing the development and maintenance of these problem behaviors are imperative. However, creating such preventive and treatment interventions has proven to be difficult, as children with conduct problems differ vastly in the types of behaviors they exhibit, in the ways in which their problem behaviors develop, and in their long-term prognoses [1, 4]. Thus, an important line of research pertains to the subtyping of children with conduct problems according to their differential characteristics. One way in which researchers have subtyped these children pertains to the age at which their conduct problems emerge. Specifically, it has been found that children who develop conduct problems before the age of 10 are more likely to exhibit severe and persistent conduct problems [5]. Similarly, these "early starters" tend to be at greater risk for negative outcomes in later childhood and adolescence (e.g., substance use, depression, and delinquency) [1]. Therefore, further investigation is needed to identify factors that are related to the development of early-onset conduct problems and that are amenable to change.

The Role of Parenting

The quality of parenting received in early childhood is a key factor that is associated with early-onset conduct

problems [6]. There is a substantial amount of empirical evidence suggesting that exposure to negative dimensions of parenting (e.g., criticism, intrusiveness, harsh discipline, and hostility) in early childhood is associated with the development of conduct problems in children [7–9]. The coercive family process refers to a mechanism through which negative parenting practices have been suggested to facilitate the development of child conduct problems [10]. From this perspective, hostile interactions between parents and children are thought to model and reinforce antisocial behavior among children, and this learned pattern of interaction is believed to be generalized to interactions outside of the home (e.g., when children enter school).

Accordingly, more recent empirical work has shown that positive dimensions of parenting are inversely related to the development of child conduct problems. For instance, in a longitudinal study that examined the effects of parenting practices on trajectories of antisocial behavior in preschool-age children, Denham et al. [11] demonstrated that children's behavior problems were more likely to decrease by age 9 when parents had engaged in proactive parenting strategies (e.g., having a supportive presence characterized by positive regard and emotional support). Since positive dimensions of parenting such as praise, warmth, and responsiveness are thought to facilitate children's cooperative involvement in the socialization process that typically occurs between parents and children [12–14], it follows that inadequate socialization may be more likely to occur in the absence of such positive parenting. Accordingly, multiple studies have shown that children are at increased risk for developing conduct problems when they lack exposure to positive parenting practices [15–17].

In addition to parenting practices, parental cognitions have been linked to the development of conduct problems in children. Cognitive factors such as low parental self-efficacy (i.e., confidence in one's ability to effectively parent) are associated with higher rates of conduct problems in children [18, 19]. While the nature of the relationship between parental cognitions and conduct problems is unknown, it has been shown that parental cognitions such as self-efficacy play a role in determining the types of strategies parents use during interactions with their children [20, 21].

It appears that specific characteristics of parents may increase their likelihood of engaging in maladaptive parenting practices. For example, mothers who give birth to their first child before the age of 20 have been found to have an increased potential for exhibiting negative parenting practices such as insensitivity, intrusiveness, neglect, and abuse [22, 23]. This may be due to the fact that adolescent mothers are more likely to live in poverty; to be single; to show symptoms of depression; to lack education, career opportunities and social support; and to have a history of physical or sexual abuse than older mothers [23–25]. Accordingly, children of adolescent mothers are at increased risk for developing conduct problems [22, 26, 27], and multiple variables have been linked to the development of conduct problems among this high-risk group of children, including insecure attachment [22, 26–28].

The Role of Attachment Security

Attachment security—or the degree to which a child can depend on his or her caregiver for comfort and support [29]—is another aspect of the parent–child relationship that has consistently been shown to predict the development of conduct problems in children [30]. A number of longitudinal studies have demonstrated that children who are insecurely attached to their primary caregivers in early life are at greater risk for developing conduct problems [27, 30–32]. However, recent research suggests that attachment insecurity may also have a more indirect effect on child conduct problems [33]. For example, Kochanska et al. [34] recently argued that attachment provides the foundation from which positive and mutually responsive parent–child interactions can emerge and therefore, that attachment might be best conceptualized as providing the context in which factors related to socialization exert their influence on children's development.

For this reason, the interaction between attachment and parenting has been proposed to provide a more comprehensive account of the etiology of child conduct problems. Specifically, there is reason to believe that attachment security may buffer the negative effects of maladaptive parenting practices [35, 36]. For example, in a longitudinal study that tracked more than 1,000 mother–child dyads in the United States, the NICHD Early Child Care Research Network [33] investigated the effects of changing parenting quality over the course of early childhood. While the researchers determined that changes in parenting did not differ by attachment status, they discovered that attachment status did play a role in determining whether declining parenting quality influenced children's later behavior problems. Specifically, among all of the children exposed to declining parenting quality throughout the course of the study, only children who had been classified as insecurely attached at 15 months were found to exhibit high rates of behavior problems in grade 1. That is, children who had been classified as securely attached at 15 months were not affected by changes in parenting quality (i.e., were less likely to exhibit behavior problems regardless of improving, stable, or declining parenting quality). Accordingly, the moderating effect of attachment and attachment-related constructs (e.g., parental sensitivity, warmth, emotional support) on the relationship between negative parenting

practices and conduct problems has recently been supported by studies involving typically developing children [37–39] as well as children identified as having high rates of conduct problems [40].

Importantly, the protective effect of attachment security has also been demonstrated with children at risk of developing conduct problems. Using a person-centered analysis to distinguish distinct trajectories of conduct problems among children of adolescent mothers, Keller, Spieker, and Gilchrist [41] demonstrated that attachment security interacted with environmental risk and protective factors in order to predict severe trajectories of antisocial behavior. Of the 194 children studied, the researchers reported that children who had been classified as insecurely attached at 12 months were significantly more likely to continue on a high behavior problem trajectory into preschool (i.e., to demonstrate consistent increases in conduct problems). In addition, among children who were exposed to family environments characterized by multiple problems (e.g., high financial stress, maternal depression and delinquency as well as many stressful life events), those who were insecurely attached were at substantially greater risk for developing the high behavior problem trajectory (versus the securely attached children exposed to this high-risk type of environment, who developed the high behavior problem trajectory no more than would be expected by chance). Moreover, the researchers reported that insecurely attached children were also more likely than their secure peers to develop the high behavior problem trajectory even when exposed to positive parenting (e.g., high warmth, high parental competence, and low negative control), suggesting that secure attachments may serve to prevent severe conduct problems in low-risk contexts. However, since these researchers assessed conduct problems among children of adolescent mothers between the ages of 24 and 64 months (or 2–4.5 years), the question remains whether infant attachment security continues to act as a formal moderator of the effects of multiple dimensions of parenting on conduct problems among high-risk children into grade school.

The Present Study

The present study used longitudinal data to investigate the potential moderating effect of infant attachment security on associations between different parenting variables (parental self-efficacy, positive parenting, and criticism) and child aggression in a sample of children of adolescent mothers at high risk for developing early-onset conduct problems. Previous studies using this sample have supported the direct effects of infant attachment security and hostile parenting on later child conduct problems [26, 27]. In addition, when Vando et al. [27] attempted to test mediation models of hostile parenting and maternal depression on infant attachment security and conduct problems using this sample, they determined that the effects of maternal depression and hostile parenting on conduct problems were better accounted for when the children were separated into groups by dichotomous attachment status. However, since Vando et al.'s post hoc analysis only assessed the moderating effect of attachment on the association between a single dimension of parenting (i.e., hostility) and child conduct problems, the question remains whether early attachment security buffers the effects of other aspects of parenting that have been shown to predict child conduct problems (e.g., criticism, lack of exposure to positive parenting, low parental self-efficacy) up until grade school.

Thus, this study extends previous research by being the first to test formal moderation models in order to answer the following research question: Does infant attachment security act as a moderator of the associations between multiple aspects of parenting and child aggression among a high-risk sample of children of adolescent mothers? This study is the first to examine whether infant attachment security moderates the association between behavioral and cognitive dimensions of parenting during preschool and child conduct problems in grade school. It was hypothesized that attachment security would significantly moderate associations between each of the three parenting variables measured in preschool (self-efficacy, positive parenting and criticism) and child aggression in grade 1. Based on previous research linking both positive and negative dimensions of parenting to higher rates of conduct problems among children, it was predicted that insecurely attached children would be more likely to act aggressively in grade 1 as a result of earlier exposure to less positive parenting and more criticism. No specific predictions were made with respect to maternal self-efficacy, given the lack of research on the relationships between parent–child attachment, parental cognitions, and child conduct problems.

Method

Sample

The data were obtained from a longitudinal study, the Early Parenting Project, which was conducted to investigate the etiology of conduct problems in children of adolescent mothers. Participants were 115 mother–child dyads living in the Puget Sound region in Washington State, USA. The adolescent mothers and their children were recruited through high schools, social services programs, and public health clinics. Dyads were considered eligible if the child

was close to the age of 12 months at the outset of the study (child ages ranged from 10.4 to 21.0 months at the first assessment) and if the mother had given birth to the target child before the age of 20.

While all mother–child dyads were originally assessed around the time of the child's first birthday, this sample consisted of two age cohorts, separated by 1 year in the preschool time points. That is, children in the younger cohort ($n = 46$) were assessed at 1, 3.5, 4.5 years, and in the summers following grades 1, 2, and 3. In contrast, children in the older cohort ($n = 69$) were assessed when they were 1, 4.5, 5.5 years, and in the summers following grades 1, 2, and 3. All participants had participated in a prior research study and had agreed in that first consent to be contacted for future studies. Written consent was obtained from mothers at each time point of the study. In addition, assent was obtained from children from the first preschool time point onward. For the purpose of this study, only data collected when children were 1 year old, 4.5 years old, and in the summer following grade 1 were employed to address the primary research questions. This study was fully approved by the institutional review boards of participating universities (i.e., University of Washington and Simon Fraser University).

Participants in this study were 82 mother–child (45 % boys) dyads. In the original sample of 115 dyads, rates of missingness on the predictor variables ranged from 2 to 11 % (2 % for infant attachment security, 10 % for parental self-efficacy, and 11 % for positive parenting and maternal criticism). The rate of missingness for the dependent variable (child aggression) was 17 %. Notably, missingness most typically took the form of wave nonresponse. The 33 dyads with missing data did not significantly differ from the 82 dyads included in the analyses on any of the demographic variables noted above, infant attachment, positive parenting behaviours, maternal criticism, or child aggression ($p > .05$ in all cases). Included and excluded dyads did differ on one of the study variables: parental self-efficacy. Included mothers reported more confidence in their parenting than excluded mothers who had data on this variable (i.e., 21 out of 33 excluded mothers; $p = .03$). Given the high rates of missingness *within* a substantial number of cases (> 60 % missing in 11 % of the sample) as well as *between* cases on the dependent variable (17 % of the sample), only dyads with complete data from all time points on all measures were included in the analyses. Among these 82 dyads, adolescent mothers self-identified as Caucasian (81.7 %), African-American (12.2 %), Native American (3.7 %), Hispanic/Latino (1.2 %), and other (1.2 %) ethnic backgrounds. All of the adolescent mothers had been less than 20 years old at the time the study child was born ($M = 17.34$; range = 14.51–19.92). Upon recruitment, the adolescent mothers had an average of 10.80 years of education, on average were of low or lower-middle class, and were mostly unmarried (79.3 %).

Procedure

As noted above, data were utilized from three assessment times: when children were 1 year old, 4.5 years old, and in the summer following grade 1. Across the time points, research assistants collected data in the laboratory and in participants' homes. Laboratory assessments included direct observations of parent–child interactions, and parent reports on parenting and child behavior. In homes, demographic information was gathered from parents.

Measures

Demographic variables, including *child sex* as well as *mother's age at the birth of the study child, race, level of education, socioeconomic status*, and *marital status* were reported by mothers on a demographic questionnaire, which was administered when the children were aged 1 year. Mothers' level of education was expressed as the total number of years that mothers attended school.

Infant attachment security was measured around the child's first birthday using the Strange Situation [29]. In the laboratory, each mother-infant dyad participated in a 25-min procedure involving various episodes of the mother and a stranger entering and leaving the room in order to assess the infant's responses to these various situations. These interactions were videotaped and infants' attachment behaviors were double-coded as either secure ($n = 39$), avoidant ($n = 23$), resistant ($n = 2$), or disorganized ($n = 18$). Infants were classified as secure if they became mildly distressed when the mother left the room but were able to greet her, seek comfort from her, and resume play when she returned. Insecure-avoidant classifications were assigned to infants who were uninvolved with their mothers; were unlikely to be distressed when the mothers left them in the room with the stranger; and turned away or ignored the mothers when they returned to the room. Infants were classified as insecure-resistant when they became extremely upset when their mothers left the room and alternately sought contact and pushed their mothers away angrily when they returned to the room (i.e., were unable to be soothed by their mothers upon return). Finally, insecure-disorganized attachment classifications were assigned to infants who showed a lack of any coherent strategy for obtaining or avoiding proximity to their mothers; who showed apprehension or confusion upon their mothers' return; or who showed dazed or disorganized confusion while in contact with her. These coding procedures were conducted in accordance with those described

by Ainsworth et al. [29] and in the case of disorganized attachment classifications, Main and Solomon [42]. Overall, the agreement between coders was 82 % ($\kappa = .73$) [43]. For the purpose of this study, attachment security was analyzed as a dichotomous variable (i.e., children were classified as either securely or insecurely attached). The attachment distribution in this sample was thus 52.4 % insecure ($n = 43$) and 47.6 % secure ($n = 39$).

Maternal parenting practices were observed when children were 4.5 years old using the parent–child interaction task (PCIT) [44, 45]. The PCIT is a 25-min procedure during which mothers were instructed to interact with their children in the following ways: (a) during the Child's Game, mothers followed the child's lead in free play for 10 min; (b) in the Parent's Game, mother's directed the course of play for 10 min; and (c) in the Clean-up phase, mothers directed children to put away toys and clean up the room for up to 5 min. These interactions were videotaped and coded using the Behavioral Coding System (BCS) [45]. Trained coders coded the following parenting behaviors, which are expressed in rates per minute to account for the slight variation in the time taken to complete the interaction task: (1) criticism (i.e., maternal statements regarding negative attributes of the child or the child's behavior possessions, or creative products) and (2) positive parenting behavior (i.e., maternal behaviors aimed at attending [i.e., verbal descriptions of the child's activity, spatial orientation, or appearance] to and/or rewarding [e.g., verbal praise] of the child). Interobserver agreement was satisfactory (i.e., at or above 80 % for all codes).

Maternal self-efficacy was assessed by maternal self-report when children were 4.5 years old using the Parenting Sense of Competence Scale (PSOC) [46]. The PSOC is a questionnaire designed to assess parental self-esteem by requiring parents to report the extent to which they agree (on a 6-point scale: 1 = "strongly disagree" through 6 = "strongly agree") with statements regarding their efficacy and satisfaction in regards to their parenting (e.g., "I meet my own personal expectations for expertise in caring for my child"). For this study, only maternal scores on the efficacy subscale (i.e., scores pertaining to the degree to which the mothers felt competent and confident in their childrearing) were used (range = 20.0–39.0). The authors of the measure have reported adequate psychometric properties [46].

Child aggression was assessed in the summer following grade 1 using mother reports on the Child Behavior Checklist (CBCL) [47]. The CBCL (consisting of 120 items) is a widely used measure that assesses child behavior problems and has good reliability (alphas and test–retest reliability >.85) and validity [47]. Mothers were asked to indicate on a scale of 0–2 (0 = "not true"; 1 = "somewhat or sometimes true"; 2 = "very true or often true") the accuracy of various statements regarding behavior problems with respect to the target child (e.g., "Physically attacks people"). The CBCL yields externalizing, internalizing and total problem broadband scores as well as subscale narrowband scores. The externalizing broadband scale, commonly used to assess conduct problems among youth, is comprised of two narrowband scales which assess aggressive behavior and delinquent behavior, respectively. We report on the aggression subscale for two reasons. First, past research highlights the particular importance of aggressive behavior in early childhood in predicting negative developmental trajectories [48], and items related to aggression (e.g., bullying/cruelty, deliberately breaking/destroying things, fighting) have recently been shown to provide particularly valuable measurement information in screening tools used to assess disruptive behavior problems among young children [49]. Second, some of the items in the delinquent behavior subscale (e.g., vandalism, alcohol use, stealing) are less applicable to the young children in our sample. Normalized *T*-scores from the aggressive narrowband scale were used to assess aggressive behavior in children in order to differentiate scores that were clinically important [47]. These *T*-scores were calculated for each child by summing the raw grade 1 scores on the items pertaining to his or her aggressive behavior and by determining the associated *T*-scores (according to gender and age) as indicated by the author of the measure. These normalized *T*-scores, which have a mean of 50 and a standard deviation of 10, were determined separately for boys and girls of various ages based on a sample of 2,300 children [47].

Results

Preliminary Analyses

Table 1 presents descriptive statistics as well as correlations among the main study variables and demographic characteristics of the sample. There was a significant negative correlation between mothers' level of education when children were aged 1 year and child aggression in grade 1 ($r = -.29$, $p < .01$). Therefore, this demographic variable was included as a potential covariate in the regression analyses in addition to child sex. As expected, infant attachment security was significantly negatively correlated with child aggression in grade 1 ($r = -.37$, $p < .01$). None of the parenting variables measured in preschool were significantly associated with child aggression in grade 1; however, there was a trend for a significant relationship between maternal self-efficacy and later child aggression ($r = -.21$, $p = .06$).

Inspection of the distribution properties of scores for the main study variables revealed an extreme leptokurtic

Table 1 Bivariate correlations, means, and standard deviations for all measured variables (N = 82)

	M (*SD*) or %	1	2	3	4	5	6	7	8	9	10
1. Child sex (male)	45.1 %	–									
2. Mother age[a]	17.34 (1.22)	−.05	–								
3. Mother race (Caucasian)	81.7 %	.04	−.07	–							
4. Mother education (years)[a]	10.80 (1.13)	−.01	.25*	−.15	–						
5. Mother SES (low)[a]	59.8 %	−.14	.26*	.15	.05	–					
6. Mother married (yes)[a]	20.7 %	−.08	.35**	−.15	.01	.17	–				
7. Child aggression[b]	59.09 (8.50)	.15	−.01	−.01	−.29**	−.07	.12	–			
8. Attachment status (secure)	47.6 %	−.02	.00	.03	.06	.08	−.25*	−.37**	–		
9. Maternal self-efficacy	31.28 (4.56)	−.15	.12	−.11	.19†	.06	−.07	−.21†	−.04	–	
10. Positive parenting[c]	.60 (.34)	−.00	.14	.05	.10	.19†	.10	−.18	.13	.01	–
11. Maternal criticism[c]	.05 (.06)	−.05	.34**	.01	.04	−.04	.09	.08	−.00	.08	.05

[a] At birth of the study child

[b] *T*-score

[c] Rate per minute

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

distribution of maternal criticism scores (kurtosis = 6.29) [50]. Scores for maternal criticism were log transformed; however, after this transformation was conducted, these scores remained positively skewed for children with an insecure attachment (kurtosis = 7.36). In line with Osborne and Overbay [51], further analyses of this distribution provided evidence for one significant outlier score 5.5 *SD*'s above the mean on maternal criticism. The removal of this outlier reduced the kurtosis value for maternal criticism in children with an insecure attachment to an acceptable level (kurtosis = 3.07).[1]

The Moderating Effect of Infant Attachment Security on Parenting in Preschool and Child Aggression in Grade 1

Three hierarchical multiple regression analyses were conducted to assess the moderating effect of attachment security on the relationships between the three maternal parenting variables measured in preschool (i.e., when children were 4.5 years old) and child aggression in grade 1. Mean-centered scores on the continuous independent variables were computed and separate analyses were conducted for self-efficacy, positive parenting behavior, and criticism. The following variables were entered into each of the regression models in three steps: (1) the potential covariates (i.e., child sex, mothers' level of education); (2) the main effects of attachment security and the relevant parenting variable; and (3) the product terms of attachment security and the relevant parenting variable. The dependent variable in all analyses was child aggression *T*-scores in grade 1.

Table 2 Regression analyses testing for the moderating effect of infant attachment security on associations between parenting variables in preschool and child aggression in grade 1

Step	Independent variables	Child aggression		
		β	$R^2\Delta$	R^2
Maternal self-efficacy ($N = 82$)				
1.	Child sex	.15		
	Maternal education	−.29**	.11*	
2.	Attachment security	−.36***		
	Maternal self-efficacy	−.16	.15**	
3.	Maternal self efficacy × attachment security	−.08	.00	.26
Maternal positive parenting ($N = 82$)				
1.	Child sex	.15		
	Maternal education	−.29**	.11*	
2.	Attachment security	−.34**		
	Maternal positive parenting	−.11	.13**	
3.	Maternal positive parenting × attachment security	−.01	.00	.24
Maternal criticism ($N = 81$)				
1.	Child sex	.16		
	Maternal education	−.29**	.11*	
2.	Attachment security	−.35**		
	Maternal criticism	.09	.13**	
3.	Maternal criticism × attachment security	−.36*	.06*	.29

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

[1] The regression analysis involving maternal criticism was re-run using the skewed scores from the full sample ($N = 82$), and the pattern of the results remained the same.

Table 2 shows the results of the separate regression analyses for the three parenting variables. In the first analysis, the moderating effect of infant attachment security on the association between maternal self-efficacy in preschool and child aggression in grade 1 was examined. There were significant main effects for mother's level of education and attachment security, with lower levels of maternal education and insecure attachment linked to higher scores on child aggression. The interaction effect involving attachment security and maternal self-efficacy was not significant. The overall regression model (i.e., the regression model that did not include the interaction term) was significant, $F(4,77) = 6.60$, $p < .01$.

In the second analysis, the moderating effect of infant attachment security on the association between observed maternal positive parenting in preschool and child aggression in grade 1 was examined. Again, significant main effects for mother's level of education and attachment security were found; however, the positive parenting x attachment security interaction effect was not significant. The overall regression model (i.e., the regression model that did not include the interaction term) was significant, $F(4,77) = 6.13$, $p < .01$.

The final analysis investigated the moderating effect of infant attachment security on the association between observed maternal criticism in preschool and child aggression in grade 1. In line with the abovementioned main effects, both mothers' level of education and attachment security were significantly associated with later child aggression. There was a significant interaction effect between attachment security and maternal criticism ($p = .02$),[2,3] The overall regression model (i.e., the regression model that included the interaction term) was significant, $F(5,75) = 6.26$, $p < .01$. The significant interaction effect was dismantled by examining whether the slopes of the regression lines for the secure and insecure groups differed significantly from zero [52]. Regression equations were used to plot the mean values for child aggression at minimum and maximum observed values for maternal criticism as a function of attachment status (see Fig. 1). Maternal criticism in preschool was significantly positively associated with child aggression in grade 1 among children with an insecure attachment ($\beta = .27$, $p = .05$). There was no significant association between maternal criticism and child aggression among children with a secure attachment ($\beta = -.14$, $p = .47$).

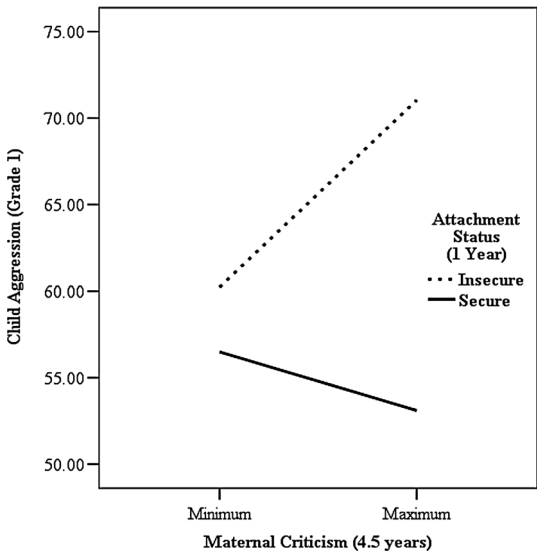

Fig. 1 Simple slopes of the association between maternal criticism at 4.5 years and child aggression in grade 1 for children who were classified as insecurely and securely attached in infancy

Discussion

Parenting and attachment are key factors implicated in the development of early-onset conduct problems. Using a sample of children of adolescent mothers that are at high risk for developing early-onset conduct problems, the main aim of this study was to examine whether attachment security in infancy moderated the association between three aspects of parenting in preschool (parental self-efficacy, positive parenting, and criticism) and child aggression in grade 1.

First, our results did not reveal significant correlations between any of the parenting variables measured in preschool and child aggression in grade 1. This is in direct contrast to a substantial body of research suggesting a strong predictive link between parenting practices (both positive and negative) and child conduct problems [6, 8, 9]. However, the magnitude of the correlations between two of the parenting variables (self-efficacy and positive parenting) and child aggression were in the expected direction ($r = -.21$, $p = .06$ and $r = -.18$, $p = .11$, respectively), and may have reached statistical significance if a larger sample had been available.

Second, insecure attachment status at 1 year was found to significantly predict greater child aggression in grade 1, which is consistent with a substantial body of research suggesting that attachment security plays a role in the development of conduct problems in children [26, 30–32].

[2] The interaction effect remained significant when CBCL subscale scores at 4.5 years old (i.e., withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior) were controlled for ($p = .02$).

[3] The regression analyses were re-run using the multiple imputation function on SPSS and the pattern of the results remained the same. However, due to the patterns of missingness in this sample, the results based on imputed data are not formally reported.

Third, results from the regression analyses demonstrated that infant attachment security moderated the association between maternal criticism and later child aggression. Higher rates of maternal criticism in preschool significantly predicted higher rates of aggression in grade 1 among children who had been classified as insecurely attached in infancy. In contrast, exposure to maternal criticism in preschool did not significantly predict later aggression among children who had been classified as securely attached. These results are particularly interesting given the lack of correlation found between attachment security and maternal criticism, as this suggests that the secure and insecure children in this sample did not differ in their exposure to maternal criticism (as a t test confirmed; $p > .05$). These results are in line with Kochanska and Kim's [36] findings that parental power assertion only predicted antisocial outcomes among children who had been classified as insecurely attached in infancy. Thus, our results provide further support for a broader conceptualization of attachment, which posits that attachment security may exert its influence on the development of child conduct problems by providing the *context* in which risk factors operate. That is, attachment may provide a lens through which children perceive negative aspects of parenting. From this perspective, it follows that securely attached children may be less vulnerable to the deleterious effects of harsh parenting practices such as criticism, because these children have a stronger foundation of positive emotionality and mutual responsiveness with their caregivers. Insecurely attached children, in contrast, are more likely to view their caregivers' positive regard and attention to their needs as less reliable and thus, are possibly more susceptible to the negative effects of criticism expressed by their caregivers.

Fourth, in contrast with some other research [41], infant attachment security did not significantly moderate the relationships between positive dimensions of parenting (parental self-efficacy and positive parenting practices) and later child aggression. Keller et al. [41] found that secure attachment continued to act as a protective factor in low-risk family environments characterized by positive parenting practices. However, in the present research, it appeared that exposure to positive parenting in preschool protected neither secure nor insecure children from developing conduct problems. That is, it appeared that attachment security may have had a more pronounced protective effect in family environments characterized by maladaptive parenting practices such as criticism.

This study has several noteworthy strengths. First, the data come from a longitudinal study that tracked adolescent mother–child dyads over a period of 5 years. Given that the aim of this study was to assess the tenability of a moderation model involving attachment security, parenting variables and child aggression, the temporal separation of these variables is extremely important. Second, the Strange Situation [29] was used to examine attachment security when children were 12 months old. This "gold standard" observational measure has been widely used to measure early attachment relationships [53], and has been determined to be valid and reliable [29]. Third, direct observational measures (rather than parent reports) were used to assess specific parenting behaviors. In preschool, both positive and negative parenting practices were observed, which eliminated the possibility of obtaining biased maternal reports on their own parenting practices. Finally, the sample of child participants can be characterized as high risk, as children of adolescent mothers tend to display higher rates of conduct problems [22]. This is beneficial considering that information regarding the development of conduct problems among this specific group of children is particularly needed.

There are also several limitations of this study. The use of listwise deletion in these analyses identified 33 cases from the original sample with missing values on the study variables, the inclusion of which would have resulted in increased power to detect significant correlations between the parenting variables and child aggression as well as significant moderation effects of attachment security. Moreover, a dichotomous measure of attachment security was used in this study, despite the fact that attachment disorganization has been shown to be particularly predictive of conduct problems in children [30]. Thus, future research on the moderating effect of attachment security in relation to parenting and conduct problems should further investigate the role of attachment disorganization, as was done by Kochanska et al. [35] with respect to parental power assertion. Similarly, this study utilized a single report from mothers to assess child aggression in grade 1, which may have provided an insufficient and/or biased account of child conduct problems. In addition to our multi-method approach, future studies on this topic should incorporate multiple informants for the measurement of child behavior to determine whether the moderating effect of attachment extends to children with conduct problems.

Should the moderating effect of attachment on parenting and conduct problems prove to hold with replication using larger samples of at-risk families, research efforts should then aim to investigate the exact mechanisms through which attachment exerts its influence on the dynamic process of socialization during childhood. For example, recent research suggests that attachment security may play an indirect role in the development of conduct problems among children by facilitating the development of more proximal factors such as emotion regulation, empathy, and a willing stance towards socialization [34, 36, 54]—all of which have been linked to the later development of conduct

problems [34, 55, 56]. Moreover, future research on this topic should aim to identify the specific features of secure parent–child relationships (e.g., warmth, mutual responsiveness) that serve to promote positive behavioral adjustment among children at risk for developing conduct problems and also seek to investigate the unique contributions of children and parents in this bidirectional process of socialization in order to highlight areas for intervention.

Summary

Overall, this study demonstrates that early attachment may be a pivotal factor in the development of conduct problems among children of adolescent mothers. In line with previous research [30], infant attachment security was shown to have a main effect on child aggression in grade 1. Moreover, attachment security in infancy was found to moderate the association between maternal criticism in preschool and child aggression in grade 1, such that children with an insecure versus secure attachment demonstrated higher levels of aggression associated with greater exposure to criticism expressed by their caregivers. Taken together, these findings indicate that infant attachment security may be an important target of intervention for children at risk for developing conduct problems, particularly when such children are likely to be exposed to maladaptive parenting practices. Undoubtedly, efforts aimed at decreasing the frequency of negative parenting practices such as criticism are valuable, as they have been shown to be effective in reducing conduct problems among children [57, 58]. However, given initial evidence suggesting that attachment-based interventions are effective at promoting positive parent–child attachments [59] and preventing the development of conduct problems among young children [60], this study indicates that interventions aimed at fostering secure attachments in early life may serve to further enhance children's resilience during the delicate process of socialization.

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References

1. McMahon RJ, Wells KC, Kotler JS (2006) Conduct problems. In: Mash EJ, Barkley RA (eds) Treatment of childhood disorders, 3rd edn. Guilford Press, New York, pp 137–268
2. Fergusson DM, Horwood LJ, Ridder EM (2005) Show me a child at seven: the consequences of conduct problems in childhood for psychosocial functioning in adulthood. J Child Psychol Psychiatry 48:837–849
3. Reef J, Diamantopoulou S, van Meurs I, Verhulst FC, van der Ende J (2011) Developmental trajectories of child to adolescent externalizing behavior and adult DSM-IV disorder: results of a 24-year longitudinal study. Soc Psychiatry and Psychiatr Epidemiol 46:1233–1241
4. Frick PJ, White SF (2008) Research review: the importance of callous-unemotional traits for developmental models of aggressive and antisocial behavior. J Child Psychol Psychiatry 49:359–375
5. Moffitt TE (1993) Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. Psychol Rev 100:674–701
6. Rothbaum F, Weisz JR (1994) Parental caregiving and child externalizing behavior in nonclinical samples: a meta-analysis. Psychol Bull 116:55–74
7. Brannigan A, Gemmell W, Pevalin DJ, Wade TJ (2002) Self-control and social control in childhood misconduct and aggression: the role of family structure, hyperactivity, and hostile parenting. Can J Criminol 44:119–142
8. Campbell SB (1995) Behavior problems in preschool children: a review of recent research. J Child Psychol Psychiatry 36:113–149
9. Hoeve M, Dubas JS, Echelsheim VI, van der Laan PH, Smeenk W, Gerris J (2009) The relationship between parenting and delinquency: a meta-analysis. J Abnorm Child Psychol 37:749–775
10. Patterson GR (1982) Coercive family process. Castalia, Eugene, OR
11. Denham SA, Workman E, Cole PM, Weissbrod C, Kendziora MT, Zahn-Waxler C (2000) Prediction of externalizing behavior problems from early to middle childhood: the role of parental socialization and emotional expression. Dev Psychopathol 12:23–45
12. Gardner F (1992) Parent-child interaction and conduct disorder. Educ Psychol Rev 4:135–163
13. Kochanska G, Barry RA, Aksan N, Boldt LJ (2008) A developmental model of maternal and child contributions to disruptive conduct: the first six years. J Child Psychol Psychiatry 49:1220–1227
14. Russell A, Russell G (1996) Positive parenting and boy's and girls' misbehaviour during a home observation. Int J Behav Dev 19:291–307
15. Boeldt DL, Rhee SH, DiLalla LE, Mullineaux PY, Schulz-Heik RJ, Corley RP et al (2012) The association between positive parenting and externalizing behaviour. Infant Child Dev 21:85–106
16. Chronis AM, Lahey BB, Pelham WE, Williams SH, Baumann BL, Kipp H et al (2007) Maternal depression and early positive parenting predict future conduct problems in young children with attention-deficit/hyperactivity disorder. Dev Psychol 4:70–82
17. Dodge KA, Pettit GS, Bates JE (1994) Socialization mediators of the relation between socioeconomic status and child conduct problems. Child Dev 65:649–665
18. Sanders MR, Woolley ML (2004) The relationship between maternal self-efficacy and parenting practices: implications for parent training. Health Dev 31:65–73
19. Weaver CM, Shaw DS, Dishion TJ, Wilson MN (2008) Parenting self-efficacy and problem behavior in children at risk for early conduct problems: the mediating role of maternal depression. Infant Behav Dev 31:594–605
20. Bor W, Sanders MR (2004) Correlates of self-reported coercive parenting of preschool-aged children at high risk for the development of conduct problems. Aust N Z J Psychiatry 38:738–745
21. Jones TL, Prinz RJ (2005) Potential roles of parental self-efficacy in parent and child adjustment: a review. Clin Psychol Rev 25:341–363
22. Lounds JJ, Borkowski JG, Whitman TL (2006) The potential for child neglect: the case of adolescent mothers and their children. Child Maltreat 11:281–294

23. Flaherty SC, Sadler LS (2011) A review of attachment theory in the context of adolescent parenting. J Pediatr Health Care 25:114–121
24. Al-Sahab B, Heifetz M, Tamim H, Bohr Y, Connolly J (2012) Prevalence and characteristics of teen motherhood in Canada. Matern Child Health J 16:228–234
25. Reid V, Meadows-Oliver M (2007) Postpartum depression in adolescent mothers: an integrative review of the literature. J Pediatr Health Care 21:289–298
26. Munson JA, McMahon RJ, Spieker SJ (2001) Structure and variability in the developmental trajectory of children's externalizing problems: impact of infant attachment, maternal depressive symptomology, and child sex. Dev Psychopathol 13:277–296
27. Vando J, Rhule-Louie DM, McMahon RJ, Spieker SJ (2008) Examining the link between infant attachment and child conduct problems in grade 1. J Child Fam Stud 17:615–628
28. Black MM, Papas MA, Hussey JM, Dubowitz H, Kotch JB, Starr RH et al (2002) Behavior problems among preschool children born to adolescent mothers: effects of maternal depression and perceptions of partnered relationships. J Clin Child Adolesc Psychol 31:16–26
29. Ainsworth MS, Blehar MC, Waters E, Wall S (1978) Patterns of attachment: a psychological study of the strange situation. Erlbaum, Hillsdale, NJ
30. Fearon RP, Bakermans-Kranenburg MJ, van Ijzendoorn MH, Lapsley A, Roisman GI (2010) The significance of insecure attachment and disorganization in the development of children's externalizing behavior: a meta-analytic study. Child Dev 81:435–456
31. Hoeve M, Stams G, van der Put CE, Dubas JS, van der Laan PH, Gerris J (2012) A meta-analysis of attachment to parents and delinquency. J Abnorm Psychol 40:771–785
32. O'Connor EE, Collins BA, Supplee L (2012) Behavior problems in late childhood: the roles of early maternal attachment and teacher-child relationship trajectories. Attach Hum Dev 14:265–288
33. National Institute for Child and Human Development Early Child Care Research Network (2006) Infant-mother attachment classification: risk and protection in relation to changing maternal caregiving quality. Dev Psychol 42:38–58
34. Kochanska G, Woodard J, Kim S, Koenig JL, Yoon JE, Barry RA (2010) Positive socialization mechanisms in secure and insecure parent-child dyads: two longitudinal studies. J Child Psychol Psychiatry 51:998–1009
35. Kochanska G, Barry RA, Stellern SA, O'Bleness JJ (2009) Early attachment organization moderates the parent-child mutually coercive pathway to children's antisocial conduct. Child Dev 80:1288–1300
36. Kochanska G, Kim S (2012) Toward a new understanding of legacy of early attachments for future antisocial trajectories: evidence from two longitudinal studies. Dev Psychopathol 24:783–806
37. Deater-Deckard K, Ivy L, Petrill SA (2006) Maternal warmth moderates the link between physical punishment and child externalizing problems: a parent-offspring behavior genetic analysis. Parent Sci Pract 6:59–78
38. McKee L, Roland E, Coffelt N, Olson AL, Forehand R, Massari C et al (2007) Harsh discipline and child problem behaviors: the roles of positive parenting and gender. J Fam Violence 22:187–196
39. McLoyd VC, Smith J (2002) Physical discipline and behavior problems in African American, European American, and Hispanic children: emotional support as a moderator. J Marriage Fam 64:40–53
40. Alink L, Mesman J, van Zeijl J, Stolk MN, Juffer F, Bakermans-Kranenberg MJ, van IJzendoorn MH (2008) Maternal sensitivity moderates the relation between negative discipline and aggression in early childhood. Soc Dev 18:99–120
41. Keller TS, Spieker SJ, Gilchrist L (2005) Patterns of risk and trajectories of preschool problem behaviors: a person-oriented analysis of attachment in context. Dev Psychopathol 17:349–384
42. Main M, Solomon J (1990) Procedures for identifying infants as disorganized/disoriented during the Ainsworth Strange Situation. In: Greenberg M, Cicchetti D, Cummings E (eds) Attachment in the preschool years. University of Chicago Press, Chicago, IL, pp 121–160
43. Spieker SJ, Bensley L (1994) Roles of living arrangements and grandmother social support in adolescent mothering and infant attachment. Dev Psychol 30:102–111
44. Eyberg SM, Robinson EA (1983) Dyadic parent-child interaction coding system: a manual. Psychol Doc 13: Ms. No. 2582
45. Forehand R, McMahon RJ (1981) Helping the noncompliant child: a clinician's guide to parent training. Guilford Press, New York
46. Johnston C, Mash EJ (1989) A measure of parenting satisfaction and efficacy. J Clin Child Psychol 18:167–175
47. Achenbach TM (1991) Manual for the Child Behavior Checklist/4-18 and 1991 profile. University of Vermont Department of Psychiatry, Burlington, VT
48. Campbell SB, Spieker S, Burchinal M, Poe MD, the NICHD Early Child Care Research Network, (2006) Trajectories of physical aggression from toddlerhood to age 9 predict academic and social functioning through age 12. J Child Psychol Psychiatry 47:791–800
49. Studts CR, van Zyl MA (2013) Identification of developmentally appropriate screening items for disruptive behavior problems in preschoolers. J Abnorm Child Psychol. doi:10.1007/s10802-013-9738-8
50. Kline RB (1998) Principles and practice of structural equation modeling. Guilford Press, New York
51. Osborn JW, Overbay A (2008) Best practices in data cleaning; how outliers and "fringeliers" can increase error rates and decrease the quality of precision in your results. In: Osborne JW (ed) Best practices in quantitative methods. Sage, Thousand Oaks, CA, pp 205–213
52. Cohen J, Cohen P, West SG, Aiken LS (2003) Applied multiple regression/correlation analysis for the behavioral sciences, 3rd edn. Erlbaum, Hillsdale, NJ
53. Goldberg S (2001) Attachment assessment in the strange situation. In: Singer LT, Zeskind PS (eds) Biobehavioral assessment of the infant. Guilford Press, New York, NY, pp 209–230
54. Panfile TM, Liable DJ (2012) Attachment security and child's empathy: the mediating role of emotion regulation. Merrill Palmer Q 58:1–21
55. Cole PM, Teti LO, Zahn-Waxler C (2003) Mutual emotion regulation and the stability of conduct problems between preschool and early school age. Dev Psychopathol 15:1–18
56. Jones AP, Happe F, Gilbert F, Burnett S, Viding E (2012) Feeling, caring, and knowing: different types of empathy deficit in boys with psychopathic tendencies and autism spectrum disorder. J Child Psychol Psychiatry 51:1188–1197
57. Furlong M, McGilloway S, Bywater T, Hutchings J, Smith SM, Donnelly M (2012) Behavioural and cognitive-behavioural group-based parenting programmes for early-onset conduct problems in children aged 3 to 12 years (Review). Evid Based Child Health 2:318–692
58. McMahon RJ, Pasalich DS (in press) Family-based interventions for young children with conduct problems as a means of delinquency prevention. In: Craig WM, Pepler DJ, Cummings J (eds) Creating healthy relationships to prevent bullying: get the tools to take action. PREVNet Series, vol V. National Printers, Ottawa
59. Hoffman KT, Marvin RS, Cooper G, Powell B (2006) Changing toddlers' and preschoolers' attachment classifications: the circle of security intervention. J Consult Clin Psychol 74:1017–1026
60. Klein Velderman M, Bakermans-Kranenburg MJ, Juffer F, Van Ijzendoorn MH, Mangelsdorf SC, Zevalkink J (2006) Preventing preschool externalizing behavior problems through video-feedback intervention in infancy. Infant Ment Health J 27:466–493