
Maternal Sensitivity Moderates the Relation between Negative Discipline and Aggression in Early Childhood

Lenneke R. A. Alink, Judi Mesman, Jantien van Zeijl, Mirjam N. Stolk, Femmie Juffer, Marian J. Bakermans-Kranenburg, Marinus H. van IJzendoorn, *Centre for Child and Family Studies, Leiden University* and Hans M. Koot, *Department of Developmental Psychology, Vrije Universiteit Amsterdam*

Abstract

Three models regarding the relation between maternal (in)sensitivity, negative discipline, and child aggression were examined in a sample of 117 mother–child pairs with high scores on child externalizing behavior: (1) Sensitivity and discipline are uniquely related to child aggression (the additive model); (2) the relation between discipline and aggression is moderated by maternal sensitivity (the moderating model); (3) the relation between sensitivity and aggression is mediated by maternal discipline (the mediating model). Parenting and child aggression were observed when the children were on average 26.71 months old (range of 13.58 to 41.91 months) and again one year later. Results supported the moderating model. More negative discipline was related to more child aggression one year later, but only when mothers were insensitive. This finding supports the idea that the affective context is important for the impact of negative discipline on child development.

Keywords: aggression; maternal sensitivity; negative discipline; early childhood

Introduction

Low to moderate levels of aggression are normative in early childhood (Alink et al., 2006; Tremblay, Japel, Pérusse, Boivin, Zoccolillo, & Montplaisir, 1999). High levels of aggression at this age, however, are predictive of problematic behavior at later ages (Broidy, Nagin, Tremblay, Bates, Brame, & Dodge, 2003; NICHD, 2004b). Several studies have shown that genetic and environmental influences explain roughly the same amount of variance in aggressive behaviors in children (Arseneault et al., 2003; Dionne, Tremblay, Boivin, Laplante, & Pérusse, 2003). Two important parenting factors that contribute to the environmental effect on aggression in children are parental sensitivity and discipline, which reflect the two parenting dimensions of responsiveness and demandingness distinguished by Maccoby and Martin (1983). Sensitivity

Correspondence should be addressed to J. Mesman, Centre for Child and Family Studies, Leiden University, P.O. Box 9500, 2300 RB, Leiden, The Netherlands. Email: mesmanj@fsw.leidenuniv.nl

reflects the parent's ability to adequately perceive the child's signals and to respond to them in a prompt and appropriate way (Ainsworth, Blehar, Waters, & Wall, 1978). In most observational measures, sensitivity also includes other aspects of parental behavior such as warmth and emotional support (e.g., Stams, Juffer, & Van IJzendoorn, 2002). Discipline refers to how rules and limits are imposed on the child (for a review, see Coie & Dodge, 1998). It is unclear how these aspects of parenting relate to each other in their prediction of child aggression. In addition, little is known about the effects of parenting on aggression in *early* childhood. In the current study, we investigate how maternal sensitivity and maternal discipline either uniquely or jointly (through mediating or moderating processes) predict aggression in one- to three-year-old children.

Parental Sensitivity and Child Aggression

Several studies have shown that parental insensitivity (e.g., pointing out a child's mistakes in a negative or hostile way while the child is trying to complete a puzzle instead of supporting the child) is a precursor of high levels of child aggression (e.g., NICHD, 2004b; Olson, Bates, Sandy, & Lanthier, 2000). In the NICHD study on physical aggression from toddlerhood to middle childhood, various aggression trajectories between the ages of two and nine years were identified. Mothers of children in the moderate- and high-aggression trajectories were less sensitive than mothers of children in the other groups. Furthermore, Olson et al. (2000) showed that experiencing positive affective mother-child exchanges (playing games, smiling, engaging in playful conversation) was predictive of school-age and adolescent low rates of aggression. In addition, several studies have shown that maternal insensitivity is related to the broader category of externalizing behaviors (e.g., Shaw, Bell, & Gilliom, 2000).

Several mechanisms may account for the relation between (in)sensitive or (un)responsive care and the development of aggression. Firstly, the effect of parental sensitivity on aggression may be mediated by its effect on affect regulation in children. In the NICHD study, lower levels of maternal sensitivity were associated with child affect dysregulation, which in turn constituted a significant risk for the children to develop problem behaviors (NICHD, 2004a). It was hypothesized that children who had less sensitive mothers received less sensitive scaffolding to help them learn to manage their negative emotions independently. As a result, the children showed higher rates and/or intensities of negative affect and problem behaviors. Secondly, according to Mary Ainsworth (Ainsworth, Bell, & Stayton, 1974), children naturally want to comply with their parents' rules when parents are sensitive and responsive. Londerville and Main (1981) indeed found that 21-month-old children who were securely attached to their mothers in infancy were more co-operative and compliant than insecure children. Children who have experienced insensitive early care are less motivated to behave according to parental rules or requests. As a result, these children may act with aggressive or oppositional behavior in reaction to parental limit-setting. Third, parental sensitivity may serve as a model of empathic behavior (Van IJzendoorn, 1997), and children who have learned to respond in a prosocial, empathic manner will be less likely to react aggressively to frustrating or anger-provoking situations (Miller & Eisenberg, 1988). A more general mechanism concerns the internal working models children develop based on their early experiences of parental care. When early parental care has been insensitive and unresponsive, children may develop negative working models of relationships. In social situations, they expect to be rejected, being hurt,

disappointed, or afraid, and as a result, they approach these situations with anger, mistrust, and/or anxiety (Weinfield, Sroufe, Egeland, & Carlson, 1999).

Parental Discipline and Child Aggression

The second parenting dimension distinguished by Maccoby and Martin (1983) is demandingness or control. Several studies revealed that negative or harsh discipline (e.g., giving negative commands or spanking the child) is related to the development of aggression and antisocial behavior. The longitudinal effect of physical discipline on aggressive behavior was demonstrated by Fine, Trentacosta, Izard, Mostow, and Campbell (2004) in a sample of school-aged children. They found a direct relation between caregiver reports of physical discipline and later child aggression, indicating that children who received more physical discipline were more likely to show aggressive behavior four years later. Similar results were obtained by Knutson, DeGarmo, Koepl, and Reid (2005), who investigated the role of harsh punitive discipline in the development of aggression in a sample of 218 children aged four to eight years. They found that when parents used more angry and punitive disciplinary responses, their children were more likely to show high levels of aggression.

According to social learning theory (Bandura, 1973), a mechanism through which children learn aggressive behavior is modeling. When parents regularly use negative discipline, children may imitate these behaviors and learn to use aversive strategies (such as aggression) instead of positive ways to express their needs or to solve problems. Another social learning mechanism, namely social reward, was proposed by Shaw, Gilliom, and Giovannelli (2000). They argued that when parents are rejective toward their children or when they use negative discipline strategies, children may be reinforced in their negative behavior by the attention they get from their parents. In his coercion theory, Patterson (1976, 1982) stated that negative or coercive disciplinary interchanges between parents and children are likely to continue and cumulate over time and set the stage for the development of aggression. These interchanges start with a request made or limit set by the parent, which the child refuses to meet. In turn, the parent reacts negatively (e.g., by shouting at the child) to the child's coercive refusal. Consequently, the child's coercive behavior (e.g., aggressive behavior) escalates and ultimately the parent gives in to avoid further coercive reactions from the child. The child thus learns that acting coercively is rewarded, and is more likely to show this behavior in the future (Snyder, Edwards, McGraw, Kilgore, & Holton, 1994; Snyder & Patterson, 1995). As a result, coercive disciplinary interaction patterns leading to the development of aggressive behavior may be established.

Sensitivity and Discipline in Relation to Child Aggression

Although both sensitivity and discipline have often been studied in relation to the development of aggressive behavior, few studies included both parenting variables. In general, those that did investigate both aspects of parenting did not specifically examine their interrelation in the prediction of aggression (e.g., Olson et al., 2000). Insensitive parenting and negative discipline may each be uniquely and independently related to child aggression. This is in line with the conclusion of Pettit and Bates (1989) that proactive parental involvement (affectively positive, educative exchanges between mother and child) and negative control are different parenting dimensions (see also Piffner, McBurnett, Rathouz, & Judice, 2005). However, research suggests that there

are two other ways in which parental sensitivity and discipline may be related to the development of child aggression (for a review, see Coie & Dodge, 1998; Deater-Deckard & Dodge, 1997; Shaw, Keenan, & Vondra, 1994).

Firstly, the effects of negative discipline may be *moderated* by parental sensitivity. Having a sensitive parent may buffer the child against the negative effects of (incidental) harsh discipline. Deater-Deckard and Dodge (1997) showed that harsh parenting was related to externalizing problems in five-year-old children. However, correlations were significantly lower in the group of children characterized by observed warm mother-child relationships than in the group of children with mothers scoring low on expressing warmth toward their children. The authors suggested that the parent-child relationship context is a crucial factor for the effect of discipline practices on child aggression. In the same vein, McLoyd and Smith (2002) reported a moderating effect of maternal emotional support on the association of spanking with problem behavior in a sample of four- and five-year-olds. Spanking was related to an increase in behavior problems over time, but only in the context of low levels of emotional support. The authors suggested that emotional support from the parent may influence the child's perception of the parental discipline strategies. In an unsupportive context the child may view the parent's behavior as rejecting, setting the stage for the development of aggression. The importance of the context in which negative or physical discipline takes place has also been underlined in cross-cultural studies. Some evidence for the moderating role of ethnic background in the relation between maternal physical discipline on children's externalizing behaviors was found by Deater-Deckard, Bates, Dodge, and Pettit (1996). Maternal physical discipline did not increase child problem behavior at school in African-American families, whereas it did in European American families. The authors suggested that African-American parents may use harsh discipline in a warm and loving context. As a result, children may not view their parent's use of physical discipline as an indication of parental lack of warmth and concern, and therefore do not show more externalizing behaviors.

It is also possible that negative or harsh discipline *mediates* the relation between sensitivity and aggression. Ainsworth's famous Baltimore study showed that maternal sensitivity is a highly stable parenting characteristic (Ainsworth et al., 1978). In addition, Ainsworth (1967) suggested that sensitivity is rooted in mothers' childhood experiences of their own parents' sensitivity, which in turn are related to the quality of attachment representations at a later age (Beckwith, Cohen, & Hamilton, 1999). In his meta-analysis, Van IJzendoorn (1995) showed that the quality of attachment representation is indeed related to sensitive parenting. Sensitivity may thus be a fundamental parenting characteristic that reflects a generalized trait. This suggests that from a developmental perspective, parental discipline may mediate the relation between sensitivity and child aggression. In early childhood, insensitive mothers and their children may develop a pattern of mutual negativity and coercive discipline, possibly leading to increased levels of child behavior problems (Patterson, DeBaryshe, & Ramsey, 1989). When a parent is not responsive to the infant's signals for attention, the child may be provoked into escalating the intensity of his demands. As a result, providing appropriate parental disciplinary responses may become more difficult, leading to an increase in coercive interactions in which negative discipline is used (Shaw et al., 1994). Londerville and Main (1981) also found that an insecure attachment relationship between mother and child (which is partly explained by maternal insensitivity; Ainsworth et al., 1978; De Wolff & Van IJzendoorn, 1997) was predictive of the mother's use of negative discipline, which in turn was related to the child's level of

non-compliance. Thus, a history of (in)sensitive parent–child interaction may precede and predict the use of (negative) discipline.

The Current Study

In the current study, we investigate the unique and combined effects of sensitivity and discipline on child aggression. We use a design that addresses some of the shortcomings of studies that investigated the association of parenting with child problem behavior. Several of these studies used only questionnaires or interviews to assess parenting and/or child behavior (e.g., Chang, Dodge, Schwartz, & McBride-Chang, 2003; McBurnett, Pfiffner, Capasso, Lahey, & Loeber, 1997; McLoyd & Smith, 2002). However, parents may not be very accurate in reporting their own (negative) parenting practices. When both parenting and child aggression are reported by the same person, informant effects may partially account for the association of parenting with child behavior. In addition, the use of cross-sectional data or the lack of a cross-lagged design may limit the validity of causal interpretations (Brook, Zheng, Whiteman, & Brook, 2001; Cowan & Cowan, 2002; Fine et al., 2004). Further, the relation between parenting and aggression has generally been studied in preschoolers and school-aged children (Deater-Deckard & Dodge, 1997; Knutson et al., 2005). Less is known about the parenting–aggression association in younger children, although knowledge about the precursors of early aggression is crucial for designing early interventions to prevent the development of serious aggressive and antisocial behavior. In addition, researchers often focused on the broad category of externalizing problems, consisting of aggressive, oppositional, and overactive behaviors (e.g., Shaw et al., 1994). However, according to Tremblay (2003) ‘each [of these subtypes] aggregates heterogeneous types of behaviors that possibly have different causes’ (p. 184). Few studies measured the effect of parenting on the development of aggression. From a developmental perspective, aggression is relevant from an early age (Alink et al., 2006), and high levels of aggression early in development are predictive of problem behavior at later ages (Broidy et al., 2003; NICHD, 2004b). Therefore, aggression appears to be a particularly salient aspect of externalizing problem behavior that needs to be a separate focus of research regarding the contribution of parenting to child development.

In the current study, we aimed to address these issues and to answer the following question: in what way are maternal sensitivity and discipline prospectively related to child aggression in one- to three-year-old children? Based on the literature, we tested three different hypotheses: (1) the additive model: sensitivity and discipline are uniquely related to child aggression; (2) the moderating model: the relation between discipline and aggression is moderated by maternal sensitivity; (3) the mediating model: the relation between sensitivity and aggression is mediated by maternal discipline. To test these models, we investigated the effect of maternal sensitivity and discipline on child aggression using observational measures to assess both parenting and child behavior at two different time points in early development.

Method

Participants and Procedure

The sample for the current article consisted of 117 mothers and their children. These participants were drawn from the Dutch screening and intervention problem behavior

in toddlerhood (SCRIPT) study. For the current study, we used observational data for the control group of the intervention study, consisting of 117 mothers and their children (73 boys), who were selected for having high levels of mother-reported externalizing problems (for details of the selection procedure and larger sample, see Van Zeijl, Mesman, Van IJzendoorn, et al., 2006). The mothers and children came to the laboratory for two 1½-hour laboratory sessions one year apart, during which several tasks were performed. The mean age of these children at Time 1 was 26.71 months ($SD = 9.98$, range 13.58 to 41.91), and at Time 2 the mean age was 39.22 months ($SD = 10.10$, range 25.64 to 56.97). The mothers were on average 33.14 years of age ($SD = 4.06$). In 51 percent of the families, the educational level of the mother was high (Bachelor's or Master's degree). The sample included 56 percent firstborn children, and 57 percent of the children in the sample had siblings.

Central Measures

Aggression. We used two different measures to code aggression: an observational measure and a questionnaire completed by the mother. The physical aggression of the child was observed during the Time 1 and Time 2 laboratory sessions in three different situations in which only the mother and child were present, including one neutral episode and two potentially frustrating episodes (Mesman et al., in press). The neutral episode was the break in which the mother and child were having a snack and a drink without further specific instructions (duration: five minutes after which coding ended, even if the break was longer). The first frustrating episode consisted of a cleanup task in which the mother was instructed to ask her child to clean up the attractive toys that they were playing with. She was allowed to help the child with three toys and to instruct the child only during the first minute. The duration of this task was one to four minutes; the episode was ended after four minutes or when the child finished the task. In the second frustration task, the mother was asked to take the toys out of the box, place them on the floor in front of and within reach of the child, and instruct the child not to touch the toys. After two minutes the child was only allowed to touch the least attractive toy for another two minutes. For one-year-olds, the duration was two times 1.5 minutes, instead of two minutes (total duration of this task: three or four minutes).

During these three episodes, we observed the frequency of child acts corresponding to our developmental definition of physical aggression: *behavior that is aimed at and may cause harm to people, animals, or objects, and is not due to motor limitations, or part of age-appropriate play and exploration.* We explicitly chose not to include the intent of the behavior in our definition, because intentions are very hard to assess at any age (Hartup, 2005) and are particularly problematic when referring to behaviors in very young children (see Mesman et al., in press). Our coding system was based on the system originally developed by Shaw et al. (1994). Behaviors that were coded as physical aggression included hitting, kicking, biting, pinching, scratching, shaking, pushing, stamping, throwing, and physically threatening to perform any of these behaviors. These behaviors of the child could be directed at the mother or the objects in the room (e.g., toys, chair, or wall). The behaviors of the child were coded from a developmental perspective. The age and developmental level of the child were taken into account when deciding whether a child's behavior could be considered aggressive. For example, for one-year-olds a certain amount of force is necessary to put heavy objects in the basket and this behavior was not considered as aggression, whereas for

older children the same amount of force can be considered excessive and therefore potentially aggressive. When coding, the context of the behaviors as well as the child's facial and verbal expressions were taken into account. Coders were unaware of other characteristics of the participants. Because the duration of the cleanup task and the attractive toys task varied, it was taken into account for further analyses. The raw frequencies were divided by the actual duration of the task and were multiplied by four (the standard duration of each of the two tasks). The average intra-class correlation (single rater, absolute agreement) for inter-coder reliability (for all separate pairs of coders) was .90 for one-year-olds ($N = 15$; two coders), .95 for two-year-olds (range .93 to .97; $N = 15$; three coders), and .91 for three- and four-year-olds (range .82 to .96; $N = 15$; six coders).

In addition, at Time 1 and Time 2 the mothers of the children completed the Child Behaviour Checklist (CBCL)/1¹/₂-5 externalizing problems scale (Achenbach & Rescorla, 2000; Koot, Van den Oord, Verhulst, & Boomsma, 1997). The mothers indicated whether their child displayed any of the 100 behavioral descriptions in the last two months on a three-point scale (0 = *not true*; 1 = *somewhat or sometimes true*; and 2 = *very true or often true*). For the current study we used the narrowband scale, aggressive behavior (Koot et al., 1997). Internal consistencies (Cronbach's alpha) for this scale were .86 (Time 1) and .88 (Time 2).

To create an overall aggression score we summed the standardized frequency of observed aggressive behavior and the score on the CBCL aggressive behavior subscale. The correlations between observed and mother-rated aggression were $r = .25$ ($p < .01$) at Time 1 and $r = .19$ ($p < .05$) at Time 2.

Observation of Maternal Sensitivity. The mother's sensitive responsiveness to her child was assessed during a series of problem-solving tasks in the Time 1 and Time 2 laboratory sessions. Mother and child were asked to solve tasks that were somewhat difficult considering the age of the child, using different play material (same types of tasks) for each age group. Dyads were given three problem-solving tasks at Time 1 and two tasks at Time 2 consisting of a construction task (Time 1 and 2), a puzzle (Time 1 and 2), and a sorting task (only at Time 1) for five minutes per task. Mothers were instructed to help their children in the way they would normally do. The Erickson scales were used to rate mothers' supportive presence and intrusiveness (Egeland, Erickson, Moon, Hiester, & Korfmacher, 1990; Erickson, Sroufe, & Egeland, 1985). Supportive presence refers to the mothers' positive regard and emotional support to the child by acknowledging the child's accomplishments, encouraging the child, reassuring and calming, or giving a physical sense of support while the child completed the tasks. Supportive presence was coded on a seven-point scale ranging from 1 (*completely failing to be supportive*) to 7 (*skillfully providing support*). Intrusiveness refers to the mothers' lack of respect of the child's autonomy when exploring or in problem-solving situations, by interfering with the child's needs, desires, interests, or behaviors. Intrusiveness was also coded on a seven-point scale, ranging from 1 (*non-intrusive*) to 7 (*highly intrusive*). In addition to using developmentally appropriate tasks, we coded the behavior of the mother from a developmental perspective. For example, mothers of the youngest children expressed their sensitivity more often in a non-verbal, physical way, whereas verbal support was more characteristic of sensitivity in interaction with older children (cf. Stams et al., 2002).

Scale scores were computed by averaging the scores for the separate tasks. Supportive presence and intrusiveness were coded by four raters, each coding one scale for

either the pretest or posttest. Coders were unaware of other data concerning the participants. The mean intra-class correlation (single rater, absolute agreement) for inter-coder reliability (for all separate pairs of coders for the specific scale and of each coder with the expert) for supportive presence was .78 (range .75 to .80, $N = 60$, including all age groups) and for intrusiveness .76 (range .73 to .78, $N = 60$). For the analyses, intrusiveness was reversed to reflect the level of non-intrusiveness. The correlation between these two scales was significant at both time points, $r = .33$, $p < .01$ at Time 1 and $r = .41$, $p < .01$ at Time 2. The two scale scores were averaged to reflect overall level of sensitivity and, because the subscales were not equally distributed, subscale scores were standardized before they were summed to form the overall scale.

Observation of Maternal Discipline. Specific maternal discipline strategies were observed during a laboratory cleanup task at Time 1 and Time 2. After playing with attractive toys, the mother was asked to instruct her child to clean up the toys. This cleanup session was different from the cleanup task in which we coded aggression. The mother was allowed to help her child with three toys. Coding procedures were based on Kuczynski, Kochanska, Radke-Yarrow, and Girmius-Brown (1987), and Van der Mark, Van IJzendoorn, and Bakermans-Kranenburg (2002). The following maternal discipline strategies were observed: commanding, positive feedback, and physical interference. Commanding was coded when mothers gave their children instructions to clean up in an authoritarian manner. Positive feedback involved giving compliments and making positive remarks when the child was cleaning up, and responding to what the child said (e.g., 'Is the duck going to sleep?'). When the mother used physical force to constrain the child from playing with the toys or to make the child clean up the toys, we coded this as physical interference. The age and developmental level of the children were taken into account when coding these behaviors. For example, the mothers of the youngest age group were somewhat more likely to use physical strategies. However, this was not coded as physical interference when it was done in a positive, constructive way. The episode was ended after four minutes, or earlier in case the child had cleaned up all the toys. The number of times the mother had used a specific category was divided by the time of the episode.

All five coders were blind to other data concerning the participants. The average intra-class correlations (single rater, absolute agreement) for inter-coder reliability (for all separate pairs of coders) were .83 (range .71 to .93, $N = 20$, including all age groups) for commanding, .90 (range .72 to .79, $N = 20$) for positive feedback, and .85 (range .69 to .94, $N = 20$) for physical interference. Factor analyses showed that the three strategies had the highest loadings on one discipline factor (component loadings were .80 for commanding, $-.64$ for positive feedback, and .72 for physical interference). We combined the three separate scales by standardizing the scores and summing the scores on commanding and physical interference, and subtracting the score on positive feedback into one overall scale score representing level of negative discipline.

To test whether the different observed parenting scales (sensitivity and discipline) did actually represent two parenting dimensions, two principal component analyses with varimax rotation were performed on the five sensitivity and discipline subscales at Time 1. Two factors representing the sensitivity and discipline dimensions were extracted. The first factor (Eigenvalue 2.02) consisted of the three discipline subscales: commanding (factor loading, .74), positive feedback ($-.74$), and physical interference (.76). The second factor (Eigenvalue, 1.06) consisted of the two sensitivity subscales: supportive presence (factor loading, .82) and non-intrusiveness (.79).

Aggression, sensitivity, and discipline at Time 1 and Time 2 were all coded by independent observers. Every coder observed each child or mother only once, and was blind to the other codings.

Control Variables

Maternal Psychopathology. An abbreviated version of the young adult self-report (YASR; Achenbach, 1991), consisting mostly of items from the internalizing problems scale, was used to measure level of maternal psychopathology. The questionnaire consisted of 29 items, scored on a three-point Likert scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). Mothers completed this questionnaire at the end of the laboratory session at Time 1. Items reflect level of internalizing and depressive symptoms. A total score, indicated as maternal psychopathology, was computed by summing the item scores. Internal consistency (Cronbach's alpha) for this scale was .88.

Child Difficult Temperament. Child temperament (as perceived by the mother) was measured during the screening phase with the infant characteristics questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979). The ICQ was translated into Dutch and found reliable by Kohnstamm (1984). The Dutch ICQ contains 33 items, describing concrete behaviors in well-defined situations. The items were rated on a five-point scale, ranging from 0 (*not true*) to 4 (*true*). Five items in the ICQ were discarded, because of content overlap with items of the CBCL (see Van Zeijl, Mesman, Stolk, et al., 2006). Next, a one-component analysis was carried out in each age group to derive an overall difficultness factor. The difficultness factor consisted of 14 items in one-year-old children, 18 items in two-year-olds, and 16 items in three-year-old children. Internal consistencies (Cronbach's alphas) were .68, .76, and .75, respectively. Scale scores were computed by averaging item scores.

Maternal Educational Level, Presence of Siblings, and Child Gender. Part of the screening questionnaire for mothers consisted of some background questions regarding the parents' education, the number of children in the family, and the gender of the child. The educational level of the mothers was rated on a scale ranging from 1 (*elementary school*) to 5 (*Master's degree*).

Analytic Approach

Because the separate age groups were quite small (N = 44, 38 and 35), we decided to collapse these groups. Firstly, we tested for outliers and missing data. Next, Pearson correlations were computed to explore relations between the dependent and independent variables, within and across time points. To test the additive model, we performed a linear regression analysis predicting Time 2 aggression from the Time 1 parenting variables, controlling for Time 1 aggression and Time 2 parenting. The moderating model (the relation between discipline and aggression is moderated by sensitivity) was tested with a similar linear regression analysis. In the final step of this model the interaction term between Time 1 sensitivity and discipline was added. Before computing the interaction term, the predictors were centered in order to reduce possible multi-collinearity between the independent variables and the interaction term, and to facilitate the interpretation of the interaction effect (Cohen, Cohen, West, & Aiken,

2003). Thirdly, the mediating model, assuming that the relation between sensitivity and aggression would be mediated by discipline, was tested. We investigated Baron and Kenny's (1986) four conditions that must be met in order to consider a variable as a mediator: (1) the predictor (Time 1 sensitivity) must be significantly related to the hypothesized mediator (Time 1 discipline), (2) the predictor (Time 1 sensitivity) must be significantly associated with the dependent variable (Time 2 aggression), (3) the mediator (Time 1 discipline) must be significantly associated with the dependent variable (Time 2 aggression), and (4) the impact of the predictor (Time 1 sensitivity) on the dependent measure (Time 2 aggression) diminishes after adding the mediator (Time 1 discipline).

To test the robustness of the results, follow-up analyses were conducted. Firstly, the age of the children was taken into account. We tested whether the interaction effects between age and sensitivity, age and discipline, and age, sensitivity, and discipline were significant in predicting Time 2 aggression after adding Time 1 aggression, Time 1 and 2 parenting, and age to the model. Secondly, analyses were repeated using the total group ($N = 237$, including the intervention families) controlling for the effect of experimental condition (coded 0, 1). Thirdly, we tested whether adding maternal psychopathology, parental educational level, child temperament, the presence of siblings, and the gender of the children in the first step of the analyses changed the results. These variables may be related to the parenting variables as well to as child aggression, and therefore may (partly) account for the relation between parenting and child behavior. Fourthly, we tested whether child behavior influenced parenting instead of parenting affecting child behavior. Two regression analyses were performed. The first one predicted Time 2 maternal sensitivity with Time 1 sensitivity and Time 2 discipline and aggression in step 1, and Time 1 discipline and aggression in step 2. In the second regression analysis, Time 2 maternal discipline was predicted with Time 1 discipline and Time 2 sensitivity and aggression in step 1, and Time 1 sensitivity and aggression in step 2.

Results

Preliminary Analyses

Zero to two outliers ($|z| > 3.29$) were identified on each of the variables. As recommended by Keppel and Wickens (2004), outliers were included in the dataset. However, additional analyses revealed no differences in results when univariate outliers were Winsorized (Hampel, Ronchetti, & Rousseeuw, 1986). In addition, there were two missing scores (on the Time 1 aggression questionnaire and on Time 2 discipline). These missing scores were substituted with the mean scores of children matched on gender, age, and maternal educational level.

Descriptive Analyses

Table 1 shows descriptive statistics for all variables. Because our sample consisted of three age groups, we tested for age differences on the observational measures. Separate ANOVAs only revealed significant age differences for child aggression at Time 1, $F(2, 114) = 5.54, p < .01$ (one-year-olds were less aggressive than two-year-olds) maternal sensitivity at Time 2, $F(2, 114) = 4.53, p < .05$ (mothers of children in the youngest age group were less sensitive than mothers of the middle age group), maternal discipline at Time 1, $F(2, 114) = 4.57, p < .05$, and at Time 2, $F(2, 114) = 3.54, p < .05$ (at

Table 1. Descriptives for the Central Measures and Control Variables (N = 117)

	Mean	SD	Range
Aggression			
Time 1 observation	2.37	3.68	0–24
Time 1 questionnaire	5.12	2.50	0–12
Time 2 observation	1.39	2.56	0–15
Time 2 questionnaire	4.90	3.14	0–15
Sensitivity			
Time 1 supportive presence	4.58	.89	1.33–6.00
Time 1 intrusiveness	2.86	.85	1.67–5.00
Time 2 supportive presence	5.05	1.05	2.00–6.75
Time 2 intrusiveness	2.96	1.28	1.00–6.50
Negative discipline			
Time 1 commanding	4.67	4.68	0–22
Time 1 positive feedback	9.34	4.65	0–24
Time 1 physical interference	.48	1.14	0–7
Time 2 commanding	3.81	4.33	0–17
Time 2 positive feedback	10.22	5.81	0–35
Time 2 physical interference	.19	.55	0–3
Maternal psychopathology	6.71	6.27	0–28
Maternal educational level	3.59	1.06	1–5
Child difficult temperament	1.78	.45	.63–2.86
Child gender	62 percent boys		

both time points mothers of children in the youngest age group used more negative discipline than mothers of the middle age group). Correlations between Time 1 and Time 2 child aggression, maternal sensitivity, and discipline are presented in Table 2. All variables showed significant stability over time: $r(117) = .34$, $p < .01$ for child aggression, $r(117) = .43$, $p < .01$ for maternal sensitivity, and $r(117) = .20$, $p < .05$ for maternal negative discipline. Furthermore, the correlation between Time 1 aggression and sensitivity was significant ($r[117] = -.23$, $p < .05$) and Time 2 aggression was significantly related to Time 1 sensitivity ($r[117] = -.24$) and Time 2 maternal discipline ($r[117] = .24$, $p < .01$).

Testing the Three Models

To test whether the additive model supported the relation between sensitivity, discipline, and aggression, a linear regression analysis was performed on Time 2 aggression with Time 1 aggression and Time 2 sensitivity and discipline in step 1, and Time 1 sensitivity and discipline in step 2. Adding Time 1 sensitivity and discipline did not significantly improve the model, $R^2_{\text{change}} = .01$, $F_{\text{change}}(2, 111) = .69$, $p = .50$. The beta's for Time 1 sensitivity and discipline were not significant, $\beta = -.09$, $p = .37$, and $\beta = .06$, $p = .55$, respectively. Time 1 sensitivity and discipline did not predict aggression at Time 2, either uniquely, or combined. Therefore, our data did not support the additive model.

Table 2. Pearson Correlations among Time 1 and Time 2 Aggression, Sensitivity, and Negative Discipline (N = 117)

	Time 1			Time 2		
	Aggression	Sensitivity	Negative discipline	Aggression	Sensitivity	Negative discipline
Time 1 aggression	—					
Sensitivity	-.23*	—				
Negative discipline	.07	-.29**	—			
Time 2 aggression	.34**	-.24**	.15	—		
Sensitivity	-.04	.43**	-.28**	-.17	—	
Negative discipline	-.003	-.24**	.20*	.24**	-.32**	—

* $p < .05$, ** $p < .01$.

Table 3. Results of a Linear Regression Analysis Predicting Time 2 Aggression from Time 1 Sensitivity and Negative Discipline, and their Interaction (N = 117)

		β	<i>t</i>
Block 1 ($R^2 = .18$)	Time 1 aggression	.31	3.59**
	Time 2 sensitivity	-.02	-.16
	Time 2 negative discipline	.22	2.43*
Block 2 ($\Delta R^2 = .01$)	Time 1 sensitivity	-.09	-.92
	Time 1 negative discipline	-.00	-.05
Block 3 ($\Delta R^2 = .04^*$)	Interaction between Time 1 sensitivity and negative discipline	-.20	-2.29*

Note: Betas and *t*-values are derived from the third block of the regression analysis and are slightly different from those of the regression analysis testing the additive model because of the inclusion of the interaction term. Overall $F(6, 110) = 5.40, p < .01$.

* $p < .05$, ** $p < .01$.

Secondly, in order to test the moderating model, we performed a linear regression analysis predicting aggression at Time 2 with Time 1 aggression and Time 2 sensitivity and discipline in step 1, Time 1 sensitivity and discipline in step 2, and the interaction term between Time 1 sensitivity and discipline in step 3. Adding the interaction term significantly improved the model, $R^2_{\text{change}} = .04, F_{\text{change}}(1, 110) = 5.25, p < .05$ (Table 3). Collinearity tolerance was $>.74$ for all variables included in the final model. To illustrate this interaction effect, a median split was applied to Time 1 maternal sensitivity and the regression lines for these two sensitivity groups are depicted (Figure 1). The relation between Time 1 maternal discipline and Time 2 child aggression decreased when maternal sensitivity increased. In other words, maternal sensitivity reduced the impact of using negative discipline strategies on the development of child aggression, confirming the moderating model.

Thirdly, the mediating model was tested using Baron and Kenny's (1986) conditions. From the results presented in Table 2 it is clear that the first two conditions were met: Time 1 sensitivity was significantly correlated with Time 1 discipline and Time 2 aggression. However, Time 1 discipline was not significantly correlated with Time 2 aggression (see Table 2) and there was no significant association of Time 1 sensitivity and discipline with Time 2 aggression controlling for the effects of Time 1 aggression and Time 2 sensitivity and discipline, respectively ($\beta = -.17, p = .05$, and $\beta = .13, p = .14$). Therefore, the mediating model did not apply to the relation between sensitivity, discipline, and aggression.

Follow-up Analyses

Firstly, the interaction terms between age and sensitivity or age and discipline in the prediction of Time 2 aggression were not significant, $R^2_{\text{change}} = .00, F_{\text{change}}(1, 109) = .08, p = .78$, and $R^2_{\text{change}} = .00, F_{\text{change}}(1, 109) = .01, p = .91$. In addition, adding the three-way interaction term between age, sensitivity, and discipline did not significantly improve the model, $R^2_{\text{change}} = .03, F_{\text{change}}(1, 107) = 3.75, p = .06$. Neither the effects of sensitivity and discipline, nor the interaction effect between sensitivity and

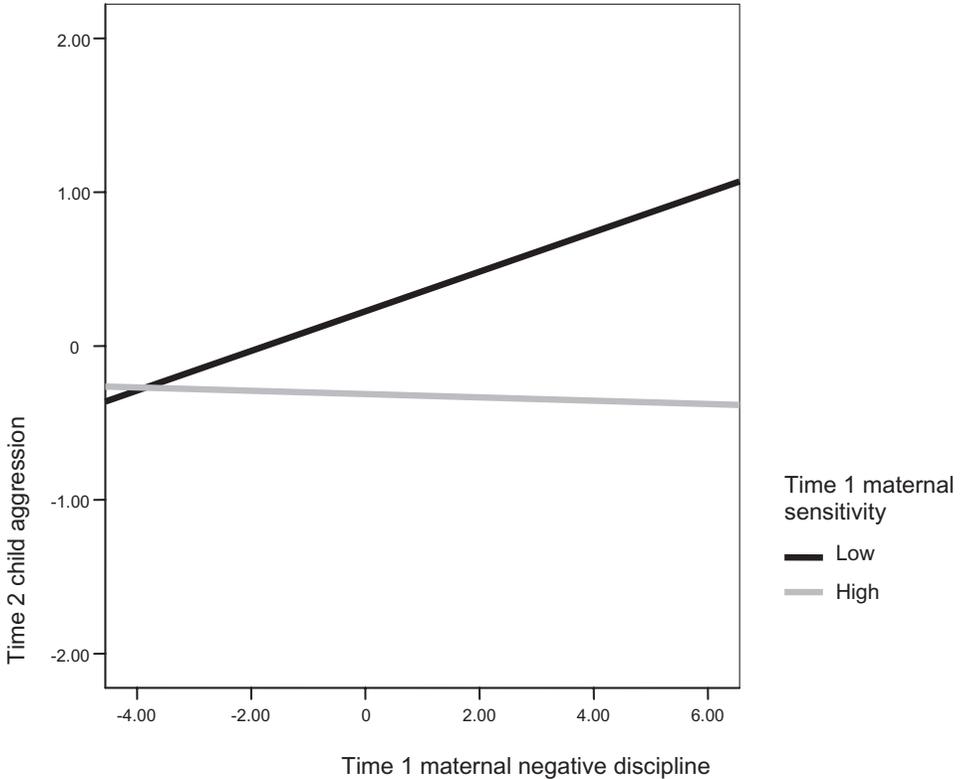


Figure 1. Discipline at Time 1 Predicting Child Aggression at Time 2 for High- and Low-sensitive Mothers.

discipline depended on the age of the children. Secondly, results of analyses on the total group controlling for the effect of experimental condition were similar to the main results. No evidence was found for the additive and the mediating models and the moderating model was confirmed. The interaction effect of sensitivity with discipline was again significant, $R^2_{\text{change}} = .04$, $F_{\text{change}}(1, 229) = 11.61$, $p < .01$. Thirdly, the interaction effect was also significant when the control variables (maternal psychopathology, maternal educational level, child temperament, the presence of siblings, and gender of the children) were added in the first step of the regression analysis, $R^2_{\text{change}} = .04$, $F_{\text{change}}(1, 105) = 5.27$, $p < .05$. We found no evidence for the additive and mediating models when the covariates were added. Fourth, child aggression at Time 1 did not predict Time 2 maternal sensitivity or discipline (step 2: $\beta = .06$, $p = .53$ and $\beta = -.11$, $p = .25$).

Discussion and Conclusion

In the current study, we investigated the longitudinal relation between maternal sensitivity and discipline strategies and child aggressive behavior. Results revealed that maternal sensitivity moderated the relation between maternal negative discipline and child aggression. When mothers frequently used negative discipline strategies, their children were more likely to be aggressive one year later, but only in the group of less sensitive mothers. These findings fit within the broader work on parenting styles by

Baumrind (1971), who found that different combinations of parental control and warmth were associated with child behavior in various ways. More specifically, our findings correspond to results of other studies predicting child problem behaviors (Deater-Deckard & Dodge, 1997; Deater-Deckard, Ivy, & Petrill, 2006; McLoyd & Smith, 2002). For example, Deater-Deckard et al. found that maternal warmth moderated the relation between punishment and child externalizing behaviors. This effect was not explained by the genetic similarity between the mother and her child, or by child behaviors eliciting harsher parenting. The results of our study also extend previous results. Earlier research has generally focused on harsh *physical* discipline (e.g., spanking) and on aggression in older children. The current study showed that the moderating effect of parental sensitivity also occurs in the relation between general negative discipline strategies and children's aggression in early childhood.

The lower correlation between negative discipline and aggression in the case of sensitive mothers may also be a result of reduced variability in discipline strategies in these mothers. Indeed, mothers who showed high levels of sensitivity were somewhat less likely to show negative discipline than mothers who were less sensitive (the correlation between sensitivity and discipline was significant). However, a substantial portion of the mothers (17 percent) did show high levels of sensitivity and high levels of negative discipline, whereas 33 percent of the mothers showed high levels of sensitivity and low levels of negative discipline. Therefore, the distribution seems adequate to detect a correlation between discipline and aggression in the sensitive group.

Although the age range of the children in this study was quite large (13.58 to 41.91 months at Time 1), follow-up results showed that the main effects of sensitivity and discipline and the interaction effect between sensitivity and discipline in the prediction of aggression did not depend on the age of the children. Furthermore, our observations were conducted using a developmental perspective. Similar child or maternal behaviors were coded differently for children of different ages depending on the developmental meaning of the behavior.

In the current study, we did not assess the genetic influence on parenting and child aggression. One might argue that at least part of the covariance between parent and child behavior is a result of genetic similarities. It is plausible that the genes that mothers and children share partly account for adverse parenting as well as child aggression (Jaffee, Caspi, Moffitt, & Taylor, 2004). Nevertheless, in our study it was not simply the combination of insensitivity and negative discipline that predicted child aggression. Moreover, child aggression did not predict maternal behavior. Therefore, a singular genetic explanation of the reported association of parenting with aggression seems unlikely. Results obtained by Deater-Deckard et al. (2006) also support the view that parenting influences child behavior independent of the genetic similarity of mother and child. In addition, we accounted for the effects of child temperament, maternal psychopathology, and maternal educational level. Of course, these variables are not equivalent to the genetic characteristics of both mothers and children. However, the fact that the interaction effect of sensitivity and discipline was still significant after adding these variables to the model also indicates that an explanation in only genetic terms is unlikely. Furthermore, previous behavioral genetic research has shown that a relatively large part of the variance in problem behavior is a result of environmental influences (Jaffee et al., 2004). Nevertheless, genetic factors may interact with environmental influences in predicting child externalizing behavior (e.g., Bakermans-Kranenburg & Van IJzendoorn, 2006).

It is also possible that children elicit parenting behavior more than parents influence their children. Although in the current study it was not possible to indisputably establish the direction of effects, the cross-lagged research design, controlling for concurrent relations between parenting and child aggression, contributes to the hypothesis that parenting at Time 1 influences child behavior at Time 2. This hypothesis was supported by the non-significant results of our analyses predicting maternal sensitivity or discipline from child aggression. This is in line with the results of Deater-Deckard et al. (2006) that indicated that the moderating effect of parental warmth on the relation between punishment and child externalizing behavior could not be explained by child behaviors eliciting harsh parenting. Furthermore, when we controlled for the effect of child temperament assessed about half a year before Time 1, this did not change our results, indicating that the interaction effect of sensitivity and discipline was independent of the child's temperament.

In our study, there were a number of significant bivariate associations between parenting and child aggression. However, maternal sensitivity and maternal discipline did not predict child aggression after controlling for the variance attributable to concurrent relations between the variables and longitudinal stability of parenting. This was also illustrated by O'Leary, Slep, and Reid (1999). They found longitudinal stability of both maternal overreactive discipline and the children's externalizing behavior, and concurrent relations between these two variables. However, in a cross-lagged model there was no significant cross-time influence of either variable on the other.

Interpreting the Moderating Effect

Our findings suggest that the affective context is an important determinant of the impact of negative discipline on child development. Maternal sensitivity may influence the meaning children attribute to negative discipline (McLoyd & Smith, 2002). When mothers are generally sensitive in the interactions with their child, the child may feel secure and interpret commands or physical interference in a discipline situation differently compared to a child who is used to insensitive care. The latter child may view the negative parental discipline techniques as unjust or rejecting, while the first child does not. Research has shown that children's perception of parental discipline as rejecting is indeed associated with their psychological maladjustment (Rohner, Bourque, & Elordi, 1996). In the same vein, Dodge, Laird, Lochman, and Zelli (2002) showed that hostile attributions of social information may provoke aggressive behaviors, and in Gomez, Gomez, Demello, and Tallent (2001) the development of aggressive behavior in school-aged children was affected by hostile social information processing, which in turn was predicted by the interaction between maternal control and support. Low levels of perceived maternal support (e.g., guidance, affection) increased the effects of perceived maternal control (discipline strategies) on hostile social information processing.

As early as in the first year of life, children develop skills that help them regulate social interaction. Studies using the still-face procedure have shown that when the social expectations of an infant are violated (during the still-face episode), the infant tries to repair the disruption (Tronick & Cohn, 1989). Weinberg and Tronick (1996) argued that the infant's capacity to repair the disruption reflects the dyadic regulatory processes that take place in the mother-infant interaction which in turn are related to the mother's level of sensitivity. When mothers are insensitive and unresponsive, the

dyad's capacity for interactive repair declines (Reck, Hunt, Fuchs, Weiss, Noon, & Moehler, 2004; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002). Children of insensitive or unresponsive mothers may thus learn that a 'conflict' will not be easily resolved and this experience may color their expectations of future conflicts or disagreements, whereas positive interaction experiences in daily life (such as parental sensitivity) may foster the ability to overcome the effects of difficult situations (e.g., negative discipline situations). This is in line with the organizational perspective stressing the continuing transactions between developing persons and their environments. From this point of view, Sroufe and colleagues (Carlson, Sroufe, & Egeland, 2004; Sroufe, Egeland, Carlson, & Collins, 2005) argued that experience on the one hand and expectations and interpretations of events on the other influence each other in a progressive fashion. Early social experience creates expectations of future events and influences the interpretation of events. In turn, these expectations and interpretations shape behavior and experience. Maternal supportive and sensitive care early in life may determine the child's expectations and interpretations of later social interactions (see also Ainsworth, 1985). These organizational processes have mainly been investigated in samples consisting of older (preschool- and school-aged) children. Our results suggest that a similar mechanism is operating in younger children.

A second mechanism underlying the moderating effect of maternal sensitivity may involve the development of emotion regulation. Insensitive care early in development may impede the development of adequate emotion regulation (Cassidy, 1994; Sroufe et al., 2005). As a result, children who received insensitive care may not be able to regulate their anger and frustration effectively. Frequent use of negative discipline may evoke anger in the child, which in turn may provoke aggressive behavior (Arsenio, Cooperman, & Lover, 2000; Berkowitz, 1989; Sroufe, 1995), but only in children who are unable to regulate their anger. As a result, children who have poor emotion regulation skills that are insufficiently scaffolded by their insensitive parents may be more likely to act aggressively in reaction to their mothers' negative discipline.

Thus, expectations and interpretations of maternal discipline on the one hand, and emotion regulation on the other hand may explain the moderating effect of early maternal sensitivity on the prediction of aggression by later use of negative discipline. In our research design however, maternal discipline and sensitivity were assessed contemporaneously, and as a result, we cannot test the mechanisms of early (in)sensitivity influencing the interpretation of subsequent discipline and/or modifying the effect of negative discipline by influencing emotion regulation skills. However, maternal sensitivity is rather stable (in the current study, the 1-year stability was .43) and it is a salient aspect of the mother-child relationship from birth onward (Sroufe et al., 2005), whereas discipline is relevant at a somewhat later age (Shaw et al., 2000), which argues for the plausibility of the proposed mechanisms. Further research is needed to carefully investigate the *process* underlying the moderating role of early maternal sensitivity in the effect of later negative discipline on child aggression.

It is important to note that our sample may not be representative of the general population. The educational level of the parents was rather high and the children in the current study were selected based on their high levels of externalizing behavior. Although the aggression rates of the children were not extremely high, the findings of the study cannot straightforwardly be generalized to the general population. It should however be noted that different rates of aggression and negative parenting in other samples will not necessarily result in differences in the *relations* between parenting and aggression.

Conclusion

Results of the current study revealed that maternal sensitivity moderates the relation between maternal negative discipline and child aggression. The direction of effects cannot be indisputably proven in this study. However, on the basis of previous literature (e.g., Deater-Deckard et al., 2006) and considering that we did not find any evidence for child effects, we hypothesize that being exposed to maternal negative discipline predicts aggressive behavior in children when their mothers are less sensitive, whereas children of more sensitive mothers are less negatively affected by their mothers' use of negative discipline. Apparently, maternal sensitivity acts as a buffer against the influence of negative discipline. Our results underline the importance of considering both aspects of parenting in research on child aggression and in developing interventions to prevent the development of persistent aggressive and antisocial behavior.

References

- Achenbach, T. M. (1991). *Integrative guide for the 1991 CBCL/4-18, YSR, and TRF profiles*. Burlington, VT: Department of Psychiatry, University of Vermont.
- Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for ASEBA preschool forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth & Families.
- Ainsworth, M. D. S. (1967). *Infancy in Uganda: Infant care and the growth of love*. Baltimore, MD: Johns Hopkins University Press.
- Ainsworth, M. D. S. (1985). Patterns of infant-mother attachments: Antecedents and effects on development. *Bulletin of the New York Academy of Medicine*, *61*, 771–791.
- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99–135). London: Cambridge University Press.
- Ainsworth, M. D., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.
- Alink, L. R. A., Mesman, J., Van Zeijl, J., Stolk, M. N., Juffer, F., Koot, J. M., et al. (2006). The early childhood aggression curve: Development of physical aggression in 10- to 50-month-old children. *Child Development*, *77*, 954–966.
- Arseneault, L., Moffitt, T. E., Caspi, A., Taylor, A., Rijdsdijk, F. V., Jaffee, S. R., et al. (2003). Strong genetic effects on cross-situational antisocial behaviour among 5-year-old children according to mothers, teachers, examiner-observers, and twins' self-reports. *Journal of Child Psychology and Psychiatry*, *44*, 832–848.
- Arsenio, W. F., Cooperman, S., & Lover, A. (2000). Affective predictors of preschoolers' aggression and peer acceptance: Direct and indirect effects. *Developmental Psychology*, *36*, 438–448.
- Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2006). Gene-environment interaction of the dopamine D4 receptor (DRD4) and observed maternal insensitivity predicting externalizing behavior in preschoolers. *Developmental Psychobiology*, *48*, 406–409.
- Bandura, A. (1973). *Aggression. A social learning analysis*. Englewood Cliffs, NJ: Prentice Hall.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.
- Bates, J. E., Freeland, C. A., & Lounsbury, M. L. (1979). Measurement of infant difficultness. *Child Development*, *50*, 794–803.
- Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology Monograph*, *4*, 1–103.
- Beckwith, L., Cohen, S. E., & Hamilton, C. E. (1999). Maternal sensitivity during infancy and subsequent life events relate to attachment representation at early adulthood. *Developmental Psychology*, *35*, 693–700.

- Berkowitz, L. (1989). Frustration-aggression hypothesis: Examination and reformulation. *Psychological Bulletin*, *106*, 59–73.
- Broidy, L. M., Nagin, D. S., Tremblay, R. E., Bates, J. E., Brame, B., Dodge, K. A., et al. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology*, *39*, 222–245.
- Brook, J. S., Zheng, L., Whiteman, M., & Brook, D. (2001). Aggression in toddlers: Associations with parenting and marital relations. *The Journal of Genetic Psychology*, *162*, 228–241.
- Carlson, E. A., Sroufe, L. A., & Egeland, B. (2004). The construction of experience: A longitudinal study of representation and behavior. *Child Development*, *75*, 66–83.
- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. *Monographs of the Society for Research in Child Development*, *59*, 228–249.
- Chang, L., Dodge, K. A., Schwartz, D., & McBride-Chang, C. (2003). Harsh parenting in relation to child emotion regulation and aggression. *Journal of Family Psychology*, *17*, 598–606.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon, & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (pp. 779–862). New York: Wiley.
- Cowan, P. A., & Cowan, C. P. (2002). What an intervention design reveals about how parents affect their children's academic achievement and behavior problems. In J. G. Borkowski, S. L. Ramey, & M. Bristol-Power (Eds.), *Parenting and the child's world* (pp. 75–97). London: Lawrence Erlbaum Associates.
- De Wolff, M., & Van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*, 571–591.
- Deater-Deckard, K., & Dodge, K. A. (1997). Externalizing behavior problems and discipline revisited: Nonlinear effects and variation by culture, context, and gender. *Psychological Inquiry*, *8*, 161–175.
- Deater-Deckard, K., Bates, J. E., Dodge, K. A., & Pettit, G. S. (1996). Physical discipline among African American and European American mothers: Links to children's externalizing behaviors. *Developmental Psychology*, *32*, 1065–1072.
- Deater-Deckard, K., Ivy, L., & Petrill, S. A. (2006). Maternal warmth moderates the link between physical punishment and child externalizing problems: A parent—offspring behavior genetic analysis. *Parenting: Science and Practice*, *6*, 59–78.
- Dionne, G., Tremblay, R. E., Boivin, M., Laplante, D., & Pérusse, D. (2003). Physical aggression and expressive vocabulary in 19-month-old twins. *Developmental Psychology*, *39*, 261–273.
- Dodge, K. A., Laird, R., Lochman, J. E., & Zelli, A. (2002). Multidimensional latent-construct analysis of children's social information processing patterns: Correlations with aggressive behavior problems. *Psychological Assessment*, *14*, 60–73.
- Egeland, B., Erickson, M. F., Clemenhagen-Moon, J. C., Hiester, M. K., & Korfmacher, J. (1990). *24 months tools coding manual*. Project STEEP revised 1990. From mother-child project scales. Unpublished manuscript, University of Minnesota, Minneapolis.
- Erickson, M. F., Sroufe, L. A., & Egeland, B. (1985). The relationship between quality of attachment and behavior problems in preschool in a high-risk sample. *Monographs of the Society for Research in Child Development*, *50*, 147–166.
- Fine, S. E., Trentacosta, C. J., Izard, C. E., Mostow, A. J., & Campbell, J. L. (2004). Anger perception, caregivers' use of physical discipline, and aggression in children at risk. *Social Development*, *13*, 213–228.
- Gomez, R., Gomez, A., DeMello, L., & Tallent, R. (2001). Perceived maternal control and support: Effects on hostile biased social information processing and aggression among clinic-referred children with high aggression. *Journal of Child Psychology and Psychiatry*, *42*, 513–522.
- Hampel, F. R., Ronchetti, E. M., & Rousseeuw, P. J. (1986). *Robust statistics: The approach based on influence functions*. New York: Wiley.
- Hartup, W. W. (2005). The development of aggression: Where do we stand? In R. E. Tremblay, W. W. Hartup, & J. Archer (Eds.), *Developmental origins of aggression* (pp. 3–22). New York: The Guilford Press.

- Jaffee, S. R., Caspi, A., Moffitt, T. E., & Taylor, A. (2004). Physical maltreatment victim to antisocial child: Evidence of an environmentally mediated process. *Journal of Abnormal Psychology, 113*, 44–55.
- Keppel, G., & Wickens, T. D. (2004). *Design and analysis: A researcher's handbook (4th international)*. Upper Saddle River, NJ: Pearson Prentice-Hall.
- Knutson, J. F., DeGarmo, D., Koepl, G., & Reid, J. B. (2005). Care neglect, supervisory neglect, and harsh parenting in the development of children's aggression: A replication and extension. *Child Maltreatment, 10*, 92–107.
- Kohnstamm, G. A. (1984, April). *Bates' infant characteristics questionnaire (ICQ) in the Netherlands*. Paper presented at the fourth biennial International Conference on Infant Studies, New York.
- Koot, H. M., Van den Oord, E. J. C. G., Verhulst, F. C., & Boomsma, D. I. (1997). Behavioral and emotional problems in young preschoolers: Cross-cultural testing of the validity of the child behavior checklist/2-3. *Journal of Abnormal Child Psychology, 25*, 183–196.
- Kuczynski, L., Kochanska, G., Radke-Yarrow, M., & Girmius-Brown, O. (1987). A developmental interpretation of young children's noncompliance. *Developmental Psychology, 23*, 799–806.
- Londerville, S., & Main, M. (1981). Security of attachment, compliance, and maternal training methods in the second year of life. *Developmental Psychology, 17*, 289–299.
- Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In E. M. Hetherington (Ed.), *Handbook of child psychology: Vol. 4. Socialization, personality, and social development* (pp. 1–101). New York: Wiley.
- McBurnett, K., Pfiffner, L. J., Capasso, L., Lahey, B. B., & Loeber, R. (1997). Children's aggression and DSM-III-R symptoms predicted by parent psychopathology, parenting practices, cortisol, and SES. In A. Raine (Ed.), *Biosocial bases of violence* (pp. 345–348.). New York: Plenum Press.
- Mcloyd, V. C., & Smith, J. (2002). Physical discipline and behavior problems in African American, European American, and Hispanic children: Emotional support as a moderator. *Journal of Marriage and the Family, 64*, 40–53.
- Mesman, J., Alink, L. R. A., Van Zeijl, J., Stolk, M. N., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., et al. (in press). The observation of early childhood physical aggression: A psychometric study of the system for coding early physical aggression (SCEPA). *Aggressive Behavior*.
- Miller, P. A., & Eisenberg, N. (1988). The relation of empathy to aggressive and externalizing/antisocial behavior. *Psychological Bulletin, 103*, 324–344.
- NICHD Early Childcare Research Network (2004a). Affect dysregulation in the mother-child relationship in the toddler years: Antecedents and consequences. *Development and Psychopathology, 16*, 43–68.
- NICHD Early Childcare Research Network (2004b). Trajectories of physical aggression from toddlerhood to middle childhood. *Monographs of the Society for Research in Child Development, 69* (4), 1–128.
- O'Leary, S. G., Slep, A. M., & Reid, M. J. (1999). A longitudinal study of mothers' overreactive discipline and toddlers' externalizing behavior. *Journal of Abnormal Child Psychology, 27*, 331–341.
- Olson, S. L., Bates, J. E., Sandy, J. M., & Lanthier, R. (2000). Early developmental precursors of externalizing behavior in middle childhood and adolescence. *Journal of Abnormal Child Psychology, 28*, 119–133.
- Patterson, G. R. (1976). The aggressive child: Victim and architect of a coercive system. In E. J. Mash, L. A. Hamerlynch, & L. C. Hardy (Eds.), *Behavior modification and families* (pp. 267–316). New York: Brunner/Mazel.
- Patterson, G. R. (1982). *Coercive family process*. Eugene, OR: Castilia.
- Patterson, G. R., DeBaryshe, B. D., & Ramsey, E. (1989). A developmental perspective on antisocial behavior. *American Psychologist, 44*, 329–335.
- Pettit, G. S., & Bates, J. E. (1989). Family interaction patterns and children's behavior problems from infancy to 4 years. *Developmental Psychology, 25*, 413–420.
- Pfiffner, L., McBurnett, K., Rathouz, P., & Judice, S. (2005). Family correlates of oppositional and conduct disorders in children with attention deficit/hyperactivity disorder. *Journal of Abnormal Child Psychology, 33*, 551–563.

- Reck, C., Hunt, A., Fuchs, T., Weiss, R., Noon, A., Moehler, E., et al. (2004). Interactive regulation of affect in postpartum depressed mothers and their infants: An overview. *Psychopathology*, *37*, 272–280.
- Rohner, R. P., Bourque, S. L., & Elordi, C. A. (1996). Children's perceptions of corporal punishment, caretaker acceptance, and psychological adjustment in a poor, biracial southern community. *Journal of Marriage and the Family*, *58*, 842–852.
- Rosenblum, K. L., McDonough, S., Muzik, M., Miller, A., & Sameroff, A. (2002). Maternal representations of the infant: Associations with infant response to the Still Face. *Child Development*, *73*, 999–1015.
- Shaw, D. S., Bell, R. Q., & Gilliom, M. (2000). A truly early starter model of antisocial behavior revisited. *Clinical Child and Family Psychology Review*, *3*, 155–172.
- Shaw, D. S., Gilliom, M., & Giovannelli, J. (2000). Aggressive behavior disorders. In H. Zeanah (Ed.), *Handbook of infant mental health* (pp. 397–411). New York: The Guilford Press.
- Shaw, D. S., Keenan, K., & Vondra, J. I. (1994). Developmental precursors of externalizing behavior: Ages 1 to 3. *Developmental Psychology*, *30*, 355–364.
- Snyder, J., & Patterson, G. R. (1995). Individual differences in social aggression: A test of a reinforcement model of socialization in the natural environment. *Behavior Therapy*, *26*, 371–391.
- Snyder, J., Edwards, P., McGraw, K., Kilgore, K., & Holton, A. (1994). Escalation and reinforcement in mother-child conflict: Social processes associated with the development of physical aggression. *Development and Psychopathology*, *6*, 305–321.
- Sroufe, L. A. (1995). *Emotional development. The organization of emotional life in the early years*. Cambridge: Cambridge University Press.
- Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York: Guilford Press.
- Stams, G. J. J. M., Juffer, F., & Van IJzendoorn, M. H. (2002). Maternal sensitivity, infant attachment, and temperament in early childhood predict adjustment in middle childhood: The case of adopted children and their biologically unrelated parents. *Developmental Psychology*, *38*, 806–821.
- Tremblay, R. E. (2003). Why socialization fails. The case of chronic physical aggression. In B. B. Lahey, T. E. Moffitt, & A. Caspi (Eds.), *Causes of conduct disorder and juvenile delinquency* (pp. 182–224). New York: The Guilford Press.
- Tremblay, R. E., Japel, C., Pérusse, D., Boivin, M., Zoccolillo, M., Montplaisir, J., et al. (1999). The search for the age of 'onset' of physical aggression: Rousseau and Bandura revisited. *Criminal Behavior and Mental Health*, *9*, 8–23.
- Tronick, E. Z., & Cohn, J. F. (1989). Infant-mother face-to-face interaction: Age and gender differences in coordination and the occurrence of miscoordination. *Child Development*, *60*, 85–92.
- Van der Mark, I. L., Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2002). Development of empathy in girls during the second year of life: Associations with parenting, attachment, and temperament. *Social Development*, *11*, 451–468.
- Van IJzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of the adult attachment interview. *Psychological Bulletin*, *117*, 387–403.
- Van IJzendoorn, M. H. (1997). Attachment, emergent morality, and aggression: Toward a developmental socioemotional model of antisocial behaviour. *International Journal of Behavioral Development*, *21*, 703–727.
- Van Zeijl, J., Mesman, J., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Juffer, F., Stolk, M. N., et al. (2006). Attachment-based intervention for enhancing sensitive discipline in mothers of 1- to 3-year-old children at risk for externalizing behavior problems: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *74*, 994–2005.
- Van Zeijl, J., Mesman, J., Stolk, M. N., Alink, L. R. A., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., et al. (2006). Terrible ones? Assessment of externalizing behaviors in infancy with the child behavior checklist. *Journal of Child Psychology and Psychiatry*, *47*, 801–810.

- Weinberg, M. K., & Tronick, E. Z. (1996). Infant affective reactions to the resumption of maternal interaction after the still-face. *Child Development*, *67*, 905–914.
- Weinfield, N. S., Sroufe, L. A., Egeland, B., & Carlson, E. A. (1999). The nature of individual differences in infant-caregiver attachment. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 68–88). New York: The Guilford Press.

Acknowledgments

This study is part of the research project ‘Screening and Intervention of Problem behavior in Toddlerhood’ (SCRIPT), conducted at the Centre for Child and Family Studies, Leiden University, The Netherlands. The study is supported by grant 2200.0097 from The Netherlands Organisation for Health Research and Development (Zorgonderzoek Nederland) to Marinus H. van IJzendoorn and Femmie Juffer.