

Differential Susceptibility to Discipline: The Moderating Effect of Child Temperament on the Association Between Maternal Discipline and Early Childhood Externalizing Problems

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This study investigated the interaction of child temperament and maternal discipline in the prediction of externalizing problems in early childhood. Interaction effects were evaluated in a sample of 227 one- to three-year-old children with relatively high externalizing problems scores on the Child Behavior Checklist/1½–5. Child temperament was reported by the mothers, maternal discipline was observed in a laboratory session, and child outcome measures included both mother-reported externalizing problems and observed physical aggression. Results indicate that children with difficult temperaments are more susceptible to negative discipline (i.e., they showed more externalizing problems) as well as more susceptible to positive discipline (i.e., they showed fewer externalizing problems and less physical aggression), as compared with children with relatively easy temperaments. These findings provide empirical evidence for the differential susceptibility hypothesis and suggest directions for enhancing the effectiveness of interventions aimed at reducing early childhood externalizing problems.

Keywords: differential susceptibility, temperament, discipline, externalizing problems, early childhood

According to Belsky's (1997b) differential susceptibility hypothesis, environmental influences do not affect all children equally. Children with difficult temperaments seem to be most susceptible to rearing influences (Belsky, 1997a). These children are thought to be more likely to develop externalizing problems as a result of negative parenting but also to be more positively affected by optimal parenting than other children. As Collins, Maccoby, Steinberg, Hetherington, and Bornstein (2000) have argued, contemporary research should underscore the fact that "statistical interactions and moderator effects are the rule, not the exception" (p. 228). Empirical evidence for the moderating effect of child temperament on the relation between parental discipline and child externalizing problems is emerging. Most

research in this area concerns school-age children, whereas the literature shows that ineffective discipline and child externalizing problems emerge in early childhood and are predictive of a variety of negative outcomes in later childhood (e.g., Campbell, Shaw, & Gilliom, 2000). In order to provide further empirical evidence for the differential susceptibility hypothesis, this study investigated the interaction between difficult temperament and maternal discipline in the prediction of externalizing behavior problems in 1- to 3-year-old children.

Temperament research has highlighted the child's contribution to his or her own development. Although different approaches to temperament can be adopted, child temperament is generally considered to refer to individual differences in behavioral style that are visible from early childhood (Goldsmith et al., 1987; Rothbart & Bates, 1998). Both genetic influences and unique environmental factors contribute to the expression of child temperament (e.g., Bokhorst et al., 2003; Saudino, 2005). There is ample evidence for the relation between temperament and child behavior problems (for a review, see Sanson, Hemphill, & Smart, 2004), even though limitations such as construct overlap and informant effects preclude conclusions that are too strong (e.g., see Belsky, Hsieh, & Crnic, 1998). Difficult temperament has been conceptualized in many different ways (mainly different combinations of negative emotion-

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ality, low effortful control, inadaptability, persistence, and negative mood) but has nonetheless been frequently found to be related to the development of externalizing problems. Although direct relations exist, the combination of difficult temperament with other risk factors, such as a poor mother-child relationship, seems to have the greatest impact (Sanson, Oberklaid, Pedlow, & Prior, 1991). Thomas, Chess, and Birch (1968) hypothesized that infant characteristics interact with parenting to produce poor (or better) child outcomes. In his differential susceptibility theory, Belsky (1997a, 1997b) emphasized the evolutionary rationale for a varying susceptibility to environmental influences in different children. The probabilities of passing on one's genes in a changing environment and an uncertain future will be greater with a diversification of investments, which includes bearing offspring with a differential susceptibility to that environment. Similarly, Boyce and Ellis (2005a, 2005b) have posited an evolutionary-developmental theory of sensitivity to context related to variations in neurobiological stress reactivity. Others have focused on gene-environment interactions with respect to family violence (Caspi et al., 2002) and behavioral inhibition (Fox et al., 2005). Research that does not account for the moderating effects of child characteristics can both over- and underestimate environmental effects.

Concerning the development of child behavior problems, Belsky (1997b) speculated that some children will engage in externalizing behaviors because they are born that way (i.e., have an inherited propensity to exhibit externalizing problems), whereas others are made that way, especially if they have an inherited propensity to be environmentally reactive. Belsky (1997a) suggested that difficult, negatively emotional infants may be most affected by rearing influences. Currently, a growing number of studies have confirmed the moderating role of child temperament in the association between parenting and the development of externalizing behavior problems, for example, in an intervention context (Blair, 2002), in the context of day care (Crockenberg & Leerkes, 2005), and in the context of family conflict (Ramos, Guérin, Gottfried, Bathurst, & Oliver, 2005).

In studies on early childhood, the main focus has been on general parenting styles by temperament interactions in the prediction of externalizing problems (e.g., Belsky et al., 1998; Feldman, Greenbaum, & Yirmiya, 1999; Shaw et al., 1998). Only a few studies have examined the influences of child temperament on the more specific association between parental discipline practices and externalizing behaviors. Colder, Lochman, and Wells (1997) found that harsh discipline predicted high levels of aggression in fourth- and fifth-grade boys characterized by moderate to high fear, whereas in a study by Leve, Kim, and Pears (2005), harsh discipline predicted increases in externalizing behavior from ages 5 to 17 years only in girls high on impulsivity or low on fear. A combination of high negative emotionality, low fearfulness, and high negative maternal control preceded high, nondecreasing externalizing trajectories in disadvantaged boys followed from ages 2 to 6 years in a study by Gilliom and Shaw (2004). Results from Paterson and Sanson (1999) indicated an interaction between tempera-

mental inflexibility and punitive parenting in the development of externalizing behavior problems in 5- and 6-year-olds. Finally, Lengua, Wolchik, Sandler, and West (2000) reported that inconsistent discipline was more strongly related to adjustment problems for 9- to 12-year-old children of divorce who were high in impulsivity. Despite variations in strengths and limitations, sample size and characteristics, statistical analyses, and the operationalization of both temperament and parental discipline, the above-mentioned studies have provided some evidence for the moderating effect of child temperament on the association between parental discipline and externalizing behavior problems.

Most studies on discipline by temperament interactions in the prediction of externalizing problems concerned school-age children. Gilliom and Shaw (2004) were the only ones to include preschoolers in their sample. From a developmental perspective, parental discipline strategies become increasingly important for managing child behavior during the toddler years (e.g., Belsky, Woodworth, & Crnic, 1996). By the end of the 1st year, when children experience rapid developmental advances in cognitive, linguistic, and motor skills, parenting issues shift from primarily providing nurturance and protection to caregiving issues such as firm support, limit setting, and the use of effective control strategies (Sroufe, 1979). Several studies have shown that parental discipline is associated with externalizing problems. Negative discipline, including coercive, physical, and inconsistent discipline, is associated with higher levels of behavior problems (e.g., Gardner, 1989; Gershoff, 2002; Patterson, 1982). At the same time, positive discipline techniques, such as induction or empathy, and discipline in the context of a positive affective relationship predict lower levels of externalizing problems (Maccoby & Martin, 1983; Rothbaum & Weisz, 1994). It is therefore also interesting that the studies examining the moderating effect of child temperament on the relation between parental discipline and externalizing problems mainly concentrated on the negative consequences of negative discipline for children with a vulnerable temperament, whereas one could argue likewise that these children would also be more positively affected by positive discipline because of their "sensitive" temperament. In the differential susceptibility theory, it is suggested that the susceptibility to parental influence is for better, in the case of positive caregiving, or for worse, in the case of less positive or negative caregiving (Belsky, 2005). Gilliom and Shaw (2004) combined their measurements of harsh control techniques and (the absence of) warmth into an overall measure of maternal negative control. Paterson and Sanson (1999) did measure induction and parental warmth in addition to the negative discipline variables of punishment and expectancy of obedience, but only the interaction between temperamental inflexibility and parental punishment accounted for additional variance beyond main effects.

Although most of the studies on discipline by temperament interactions in the prediction of externalizing problems attempted to avoid informant effects by using parent, child, and/or teacher data, the majority of studies relied on questionnaire data. In Leve et al. (2005), parents were

interviewed on their harsh discipline practices, and the use of parent interviews may be comparable to the use of questionnaires. Gilliom and Shaw (2004), however, also used observational data for both child temperament and parental discipline. Sole reliance on questionnaires increases the probability of measurement confounding or method bias, which is especially relevant when temperament and externalizing behavior problems are studied simultaneously (e.g., see Lemery, Essex, & Smider, 2002; Sanson, Prior, & Kyrios, 1990). Only in the studies by Paterson and Sanson (1999) and Lengua et al. (2000) was item overlap between questionnaires tapping both constructs explicitly reduced.

In sum, research regarding children's differential susceptibility to parental discipline practices, both negative and positive, in the development of externalizing problems in early childhood is limited and hampered by several methodological issues. Moreover, Bates, Pettit, Dodge, and Ridge (1998) and Belsky et al. (1998) stressed the need for replication of temperament by environment interactions. In fact, empirical evidence for the positive side of the differential susceptibility hypothesis, pointing to similar high sensitivity of children with difficult temperaments to optimal parenting, is scarce (Klein Velderman, Bakermans-Kranenburg, Juffer, & Van IJzendoorn, 2006; Kochanska, Aksan, & Joy, 2007). Nevertheless, such evidence seems crucial for its difference with a cumulative risk model. The aim of this study was to investigate whether the relation between negative as well as positive maternal discipline and externalizing problems is moderated by child difficult temperament in 1- to 3-year-old children. Both questionnaire and observational data were used for child outcome measures, whereas efforts were also made to reduce content overlap between questionnaires of child outcome and child difficult temperament. On the basis of the available literature, children with difficult temperaments were expected to be more susceptible to the negative consequences of negative discipline strategies and also more influenced by positive discipline as compared with children with relatively easy temperaments. The influences of child age and sex on the discipline by temperament interactions were also explored, but specific predictions were not made because of the lack of conclusive evidence from previous studies regarding this topic.

Method

The Screening and Intervention of Problem Behaviors in Toddlerhood (SCRIPT) Study

This study was based on data obtained in the SCRIPT study, which investigated the effectiveness of an early intervention program aimed at reducing externalizing problems in 1- to 3-year-old children by enhancing maternal sensitivity and adequate discipline strategies. It consisted of a screening phase in a general population sample and a randomized case-control intervention phase in a selected subsample of children with relatively high levels of externalizing behavior problems. In the intervention phase, chil-

dren from both the intervention and control groups were seen in the laboratory for a pretest and two posttests (1 and 2 years later, respectively). Data for this study were derived from the screening and pretest phase.

Sample and Procedure

Participants were recruited from community records of several cities and towns in the western region of the Netherlands. Children born in a specific time period were selected in order to obtain a group of 1-, 2-, and 3-year-old children (10–15, 22–27, and 33–40 months old, respectively). Because the screening phase of the SCRIPT study was designed to provide participants for the intervention study, sample homogeneity in terms of cultural background (Dutch) was important for statistical reasons (power) and practical reasons (possible cultural/language difficulties in home visits). Therefore, children who had both a non-Dutch surname and a non-Dutch first name were not included in the target screening sample. Parents of 4,615 eligible children were sent questionnaire booklets by mail. We obtained 2,408 questionnaires from primary caregivers (response rate 52%). Unfortunately, we were not able to collect detailed information on nonparticipating families, but there were no child age or child sex differences between responding and nonresponding families ($p = .11$ and $p = .38$, respectively).

To ensure a homogenous sample, only children living with two parents (with the biological mother as the primary caregiver and a father figure—biological or stepfather—as the second caregiver: 95% of the screening sample) were eligible for the intervention study. This selection and the application of several other exclusion criteria (e.g., twins, serious medical condition in child or mother) resulted in the exclusion of 454 cases, leaving a target selection sample of 1,954 children. At the time of our data collection, there were no established clinical cutoff scores for the Dutch Child Behavior Checklist (CBCL/1½–5) and no existing normative data regarding 1-year-old children. Because the intervention study targeted children suffering from externalizing behavior problems or those at risk for the development of such problems, children with scores above the 75th percentile on the CBCL Externalizing Problems scale (age 1 year: scores ≥ 13 ; age 2 years: scores ≥ 19 ; age 3 years: scores ≥ 20) were selected for the intervention study.

Of the 438 selected families, parents of 237 children (54%) agreed to participate in the entire intervention study and were invited for a visit to the laboratory. During the 1.5-hr laboratory session, mother and child completed several tasks (coded afterwards from videotapes with observational measures, by independent coders, unaware of other data concerning the participants), and mothers were asked to fill in some questionnaires. The average time between the screening and the laboratory session was 3.85 months ($SD = 0.96$, range = 0.83–6.37). There were no significant differences between selected families who agreed to participate in the entire intervention phase and those who did not regarding initial level of child externalizing problems ($M = 23.92$, $SD = 0.43$ vs. $M = 23.92$, $SD = 0.47$, respectively), $F(1, 436) = 0.00$, $p = .99$; child age in months ($M = 23.14$,

$SD = 0.63$ vs. $M = 24.78$, $SD = 0.69$, respectively), $F(1, 436) = 3.07$, $p = .08$; maternal age in years ($M = 33.15$, $SD = 0.27$ vs. $M = 32.42$, $SD = 0.29$, respectively), $F(1, 436) = 3.42$, $p = .07$; child sex (55% and 56% boys, respectively), $\chi^2(1, N = 437) = 0.04$, $p = .84$; and presence of siblings (58% and 59%, respectively), $\chi^2(1, N = 437) = 0.00$, $p = .98$. The only statistically significant but small difference was that participating parents had a somewhat higher educational level than nonparticipating parents ($M = 3.92$, $SD = 0.07$ vs. $M = 3.56$, $SD = 0.08$, respectively), $F(1, 434) = 12.70$, $p < .01$, partial $\eta^2 = .03$. Educational level was measured on a 5-point scale ranging from 1 (*only elementary school*) to 5 (*university degree*).

For this study, only those children for whom complete data were available on all variables of interest were included (96% of the sample). This selection resulted in a sample of 227 children (mean age = 27.40 months, $SD = 9.90$, range = 13.58–41.91). Fifty-six percent of the children were boys, and over half of the children had siblings (59%). Mean age of the mothers was 33 years, and the majority of the parents had a high educational level (one or both parents with a university degree in 64% of the sample). Because data concerned the screening and pretest phase, in all analyses the intervention and control groups were combined (for intervention effects, see Van Zeijl et al., 2006a).

Instruments

Internal consistencies of questionnaire data were assessed in the general population screening sample ($N = 2,408$).

Child temperament. Child difficult 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 5-point scale, ranging from 0 (*not true*) to 4 (*true*). Because the ICQ was used in combination with the CBCL/1½–5 (Achenbach & Rescorla, 2000), 5 items in the ICQ had to be discarded due to content-overlap between items of both questionnaires. Therefore, in each age group (in order to reflect developmental differences in the expression of child temperament), a one-component analysis was carried out on the remaining items to derive an overall difficulty factor (i.e., easily upset, persistent, inadaptability). The difficulty factor consisted of 14 items in 1-year-old children, 18 items in 2-year-old children, and 16 items in 3-year-old children (for more information on the composition of this measure, see Van Zeijl et al., 2006b). Internal consistencies (Cronbach's alphas) were .68, .76, and .75, respectively. A total score was computed by averaging item scores.

Maternal discipline. Maternal discipline strategies were observed in the laboratory session, during a 10-min don't task. The child was shown a treat, which was subsequently given to the mother with the (written) instruction to refrain from giving the treat to the child until the end of the session, 10 min later. During this task, the mother was asked to fill

in a questionnaire as a competing demand while the child had nothing to play with for the first 5 min and was offered toys to play with for the last 5 min. All maternal discipline strategies were coded, whether or not they concerned the forbidden treat (e.g., they could also concern the toys). Coding procedures were based on Kuczynski, Kochanska, Radke-Yarrow, and Girnius-Brown (1987), and Van der Mark, Van IJzendoorn, and Bakermans-Kranenburg (2002). The following maternal discipline strategies were observed: distraction, induction, understanding (positive strategies), prohibition, physical obstruction, and giving in (negative strategies). *Distraction* was coded when mothers redirected the child's attention by giving an alternative to the present situation or the child's behavior. *Induction* referred to mothers' explanations of why the child was not allowed to do something or of the consequences of the child's behavior. *Understanding* was coded when mothers displayed interest in or understanding of the child's feelings or thoughts. *Prohibition* concerned any prohibition, command, or disapproval with respect to the child's behavior. *Physical obstruction* was coded when mothers in any way physically obstructed the child from getting the treat. Finally, *giving in* was coded when mothers did not follow through on (part of) a prohibition, by either actively or passively giving in. Coding was ended before the intended 10-min duration if mothers completely gave in by handing the child the treat. For 1-year-old children, the duration of this task was set at 8 min because of the fatiguing length of the laboratory session for children in this age group. Therefore, the exact duration of the don't task varied from 4 to 10 min, and all frequencies were recomputed to a standard 10-min duration. The average intraclass correlation (single rater, absolute agreement) for intercoder reliability for all separate pairs of five coders was .85 (range = .61–.95; $n = 30$). Overall scores for positive discipline and negative discipline were computed by adding the frequencies of, respectively, the three positive discipline strategies (factor loadings were .79, .58, and .78) and the three negative discipline strategies (factor loadings were .85, .82, and .41). Because the six subscales were not equally distributed, subscale scores were standardized before being summed.

Child externalizing problems. The widely used and extensively validated CBCL/1½–5 (Achenbach & Rescorla, 2000) was used to measure externalizing problems and was completed by the mother during the laboratory session. The mothers indicated whether their child displayed any of the 100 behavioral descriptions in the last 2 months on a 3-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, and 2 = *very true or often true*). Using confirmatory factor analysis, Van Zeijl et al. (2006b) found that the broadband Externalizing Problems scale (31 items) reported for 2- and 3-year-olds by Koot, Van den Oord, Verhulst, and Boomsma (1997) was also applicable to 1-year-olds. The internal consistency (Cronbach's alpha) for mother-reported externalizing problems was .91. Scale scores were computed by summing item scores.

Child aggression. An observational measure of child aggression (Mesman et al., 2006) was used, complementing

mother-reported externalizing problems. Child physical aggression was observed in the laboratory session during three different episodes: a break in which mother and child had a snack and a drink, a clean-up task, and a don't task in which the child was not allowed to touch several attractive toys (different from the don't task in which maternal discipline was assessed). Ratings on a 5-point scale ranging from 0 (*not aggressive*) to 4 (*very aggressive*) were assigned for both object- and mother-directed aggression, accounting for the frequency and intensity of aggressive acts. Behaviors that were coded as aggression included hitting, kicking, biting, pinching, scratching, shaking, pushing, stamping, throwing, and physically threatening to perform any of these behaviors. The context of the behavior as well as the child's facial and verbal expressions were taken into account to ensure that the behaviors could not be ascribed to motor limitations or play. The average intraclass correlation (single rater, absolute agreement) for intercoder reliability (for all separate pairs of seven coders) was .85 (range = .73–.93; $n = 45$). In this article, the mean score of the ratings for object- and mother-directed aggression ($r = .37$, $p < .01$) was used.

Statistical Analyses

To test for moderator effects, Holmbeck (1997) recommended using variables in their continuous forms in multiple regression analyses. In the regression equation, predictor and moderator were entered first, followed by the interaction of the predictor and moderator. All variables were "centered" (i.e., sample means were subtracted from individual scores) to avoid problems of multicollinearity (Aiken & West, 1991). Residual analyses to check for nonnormal distributions did not show any problems. For the interpretation of significant interactions, regression lines were plotted for high and low moderator values, as recommended by Aiken and West (1991). The sample was split in a group of temperamentally difficult children and a group of children with relatively easy temperaments. Following Aiken and West, an a priori split was made on the 82.7th percentile in the general population sample, comparable to the commonly used borderline/clinical cutoff for the CBCL/1½–5 (see also Klein Velderman et al., 2006) to distinguish the extreme from the more normal population. Because the three age groups differed in their temperament levels, splits were made separately in each age group. There were no differences between groups of children with relatively easy or difficult temperaments on any of the sociodemographic variables ($ps > .10$).

Some missing values (1.1% of the data) were found on the above-mentioned measurements (8 for maternal discipline, 2 for child externalizing behaviors). Results are reported for children with complete data on all variables of interest ($N = 227$). However, results were similar when missing data were substituted with the mean score on the variable for children with the same sex, age, and parental educational level, as a conservative imputation method (Tabachnick & Fidell, 2001).

Outliers were found for observed child physical aggression

and maternal discipline strategies. However, Keppel and Wickens (2004) argued that "any distribution of data is likely to contain some extreme scores. Real data often are a little more scattered than a normal distribution. These observations are a valid part of the distribution and should be included in the analysis" (p. 146). Therefore these data were not excluded and results are reported for the original, non-Winsorized data. When outliers ($z > |3.29|$) were Winsorized (i.e., "moved in close to the good data"; Hampel, Ronchetti, & Rousseeuw, 1986, p. 69) by replacing the outlying scores with the next highest value (with a $z < |3.29|$) in the distribution, results were similar, demonstrating that the reported effects cannot be ascribed to outlying values.

Results

Preliminary Analyses

In Table 1, means and standard deviations for all variables of interest are presented, as well as group differences between children with relatively easy (<82.7 percentile) and difficult (>82.7 percentile) temperaments on each variable. The use of maternal discipline strategies was similar in both temperament groups. The only significant group differences were on child externalizing problems (partial $\eta^2 = .13$) and child physical aggression (partial $\eta^2 = .04$); scores were lower in children with relatively easy temperaments as compared with temperamentally difficult children.

Table 2 shows that overall positive discipline was positively correlated with overall negative discipline ($r = .39$, $p < .01$), whereas child age was negatively correlated with both positive and negative discipline ($r = -.33$, $p < .01$, and $r = -.24$, $p < .01$, respectively). The highest correlation among separate maternal discipline strategies was .50 ($p < .01$) for prohibition and physical obstruction. Observed aggression was significantly correlated with the CBCL Externalizing Problems score ($r = .22$, $p < .01$). There were no significant differences between boys and girls on any of the predictor variables ($ps > .32$).

Moderator Effects

Child externalizing problems. First, we performed a multiple regression analysis (forced entry) including child temperament and maternal positive and negative discipline, as well as the two discipline by temperament interactions as predictor variables. Results are presented in Table 3. A significant regression model was found, $R^2 = .18$, $F(5, 221) = 9.58$, $p < .01$. Difficult temperament, positive discipline, and negative discipline showed main effects in the prediction of externalizing problems. The interactions of difficult temperament with both positive and negative discipline were also significant predictors of externalizing problems. Associations were in the expected directions. Controlling for main effects, the addition of the interaction effects significantly improved the prediction of externalizing problems, $R^2_{\text{change}} = .03$, $F_{\text{change}}(2, 221) = 3.35$, $p < .05$. The interpretation of significant interaction effects can

Table 1
Descriptive Statistics and Differences Between Two Temperament Groups

Variable	Total sample (N = 227)		Easy children (n = 129)		Difficult children (n = 98)		Differences	
	M	SD	M	SD	M	SD	t	
Child difficult temperament	1.88	0.53	1.53	0.28	2.35	0.39	-17.98**	Easy < Difficult
Child age (months)	27.40	9.10	26.65	9.54	23.39	10.31	-1.31	
Child sex (% boys)	56.4		52.7		61.2		1.65 ^a	
Mother-reported externalizing problems	25.21	8.33	22.62	6.51	28.62	9.23	-5.49**	Easy < Difficult
Observed child physical aggression	0.59	0.72	0.46	0.55	0.76	0.88	-3.02**	Easy < Difficult
Observed maternal positive discipline ^b	-0.03	2.09	-0.02	2.02	-0.04	2.19	0.06	
Distraction	4.87	5.31	4.93	5.56	4.80	5.00	0.17	
Induction	2.91	2.63	2.79	2.40	3.07	2.91	-0.82	
Understanding	4.39	5.08	4.64	5.07	4.06	5.10	0.85	
Observed maternal negative discipline ^b	-0.05	2.00	-0.06	2.00	-0.04	2.01	-0.07	
Prohibition	8.58	6.41	8.41	6.17	8.79	6.74	-0.44	
Physical obstruction	5.95	6.28	5.87	6.05	6.06	6.59	-0.23	
Giving in	0.57	1.02	0.61	1.15	0.52	0.83	0.72	

^a Chi-square. ^b Standardized values.
** *p* < .01.

be inferred from the plotted regression lines for children with relatively easy versus difficult temperaments (see Figure 1). These lines were plotted using predictor values of ± standard deviation (including the other discipline variable) as recommended by Aiken and West (1991). Post hoc regression analyses for easy and difficult children separately showed that frequent positive maternal discipline predicted fewer externalizing problems (after correcting for negative discipline) in children with difficult temperaments ($\beta = -.34; p < .01$) but not in children with easy temperaments ($\beta = -.15; p = .12$). Frequent negative discipline predicted more externalizing problems (after correcting for positive discipline) in difficult children ($\beta = .29; p < .01$) but not in children in the easy group ($\beta = .01; p = .90$).

Subsequently, we entered child age and sex in the first step of the regression analyses and three-way interactions of child age and sex with child temperament and maternal discipline in the final step, to assess whether the findings generalized across age and sex. The addition of the three-way interactions did not significantly improve the prediction

of externalizing problems, $R^2_{\text{change}} = .01, F_{\text{change}}(4, 215) = 0.38, p = .83$, but there was a significant main effect of child age ($B = 4.25, \beta = .42, p < .01$), indicating that older children showed more externalizing problems than younger children.

With a more exploratory aim, we tested the individual maternal discipline strategies in separate hierarchical multiple regression analyses (forced entry). When we controlled for main effects, the addition of the interaction effect significantly improved the prediction of externalizing problems for distraction, $R^2_{\text{change}} = .03, F_{\text{change}}(1, 223) = 7.93, p < .01$, and prohibition, $R^2_{\text{change}} = .02, F_{\text{change}}(1, 223) = 4.69, p < .05$. Children with difficult temperaments were more positively influenced by the positive discipline strategy distraction and more negatively affected by the negative discipline strategy prohibition as compared with children with relatively easy temperaments.

Child physical aggression. The analyses were repeated for observed physical aggression as a child outcome measure. A significant regression model was found, $R^2 = .07$,

Table 2
Correlations Between All Predictor Variables (N = 227)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Child difficult temperament	—											
2. Child externalizing problems (CBCL)	.31**	—										
3. Child observed aggression	.11	.22**	—									
4. Child age (months)	-.06	.41**	.18**	—								
5. Observed maternal positive discipline	.09	-.18**	-.05	-.33**	—							
6. Distraction	.09	-.24**	-.13	-.42**	.75**	—						
7. Induction	.04	-.01	.07	-.11	.67**	.21**	—					
8. Understanding	.05	-.14*	-.04	-.17*	.73**	.39**	.20**	—				
9. Observed maternal negative discipline	.05	.04	.08	-.24**	.39**	.39**	.30**	.13	—			
10. Prohibition	.02	.10	.07	-.11	.31**	.31**	.30**	.03	.83**	—		
11. Physical obstruction	.10	-.03	.02	-.44**	.37**	.38**	.28**	.12	.79**	.50**	—	
12. Giving in	-.01	.06	.06	.11	.13*	.14*	.01	.14*	.52**	.21**	.09	—

Note. CBCL = Child Behavior Checklist.
* *p* < .05. ** *p* < .01.

Table 3
Multiple Regression Analysis Predicting Child Externalizing Problems ($N = 227$)

Variable	B	β	t
Child difficult temperament	5.35	.34	5.50**
Maternal positive discipline	-0.97	-.24	-3.61**
Maternal negative discipline	0.62	.15	2.24*
Maternal Positive Discipline \times Temperament	-1.15	-.16	-2.19*
Maternal Negative Discipline \times Temperament	1.33	.16	2.28*

Note. $R = .42$, $R^2 = .18$, $F(5, 221) = 9.58$, $p < .01$.
* $p < .05$. ** $p < .01$.

$F(5, 221) = 3.14$, $p < .05$. Difficult temperament and the interaction of difficult temperament with positive discipline were significant predictors of child physical aggression (see Table 4). Associations were in the expected directions. Controlling for main effects, the addition of the interaction effects significantly improved the prediction of observed child physical aggression, $R^2_{\text{change}} = .04$, $F_{\text{change}}(2, 221) = 4.15$, $p < .05$. After correcting for negative discipline, frequent positive maternal discipline predicted less physical aggression in children with difficult temperaments ($\beta = -.24$, $p < .05$), but not in children with easy temperaments ($\beta = .09$, $p = .33$; see Figure 2).

The addition of the three-way interactions did not significantly improve the prediction of physical aggression, $R^2_{\text{change}} = .02$, $F_{\text{change}}(4, 215) = 0.97$, $p = .42$, indicating that findings were generalizable across age and sex. Child age and sex, however, showed main effects in the prediction

of physical aggression ($B = -0.20$, $\beta = -.14$, $p < .05$, and $B = 0.17$, $\beta = .19$, $p < .01$, respectively); boys as well as older children showed more physical aggression than girls and younger children. For the individual maternal discipline strategies, the addition of the interaction with temperament, after controlling for main effects, significantly improved the prediction of child physical aggression only for distraction, $R^2_{\text{change}} = .04$, $F_{\text{change}}(1, 223) = 9.35$, $p < .01$. Children with difficult temperaments were positively influenced by the positive discipline strategy distraction, whereas distraction was unrelated to physical aggression in children with relatively easy temperaments.

Discussion and Conclusion

This study showed that maternal discipline practices are related to early childhood externalizing problems, but also that effects are dependent on the child's temperament. Results of this study provide empirical evidence for the differential susceptibility hypothesis (Belsky, 1997a, 1997b). Our findings showed that children with difficult temperaments (i.e., highly negatively emotional, persistent, and inadaptible) were more vulnerable to negative discipline as compared with children with relatively easy temperaments. The former group showed more mother-reported externalizing behavior problems in the context of negative discipline (in particular, maternal prohibitions). As an important additional finding, children with difficult temperaments were also more influenced by positive discipline than children with relatively easy temperaments. Difficult children showed fewer mother-reported externalizing behaviors and less observed physical aggression when mothers showed positive discipline (in particular, distraction). All effects were independent of child age and sex. Our findings support the notion from the differential susceptibility hypothesis that parental influences act in two directions: more positively in the context of positive caregiving and more negatively when parenting is less positive (Belsky, 2005).

Moderator effects are most difficult to detect statistically in homogeneous samples (McClelland & Judd, 1993). It should be noted that our sample consisted only of children with relatively high initial levels of mother-reported externalizing problems and that the application of several exclusion criteria (e.g., living situation, cultural background) resulted in a relatively homogeneous sample. In this study, significant maternal discipline by temperament interactions accounted for 3% to 4% of the variance in externalizing

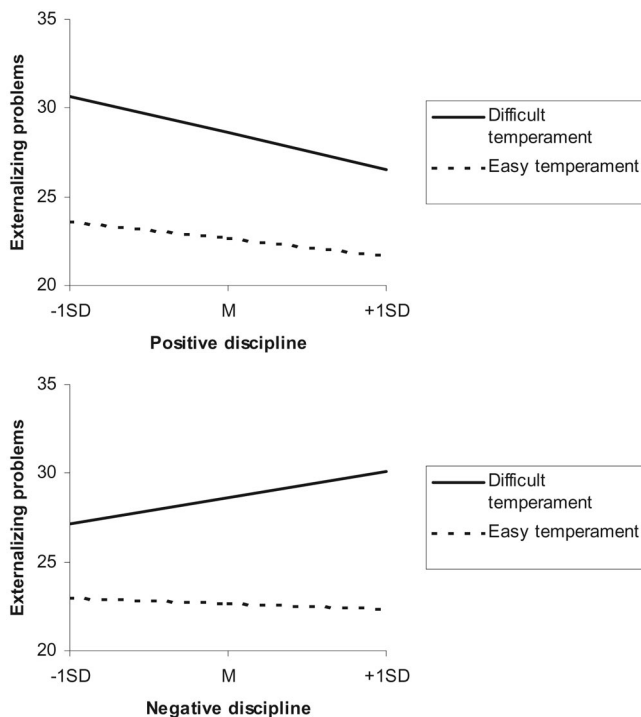


Figure 1. Regression lines for significant moderator effects of child temperament on the relations between maternal positive and negative discipline and child externalizing problems.

Table 4
Multiple Regression Analysis Predicting Child Physical Aggression ($N = 227$)

Variable	B	β	t
Child difficult temperament	0.22	.16	2.48*
Maternal positive discipline	-0.02	-.07	-0.93
Maternal negative discipline	0.04	.10	1.43
Maternal Positive Discipline \times Temperament	-0.14	-.22	-2.88*
Maternal Negative Discipline \times Temperament	0.07	.10	1.35

Note. $R = .26$, $R^2 = .07$, $F(5, 221) = 3.14$, $p < .01$.
* $p < .05$.

behavior problems, beyond that accounted for by main effects. This effect size is consistent with results reported in other studies investigating parental discipline by temperament interactions in the development of externalizing problems.

Because of the cross-sectional nature of this study, directionality cannot be established with certainty and possible cause-effect sequences cannot be disentangled. Previous studies indicated a complex model of the relation among parenting, child temperament, and their mutual role in the development of child externalizing behaviors (Lengua & Kovacs, 2005). Children with difficult temperaments may evoke maladaptive caregiving, and these caregiving behaviors in their turn increase difficultness. However, in our sample of 1- to 3-year-old children, no differences in maternal discipline strategies were found between children with difficult temperaments and relatively easy children. This finding may have been caused by the fact that transactional interaction patterns had taken place for a relatively short period of time, as compared with, for example, school-age children. Also, the fact that children were selected on the basis of their relatively high levels of externalizing problems may account for this finding. In our study, developmental and bidirectional influences on the expression of child temperament appear to have played a less important role compared with older children. Nevertheless, longitudinal studies are necessary to shed more light on the etiology of child externalizing problems and the influences of child temperament and parental discipline. In this study, maternal

positive and negative discipline practices were positively correlated, and standard deviations for maternal discipline strategies were quite large. This suggests that some mothers displayed more discipline strategies in general as a reaction to the child's behavior during the don't task, without a specific choice for either negative or positive discipline, whereas others displayed fewer discipline efforts—a reflection of passive versus proactive maternal behaviors.

This study addressed several limitations of previous research. First, both questionnaire and observational data were used to measure child outcomes. The interaction of observed positive discipline (in particular distraction) and mother-reported temperament in the prediction of mother-reported externalizing problems was replicated for observed physical aggression. Therefore, significant interactions that were found cannot be solely ascribed to informer or method bias. Unfortunately, we did not have an observational supplement to mother-reported child temperament. However, mothers reported on their child's temperament on average 4 months before they reported on their child's externalizing problems and before child physical aggression and maternal discipline techniques were observed, reducing the probability of informer or method bias. Second, we used a measure of difficult temperament that was decontaminated for content overlap with the externalizing problems measure, so confounding because of overlapping items is not likely to have influenced our results. Conceptual overlap between difficultness and externalizing behaviors, however, remains an issue in this research area, particularly when both constructs are measured beyond infancy. Nevertheless, in our study the correlation between difficult temperament and externalizing problems was sufficiently modest to suggest that overlap was not a major concern. Third, both negative and positive maternal discipline strategies were assessed, and both turned out to have a more pronounced influence in children with difficult temperaments as compared with children with relatively easy temperaments. Finally, this study's sample size was relatively large, consisted of very young children, and included boys as well as girls. The presented moderator effects were generalizable across child age and sex. Because this study was conducted in a rather age-homogeneous sample of infants and toddlers, we cannot exclude the possibility that differential susceptibility may act differently in older boys and girls.

Despite these strengths and the fact that this study was the first to provide empirical evidence of young children's

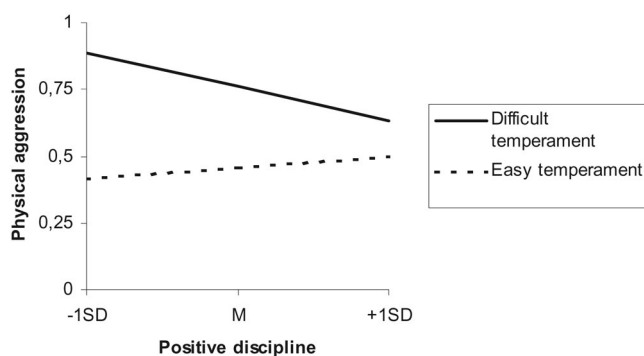


Figure 2. Regression lines for significant moderator effect of child temperament on the relation between maternal positive discipline and child physical aggression.

differential susceptibility to negative and positive maternal discipline strategies in the development of early externalizing behavior problems, there were some limitations. The first regards our sample's characteristics, which possibly restrict the generalizability of the study. Response rates were moderate, families from higher socioeconomic backgrounds were overrepresented, and families with non-Caucasian backgrounds were excluded (due to our a priori selection criteria). Although there are no indications that results would be different in other, more heterogeneous groups (except for potentially larger discipline by temperament effects because of greater variances in moderator and predictor variables), future studies should ideally include more representative samples. A second limitation is the fact that measures were concurrently assessed; only child temperament was assessed 1 to 6 months before the other measures. Therefore, firm inferences about causality and direction of effects cannot be made. Future research should examine the effect of parental discipline in the development of early externalizing behavior problems controlling for children's initial temperament in longitudinal studies as well as intervention studies (Collins et al., 2000). Our measurement of child difficult temperament is a third limitation. Whereas Belsky (1997a) speculated that the temperament dimension most likely to cause differential susceptibility is difficult temperament, discipline by temperament interactions in the prediction of externalizing problems have been demonstrated in studies using a variety of temperament dimensions, ranging from impulsivity to fearfulness. Different dimensions may operate differently for different outcomes. Lahey, Waldman, and McBurnett (1999) theorized that insensitive, power-assertive parenting in combination with high negative emotionality in children transforms normative autonomy struggles into hostile, coercive interactions, whereas Rubin and Mills (1991) emphasized that a combination with child fearfulness interferes with children's self-initiated coping skills. In our study, the broad concept of difficult temperament was used and measured in a single context with maternal reports. In future studies, temperament should be measured using multiple informants from different contexts, and separate dimensions of child temperament should be measured to assess whether they do operate differently for different outcomes. Ideally, these temperament dimensions should not be related to the specific outcome measure, in order to distinguish between cumulative risk models and differential susceptibility. A fourth limitation concerns the fact that only mothers were involved in this study. Further tests of the differential susceptibility hypothesis should also include fathers. Finally, externalizing and aggressive behaviors such as those used in this and other studies tend to show skewed distributions. More differentiated measures of these behaviors in future work may result in better distributions, which will allow for an investigation of the generalizability of the results for different parts of the distribution.

The current findings suggest that the assessment of child difficult temperament may serve as an important screening tool to identify children at risk for developing externalizing problems. Because children with difficult temperaments are

especially vulnerable to maladaptive caregiving, parents of these children are in particular need of being supported in maintaining or developing effective discipline strategies. Indeed, research suggests that children with difficult temperaments benefit most from intervention efforts (Blair, 2002; Klein Velderman et al., 2006; Van den Boom, 1994). Nevertheless, a question that arises from the present findings and that was also raised by Maziade (1989) concerns the developmental prognosis of children with easier temperaments who show externalizing problems (in this study's sample about 15% of the children). If maternal discipline is not associated with externalizing problems in this group, it is important to know if and how levels of externalizing behavior problems can be reduced and where intervention efforts should be targeted at in this specific group.

In conclusion, this study provides empirical evidence for the children's differential susceptibility to parenting hypothesis. More specifically, our results confirmed the hypothesis that children with difficult temperaments are more susceptible to maternal discipline, for better and for worse: Compared with children with relatively easy temperaments, they showed fewer externalizing problems in the context of positive discipline, whereas they showed more problems when exposed to negative discipline, independent of child age and sex. Future research may provide further empirical evidence for the applicability of the differential susceptibility hypothesis regarding parental discipline in an intervention context.

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