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Parenting, young children's behavioral self-regulation and the quality of their peer relationships

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Abstract

The quality of young children's peer relationships is important for their development, and it is assumed that parenting and self-regulation skills shape children's behavior when interacting with peers. In this multi-informant-multi-method study, we examined the direct and mediated associations between preschool parenting, children's behavioral self-regulation, and peer aggression and peer relationship problems in elementary school-aged children and extended previous work by examining both positive and negative

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parenting of both mothers and fathers. In a large community sample ($n = 698$) of parents and children who were between 1 and 6 years old, we obtained information on observed maternal sensitivity, mother- and father-reported harsh discipline, observed child self-regulation, and child-reported aggression towards peers, peer rejection and victimization. Results from a structural equation model showed that maternal sensitivity was prospectively associated with children's behavioral self-regulation and that lower levels of behavioral self-regulation were associated with higher levels of children's peer aggression and peer relationship problems. However, children's behavioral self-regulation did not mediate the association between maternal sensitivity and peer relationship problems. In addition, higher levels of paternal, but not maternal, harsh discipline were directly associated with more peer relationship problems, but again no mediation was found. The results highlight the importance of maternal sensitivity for children's behavioral self-regulation and the role of paternal harsh discipline for the quality of children's later peer relationships. Our findings suggest it is important to take maternal and paternal parenting practices into account as they might have different effects on the child.

KEYWORDS

child self-regulation, fathers, harsh discipline, peer aggression, sensitivity, victimization

1 | INTRODUCTION

Young children's social relationships play an important role in their development (Rubin et al., 2005). Although most young children develop healthy relationships with their peers, peer aggression (i.e., any action directed towards peers that causes harm) is a common phenomenon. About one-third of early elementary school children encounter aggressive peer interactions, either as aggressor or as victim (Jansen, Verlinden, et al., 2012).

Peer relationship problems constitute a significant risk for later mental health problems including anxiety, depression, self-harm, and aggressiveness (Arseneault et al., 2010; Laird et al., 2001). Given the high prevalence of peer relationship problems and the associated risk of developing mental health problems, it is important to increase our understanding of early, potentially malleable, risk factors.

Although studies have shown that genetic factors explained part of the variance in children's peer relationship problems, environmental factors also significantly contributed (Ball et al., 2008; Bowes et al., 2013). Parenting may be such an environmental factor, with parenting in the preschool period, when children first learn about social interactions in their family environment, being particularly important. It is thought that parenting may affect children's peer relationships via its impact on children's self-regulation, a key construct in their ability to regulate (social) behavior (Eisenberg et al., 2005). Whether the associations between parenting and peer relationships are similar for mothers

and fathers is, however, less clear. Fathers may play a unique role in children's social development (Paquette, 2004), but studies so far primarily focused on mothers. In the current study, we investigated whether children's behavioral self-regulation prospectively explained the associations between both mothers' and fathers' parenting in toddlerhood, and peer relationship problems in 6-year-olds.

1.1 | Parenting and peer relationship problems

Young children are assumed to transfer behavioral and relationship patterns they learn in their families to other social domains such as peer relationships (Ladd & Kochenderfer-Ladd, 2019). Children's early experiences within the family may thus impact how children later form peer relationships, emphasizing that parenting behavior in the first years of life may be of key importance. In their meta-analysis on children aged 4 years and older, Lereya et al. (2013), showed that positive parenting (i.e., authoritative parenting, communication, involvement, and support) was associated with a small to moderate decline in peer relationship problems (bullying and being victimized), whereas negative parenting (i.e., abuse and neglect, maladaptive parenting, and overprotection) was associated with an increase in these problems.

The current study focusses on two parenting constructs, one positive and one negative, that are both thought to be important for child social development, namely sensitivity and harsh discipline (Ladd & Kochenderfer-Ladd, 2019). These two constructs map onto the widely used dichotomy of autonomy-supportive versus controlling parenting (Soenens et al., 2015). Sensitivity reflects a parent's ability to perceive a child's signals and to adequately and promptly respond to these signals (Ainsworth et al., 1974), and can be operationalized as responsive and autonomy supporting parenting. Harsh discipline, on the other hand, is characterized by parental attempts to control a child's behavior using harsh verbal or physical forms of punishment (Chang et al., 2003). Studies suggest that sensitive parenting may nurture the socialization of children (Zhou et al., 2002), whereas harsh parental discipline is associated with higher levels of aggression in general (e.g., Gershoff, 2002; Larzelere, 2000), but also more specifically with aggression towards peers (Chang et al., 2003), and with lower levels of peer acceptance (Ladd & Kochenderfer-Ladd, 2019).

Several mechanisms may account for the relation between sensitivity and harsh discipline, and the development of peer relationship problems. First, parental sensitivity may directly impact peer relationships, as it is thought to be an important condition for the development of a secure caregiver-child attachment relationship (De Wolff & van IJzendoorn, 1997). Attachment theory states that the early caregiver-child attachment relationship influences the development of positive internal working models of the self and others, which impact the way children approach future (social) situations (Bowlby, 1969/1982). Indeed, a meta-analysis demonstrated that parent-child attachment security was associated with higher levels of peer competence, whereas insecurity was associated with lesser peer competence (Groh et al., 2017).

Second, the association between parenting and peer aggression may be explained by social learning theory, positing that modeling and (vicarious) reinforcement are key (Bandura, 1978). Scholars have argued that aggressive discipline induces similar behavior, because it models aggression and interferes with internalization of appropriate behavior, partly because it fails to convey the message that aggressive behaviors are wrong (Gershoff, 2002). Parents who use negative parenting practices, like physical or harsh discipline, may serve as a model for their children, showing that high levels of negative affectivity are an accepted method to approach (social) problems (Ladd & Kochenderfer-Ladd, 2019). Thereby, coercive parent-child interactions could generalize to interactions with peers (Patterson et al., 1989). Importantly, although parenting literature has primarily focused on mothers, there is some evidence that controlling or harsh behavior emanating from fathers may be more consistently associated with problematic peer interactions than harsh behavior from mothers (Chang et al., 2003; de Vries et al., 2018).

Besides these direct effects, parenting may also indirectly impact children's social development, for instance, via an effect of parenting on children's self-regulation skills.

1.2 | Parenting and behavioral self-regulation

In the broadest sense, self-regulation refers to the capacity to control and direct attention, thoughts, emotions and behavior (McClelland & Cameron, 2012), and reflects the voluntary or effortful actions to control these processes (Eisenberg & Spinrad, 2004). With respect to its development, Bridgett et al. (2015, p. 3), stated that self-regulation is “a multifaceted aspect of temperament that is biologically based and heritable, but also shaped over time.” Self-regulation develops and increases in sophistication from infancy onwards, as a result of both biological maturation and experience (e.g., social interactions). Rapid changes in neurobiological structures important for self-regulation development occur between birth and the age of five (Bridgett et al., 2015). In addition, social experiences are particularly important early on, as in these first years of life self-regulation is largely a dyadic process. Infants and preschool aged children depend principally on their caregivers for the regulation of their emotions and behavior and, at later ages, they adopt and internalize the experiences with their caregivers and gradually develop the capacity to regulate themselves (Bernier et al., 2010; Kochanska et al., 2001; Kopp, 1982).

In the present study, we focus primarily on behavioral self-regulation, one aspect of the broader self-regulation construct. Behavioral self-regulation has been defined as the overt behavioral manifestation of executive functions like attention, working memory and inhibitory control (McClelland & Cameron, 2012), or as a behavioral marker of effortful control (Liew et al., 2011). Effortful control is “the efficiency of executive attention – including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and detect errors” (Rothbart & Bates, 2006, p. 129). Clearly, effortful regulation should be distinguished from more reactive, automatic, processes involved in the modulation of emotions or behavior (Eisenberg et al., 2010; Rothbart et al., 2001). It is thought that with age, effortful types of regulation become increasingly influential for children’s functioning, and that effortful versus reactive processes predict distinct outcomes (Eisenberg & Spinrad, 2004). Olson et al. (2011) reported for instance that children’s effortful control, but not their emotional reactivity, was related to peer aggression.

Parents may play a significant role in the development of self-regulation, not only because parenting can impact the development of neural areas essential for children’s self-regulation (Belsky & de Haan, 2011), but also because parents are capable of providing support, modeling appropriate behavior, and explicitly teaching strategies to regulate emotions and behavior. Eisenberg et al. (2005) suggest, based on work by Hoffman (2001), that displaying parenting behavior like harsh discipline can cause overarousal in children, which may constrain children’s learning abilities of for instance self-regulation skills. In addition, when parents exhibit harsh discipline, ineffective regulation strategies may be modeled and the development of self-regulation may be compromised (e.g., Crockenberg et al., 2007; Patterson et al., 1989). In contrast, sensitive caregivers help children to regulate their emotions and physical needs, thereby preventing distress and providing a safe environment where the support and scaffolding is offered that is required for the development of emotion- and behavioral regulation (Hay et al., 2004; Hoffman, 2001).

In the process of self-regulation development, maternal and paternal parenting behaviors may both impact their children. Little is known, however, on specific maternal and paternal effects, as fathers still receive relatively little attention in studies on self-regulation and the vast majority of studies do not distinguish between effects of maternal and paternal parenting practices. Some scholars have suggested that mothers and fathers play different roles in child development. Paquette (2004), for instance, suggested that traditionally the father-child relationship is more strongly characterized by challenging behavior, play and activation, whereas the mother-child relationship has a more nurturing character. Others, however, stress that while both parents may make unique contributions, fathers’ and mothers’ roles are rather complementary and the parenting constructs, such as warmth, responsivity and control, used by mothers and fathers are not unique for either of them (Cabrera et al., 2014; Fagan et al., 2014). To our knowledge few empirical studies have investigated whether parenting of mothers and fathers differentially impacts self-regulation development in their children. We are aware of one recent study in adolescents. The authors found that less controlling behavior of fathers was associated with stronger emotion regulation in adolescent offspring, while for mothers this was true for higher levels of maternal support (Van Lissa et al., 2019). The authors interpreted their findings as

support for different parental roles and suggested that less controlling behavior was an age-appropriate manifestation of challenging behavior.

1.3 | Parenting, behavioral self-regulation and peer problems

Parenting may contribute to self-regulation development, and disturbances in young children's behavioral self-regulation, in turn, may underlie aggressive responses in the interaction with peers (Hay et al., 2004). Children who have difficulties regulating their behavior may be perceived as awkward or as 'different' from others, which may increase the likelihood of being disliked and facing negative reactions by peers (Hay et al., 2004). Children with self-regulation problems may also exhibit more aggressive behavior towards their peers when faced with social challenges. Empirical evidence supports this notion, demonstrating that children with higher levels of self-regulation skills tend to be more socially competent, to encounter more positive peer relationships and less rejection (Bandon et al., 2010; Ramani et al., 2010). In contrast, poorer self-regulation skills were associated with less prosocial behavior and more peer aggression (Chang et al., 2003; Olson et al., 2011; Verlinden et al., 2014).

Moreover, various longitudinal studies on externalizing problems, examining a broad collection of under-control problems, including attention problems, oppositional-defiant behavior and aggression, suggest that self-regulation in the broadest sense can explain the association between parenting and children's externalizing problems (Belsky et al., 2007; Choe et al., 2013; Doan et al., 2012; Eisenberg et al., 2005). However, whether this association is also present for social development, is to our knowledge an underexamined area.

In one of the few longitudinal studies on parenting, self-regulation and peer relations, it was found that harsh discipline—which was limited to maternal discipline—predicted peer aggression across the preschool and elementary school period (Olson et al., 2011). In addition, less effortful control was associated with more peer aggression. Yet, in that study, moderation by self-regulation was tested rather than mediation. Eisenberg et al. (2003) showed that children's parent-reported and observed self-regulation mediated the association between maternal positivity and children's social competence. In another study, Otterpohl and Wild (2015) showed reciprocal effects among maternal responsiveness, emotion regulation, and prosocial behavior in school-aged children, particularly in boys. The latter two studies did not focus, however, on specific behavioral regulation nor on peer relation problems, like being victimized or aggression towards peers, but on social competence in general or prosocial behavior (Eisenberg et al., 2003; Otterpohl & Wild, 2015). More importantly, previous studies overlooked that the actual child-rearing environment is characterized by a complex interplay of both positive and negative parenting behaviors, mostly by two parents (e.g., Lereya et al., 2013).

1.4 | Goal of the present study

In a large multi-method-multi-informant study, we extended previous work by exploring whether observed behavioral self-regulation mediates the association of mothers' and, importantly, fathers' parenting in preschool, with child reported peer relationship problems (either as aggressor or victim) in elementary school. We hypothesized that (1) observed maternal sensitivity and self-reported harsh discipline of both parents in the preschool period was associated with aggression towards peers or peer rejection/victimization as self-reported by 6-year-old elementary school aged children; and (2) that observed behavioral self-regulation in the preschool period would mediate the association between preschool parenting and later aggression towards peers and peer relationship problems.

2 | METHODS

2.1 | Design and study sample

This study was embedded in the Generation R study, a population-based prospective cohort investigating growth, development and health from fetal life onward. Detailed observational data was collected in an ethnically homogeneous subsample of children of Dutch national origin (Focus cohort). These children, their parents, and their grandparents were born in the Netherlands, which was a selection criterion to reduce the risk of confounding by ethnicity in genetic studies that were also performed in this subsample. Typically, enrolment took place in early pregnancy, with children born in 2002–2006. The study was approved by the Medical Ethics Committee of Erasmus Medical Center, Rotterdam. Written informed consent was obtained from all caregivers of participating children.

The sample for the present study consisted of 862 families who participated in the Focus cohort. At age 14 months and 3 years, maternal sensitivity was observed during lab visits. At age 3 years, data on children's behavioral self-regulation was collected using measures of compliance, ability to delay gratification, and task persistence. Additionally, both mothers and fathers filled out a questionnaire on harsh discipline. At age 6 years, participants visited our research center again and children were interviewed to obtain data on peer relationship problems. Information on maternal sensitivity and at least two self-regulation measures was available in 787 children. Participants without information on harsh discipline and peer relationship problems were excluded, leaving 698 children (81% of 862) for the analyses.

A non-response analysis indicated no differences between the 698 included and 164 excluded participants in parental age, family income or parental psychopathology.

2.2 | Measures

2.2.1 | Observed maternal sensitivity

Maternal sensitivity was observed in lab visits. When children were 14-months old, maternal sensitivity was observed in a 5-min free play session and during a psychophysiological assessment. Maternal sensitivity was coded from DVD recordings using the Ainsworth's nine-point rating scales for *Sensitivity* (responding in a prompt and adequate way to signals of the child) and *Cooperation* (respecting the child's wishes and activities without interfering or imposing mother's own will) (Ainsworth et al., 1974), Pearson $r_{\text{sensitivity-cooperation}} = .87, p < .001$. An overall maternal sensitivity score was created by standardizing the two scores and computing the average (see Kok, Linting, et al., 2013).

At child age 3 years, maternal sensitivity was observed in two 3-min tasks in which mother and child performed activities too difficult for the child alone: building a tower and drawing on an etch-a-sketch. Mothers were instructed to help their children as usual. Maternal sensitivity was coded from DVD recordings with the revised Erickson seven-point rating scales for *Supportive Presence* and *Intrusiveness* (Egeland et al., 1990). Mothers with high scores on Supportive Presence expressed positive regard and emotional support to the child. Parents who scored high on Intrusiveness showed a lack of respect for the child's autonomy, including disregarding desires, needs and interests. An overall maternal sensitivity score was created by reversing the Intrusiveness scales, standardizing the scores and creating an average over the supportive presence and intrusiveness scales per task (tower task $r = .41$; etch-a-sketch $r = .34, p < .001$) (Kok, Linting, et al., 2013).

For all sensitivity assessments (and the hereafter introduced observations), coders were extensively trained and regularly supervised. Reliability of coding was assessed directly after the training and at the end of the coding process to detect possible rater drift. The intercoder reliability (ICC) ranged from .65 to .71 ($n = 82$ double coded videos) for the 1-year measurement and from .75 to .79 ($n = 53$ double coded videos) for the 3-year observation.

2.2.2 | Harsh parental discipline

Disciplinary styles of mothers and fathers were assessed when the child was 3 years old using an adapted version of the Parent–Child Conflict Tactics Scale (Straus et al., 1998). Parents rated their use of discipline during the past two weeks on a six-point scale ranging from “never” to “five times or more.” Due to low prevalence rates scores were combined in a three-point scale (0 “never,” 1 “once,” 2 “twice or more”). Factor analysis of this adapted CTS-PC has identified a harsh discipline construct consisting of six items (Jansen, Raat, et al., 2012), representing psychological aggression and (mild) physical assault: for example, “I angrily pinched my child’s arm,” or “I shouted, yelled or screamed angrily at my child.” The 6 items were summed, then square root transformed to approach normality. The internal consistencies were rather low ($\alpha_{\text{mothers}} = .63$; $\alpha_{\text{fathers}} = .57$), because of low base rates and the small number of items involved.

2.2.3 | Peer aggression and peer relationship problems

Children’s information on peer problems was obtained with the Berkeley Puppet Interview (BPI) during a research center visit when children were 6 years old. The BPI is a semi-structured interactive interview to obtain reports from young children concerning problem behavior (i.e., internalizing and externalizing problems) and peer relationships (Ablow & Measelle, 2003). Two identical dog hand puppets, “Iggy” and “Ziggy” were introduced to the child and invited him/her to engage in conversation. The puppets made opposing statements about themselves and asked children to indicate which statement described him/her best. Videotaped interviews were scored by trained coders on a seven-point scale ranging from 1 to 7. The exact score depended on which of the puppets’ statement the child chose and how much emphasis was put on the answer. Very positive answers (e.g., “Kids *always* like me”) received a score of 1 and very negative answers (e.g., “Kids *never* like me”) received a score of 7. For the present study, we used the six-item “Overt Hostility” scale addressing peer aggression, and the nine-item “Peer Relations” scale which addressed peer rejection/victimization. Item scores were summed to compute scale scores. BPI scale scores underwent an inverse transformation to approach normality. The BPI has shown an adequate factor structure, construct validity as indexed by associations with known correlates of problem behavior, and an acceptable internal consistency (in the present sample: $\alpha_{\text{Overt Hostility}} = .68$; $\alpha_{\text{Peer Relations}} = .66$) (Ringoot et al., 2013), and test-retest reliability across 7–10 days ranged from .43 to .72 in previous studies (Ablow et al., 1999). Interrater reliabilities were high (average ICCs all $\geq .87$ on 10% double coded interviews).

2.2.4 | Observed behavioral self-regulation

Children’s behavioral self-regulation was assessed by observations, obtained in the lab when children were 3 years old.

Delay of gratification – The ability to delay gratification was assessed using an adapted version of the gift delay task (Kochanska et al., 1996, 2000). During our *Gift Delay* task, a trained experimenter placed a paper bag containing a wrapped gift on a table. Then the experimenter asked the child to wait in a chair without touching the bag until a sticker was brought in, which was a part of the gift. The experimenter returned after 180 s. Scores were given for two dimensions: (1) “gift behavior,” for example, whether or not the child touched the gift, ranging from 1 “opens the gift,” to 6 “does neither touch the bag nor the gift”; and (2) the time the child stayed seated, ranging from 1 “less than 15 seconds,” to 6 “remains seated all the time.” Gift behavior scores and seating time (Spearman $r = .45$, $p \leq .001$) were averaged into a total gift delay score. Inter-rater agreement among the coders was high (mean *kappa* gift behavior score = .94; mean *kappa* seating time = .95) (Henrichs et al., 2011).

Committed Compliance – Compliance was assessed in a 2-min disciplinary context (Don't) in which the parent allowed the child to play with an unattractive teddy bear, but prohibited to touch or play with a set of attractive toys that were displayed before the child. Child behavior was coded every 20 s using a coding system based on Kochanska and Aksan (1995), and Kuczynski et al. (1987). Compliance was coded in categories: committed compliance (i.e., child made no attempt to touch/play with toys, did not need prompting), situational compliance (i.e., child needed regular prompting/showed difficulties complying), passive noncompliance (i.e., child ignored requests), and resistant noncompliance (i.e., active resistance, protesting, whining), and an overall compliance score was obtained (Kok, Bakermans-Kranenburg, et al., 2013). The average ICC was .87 ($n = 53$).

Impossible Puzzle – Following Harris (1986), an Impossible Puzzle (IP) task was designed. Children were instructed to assemble a wooden puzzle in which one piece was intentionally made too big, so that it would never fit. The researcher and caregiver (in 11% a caregiver was present because children did not want to be separated) were instructed not to help the child. Here, we used a score of children's *persistence* on the task (i.e., working on the puzzle, trying to make the major piece fit), which was coded from DVD on a seven-point scale, ranging from 1 "quits playing with the major piece immediately" to 7 "plays with the major piece continuously." The average ICC of the persistence score was .75 ($n = 76$ sessions).

2.2.5 | Covariates

Several covariates were included. Information on *gender*, *parents' and child's age* was obtained from medical records. Information on *family income* was obtained by questionnaire at child age 6 years. *Child aggression at age 3 years*, assessed with the 19-item Aggressive Behavior scale of the Child Behavior Checklist for ages 1½–5 years (Achenbach & Rescorla, 2000), was included since aggression at younger ages may impact parenting and later peer aggression.

2.3 | Statistical analyses

Baseline characteristics of the data were explored and bivariate associations among parenting, children's peer aggression or peer problems, and the separate behavioral self-regulation constructs were explored with Pearson correlation coefficients.

Analyses were conducted in two stages. First, a confirmatory factor analysis (CFA) was conducted to evaluate the measurement model of observed self-regulation, which included committed compliance, gift delay, and persistence. Next, structural equation modeling (SEM) was used to test the association between parenting (i.e., observed maternal sensitivity [a latent variable comprising sensitivity at ages 1 and 3] and maternal and paternal harsh discipline) and children's peer relationships. In addition, we studied indirect effects to examine whether observed behavioral self-regulation mediated these associations. The covariates family income, child gender, and child aggression at child age 3 years were regressed on behavioral self-regulation and the peer relationship outcomes, child age at assessment of the peer relationship outcomes was only regressed on the peer relationship outcomes.

The CFA and SEM were estimated in MPlus version 7.4 (Muthèn & Muthèn, 1998-2017), using full information maximum likelihood (FIML) estimation with robust standard errors (MLR). MLR was used to account for remaining non-normality in our data.

Moderation by gender was examined by first testing measurement invariance of behavioral self-regulation with a multiple group CFA to determine if indicators measured the same latent factor in both boys and girls. Then, to test structural differences between boys and girls, we compared a structural model in which paths were free to vary across gender and a model in which regression paths were constrained to be equal for both genders. Model fit was compared using Satorra-Bentler scaled (mean-adjusted) Chi-square values (referred to as: TRD).

TABLE 1 Participant characteristics

	n	Mean	(SD) ^a	Boys		Girls	
				Mean	(SD) ^a	Mean	(SD) ^a
Child characteristics							
Gender (% boys)	698	49.9		-		-	
Age at BPI assessment, years	698	5.96	(.22)	5.95	(.21)	5.96	(.22)
Age at lab visit, years	698	3.12	(.12)	3.11	(.11)	3.13	(.13)
Child reported peer hostility score	698	16.05	(3.96)	16.79	(4.59)	15.31	(3.07)***
Child reported peer problems score	690	25.34	(7.08)	25.91	(7.22)	24.78	(6.90)*
Persistence	698	4.71	(1.29)	4.55	(1.28)	4.87	(1.29)**
Gift delay	690	5.45	(.82)	5.36	(.95)	5.55	(.68)**
Committed compliance	677	.74	(.19)	.71	(.20)	.77	(.18)***
Aggressive behavior 3 year (mother report)	637	6.37	(4.85)	6.56	(4.73)	6.19	(4.91)
Aggressive behavior 3 year (father report)	586	7.29	(5.04)	7.50	(5.31)	7.08	(4.78)
Maternal characteristics							
Maternal age at intake, years	698	31.96	(3.67)	31.79	(3.72)	32.11	(3.62)
Harsh discipline score, mother	641	1.84	(1.64)	1.88	(1.62)	1.80	(1.66)
Sensitivity score 1 year (z-score)	594	-		-.07	(.82)	.06	(.85)
Sensitivity score 3 year (z-score)	694	-		-.09	(.97)	.09	(1.02)*
Paternal characteristics							
Paternal age at intake, years	663	34.19	(4.85)	34.07	(4.84)	34.30	(4.86)
Harsh discipline score, father	577	1.71	(1.54)	1.92	(1.63)	1.50	(1.42)**
Family characteristics							
Marital status (% No partner)	658	4.9		5.4		4.9	
Household income (% ≤2000)	628	7.6		8.5		7.8	

Note. All values represent original, untransformed, non-imputed data.

^aPresented are mean and standard deviation, unless otherwise indicated.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$ for difference between boys and girls, derived from independent sample t-tests for normally distributed continuous variables and chi-square tests for categorical variables.

If no differences between boys and girls were present, one overall SEM model was tested. Model fit was evaluated with the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root-Mean-Square Error of approximation (RMSEA). Good model fit was achieved if the TLI and CFI were $\geq .90$ and RMSEA $\leq .06$ (Hu & Bentler, 1999; Marsh et al., 2004). Inferences about mediation were based upon the "Model Indirect" option in the analyses.

3 | RESULTS

3.1 | Descriptive statistics

Sample characteristics for the complete sample and for boys and girls separately are presented in Table 1. About half of the children were boys; about 8% of families had a lower family income (≤ 2000 euros net per month). Boys experienced more harsh paternal discipline ($t(575) = 3.30$, $p = .001$, $d = .27$), and less maternal sensitivity ($t(692) = -2.43$, $p = .02$, $d = .18$) than girls. Boys had lower scores on each of the behavioral regulation measures (e.g., Persistence:

TABLE 2 Pearson correlations between the study variables

	Child characteristics					Parenting				Covariates
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Child characteristics										
1. Peer aggression										
2. Peer relationship problems	.30**									
3. Persistence	-.07	-.06								
4. Gift delay	-.08*	-.09*	.14**							
5. Committed compliance	-.11**	-.08*	.14**	.23**						
Parenting										
6. Sensitivity, 1y	-.06	.02	.02	.02	.02					
7. Sensitivity, 3y	-.08*	-.01	.08*	.10*	.08*	.19**				
8. Harsh discipline mother	.07	.12**	-.03	-.04	-.12**	-.07	-.14**			
9. Harsh discipline father	.12**	.15**	-.05	-.04	-.12**	-.06	-.03	.35**		
Covariates										
10. Aggression, 3 year	.08	.12**	-.02	-.02	-.11**	-.03	-.07	.33**	.34**	
11. Age child 6 year	-.09*	-.08*	.01	-.12**	.06	.11**	.01	.02	.02	-.04

* $p \leq .05$.** $p \leq .01$.

$t(696) = -3.29, p = .001, d = .25$) and reported more hostility towards peers ($t(634) = 5.16, p < .001, d = .39$) and more peer problems than girls ($t(688) = 2.22, p = .03, d = .16$).

Correlations between study variables are presented in Table 2. Children's self-reported peer aggression was associated with all indicators of child behavioral regulation (e.g., committed compliance $r = -.11$), maternal sensitivity (e.g., at 3 years $r = -.08$) and paternal, but not maternal harsh discipline ($r = .12$). Children's self-reported peer relationship problems were associated with two of the three behavioral regulation indicators (namely gift delay $r = -.09$ and committed compliance $r = .08$), and with both maternal and paternal harsh discipline ($r = .12$ and $.15$). Indicators of child behavioral regulation were associated with maternal sensitivity at age 3 years and parental harsh discipline.

3.2 | Path model

3.2.1 | Gender invariance of behavioral self-regulation

To test measurement invariance of a single behavioral self-regulation factor across child gender, a baseline CFA model including committed compliance, gift delay and persistence with unconstrained parameters (configural model) was compared with a series of subsequent models which constrained factor loadings (metric model), factor loadings and intercepts (scalar model), and factor loadings, intercepts and residual variances (full uniqueness). Satorra-Bentler comparisons of model fit (Table 3) revealed significant χ^2 differences between the scalar model and the full uniqueness model ($TRd = 30.67, \Delta df = 3, p < .001$), indicating that the scalar invariance model had the best tradeoff between model fit and parsimony. Although scalar invariance was established (suggesting that the indicators reflect the same underlying construct in boys and girls), residual variances and latent means for the behavioral self-regulation factor did differ between boys and girls: boys scored consistently lower on behavioral regulation than girls ($\Delta M = .70, SE = .15, p < .001$).

TABLE 3 Measurement invariance across gender of the behavioral self-regulation factor

	χ^2	df	TRd	p-Value χ^2 difference	CFI	TLI	RMSEA
Model:							
Configural ^a	0	0	-	-	1	1	0
Metric	4.67	3	5.07	.166	.96	.92	.04
Scalar ^b	5.57	5	.84	.974	.99	.98	.02
Full uniqueness	39.30	8	30.67	<.001	.22	.42	.11
Scalar with constraint means	32.32	6	29.41	<.001	.35	.35	.11

Notes: TRd, Satorra-Bentler scaled Chi-square; CFI, comparative fit index; TLI, Tucker-Lewis index; RMSEA, root mean square of approximation.

^aJust-identified model. χ^2 and *df* of 0.

^bPreferred and thus final CFA model. Standardized factor loadings for the final model: Boys ($n = 348$): Committed compliance = .43, $p \leq .001$; Persistence = .31, $p \leq .001$; Gift delay = .33, $p \leq .001$; Girls ($n = 350$): Committed compliance = .47, $p \leq .001$; Persistence = .31, $p \leq .001$; Gift delay = .46, $p \leq .001$. Mean difference in behavioral self-regulation = .70, $p \leq .001$.

3.2.2 | Structural model of parenting, observed behavioral self-regulation and peer problems

Next, we used SEM to test the association between parenting and children's peer relationships and we examined whether indirect effects via behavioral self-regulation were present. First, we tested whether this structural model was gender invariant. Satorra-Bentler comparisons of model fit revealed no significant gender differences (TRd = 16.38, $\Delta df = 22$, $p = .796$). Therefore, a model including both boys and girls was computed, showing good fit to the data (CFI = .94; TLI = .89; RMSEA = .03).

Figure 1 depicts the standardized estimates of the path model. Maternal sensitivity was associated with children's behavioral self-regulation at age 3 years ($B = .21$, $SE = .10$; $p = .029$), yet neither maternal nor paternal harsh discipline were associated with children's self-regulation. Higher levels of behavioral self-regulation predicted less child reported peer relationship problems ($B = -.17$, $SE = .07$; $p = .019$) and aggression towards peers ($B = -.15$, $SE = .08$; $p = .049$) at age 6 years. Direct associations of maternal sensitivity and maternal harsh discipline with peer relationship problems or peer aggression were not found. Paternal harsh discipline, however, was directly associated with children's peer relationship problems ($B = .10$, $SE = .04$; $p = .015$), but not with aggression towards peers. Although the paths from maternal sensitivity to behavioral self-regulation and the paths from behavioral self-regulation to peer relationship problems and aggression towards peers were significant, we observed no statistically significant indirect effects.

4 | DISCUSSION

It is thought that parenting and self-regulation shape children's behavior when interacting with peers. In this multi-informant-multi-method study, we extended previous work on the association between parenting and peer relationships, by examining mediation by behavioral self-regulation, by studying both positive and negative parenting, and by focusing on the role of both mothers and fathers. Results demonstrated that, when accounting for various parenting behaviors that may co-occur within families, a higher level of paternal, but not maternal, harsh discipline was associated with more peer relationship problems. In addition, maternal sensitivity was associated with children's behavioral self-regulation, and that was associated with children's peer relationship problems and aggression towards peers. Yet,

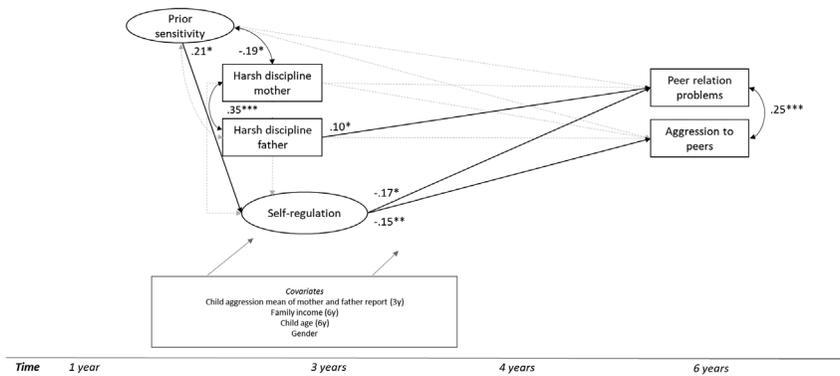


FIGURE 1 Path model depicting standardized coefficients between observed maternal sensitivity, harsh maternal and paternal discipline, observed child behavioral self-regulation and child-reported peer aggression and peer relationship problems. $N = 698$. Note. * $p \leq .05$; ** $p \leq .01$, *** $p \leq .001$; dashed arrows indicate non-significant paths; for clarity, parameter estimates for covariates are not presented in the figure but here: (a) regressed on child gender: behavioral self-regulation $\beta = .29$, $SE = .06$, $p \leq .001$; peer aggression $\beta = -.13$, $SE = .04$, $p \leq .01$; peer relation problems $\beta = -.02$, $SE = .04$, $p > .05$; (b) regressed on family income: behavioral self-regulation $\beta = .02$, $SE = .07$, $p > .05$; peer aggression $\beta = .04$, $SE = .05$, $p > .05$; peer relation problems $\beta = .09$, $SE = .04$, $p \leq .05$; (c) regressed on aggression at age 3 years: behavioral self-regulation $\beta = -.05$, $SE = .07$, $p > .05$; peer aggression $\beta = .02$, $SE = .04$, $p > .05$; peer relation problems $\beta = .04$, $SE = .04$, $p \leq .05$; (d) regressed on child age at assessment of peer relations: peer aggression $\beta = -.09$, $SE = .04$, $p \leq .05$; peer relation problems $\beta = -.08$, $SE = .04$, $p \leq .05$.

we found no direct effect of maternal sensitivity on children's peer outcomes, nor did behavioral self-regulation mediate the paths between parenting and children's peer relationship problems and aggression towards peers.

Our first hypothesis that maternal sensitivity and early exposure to harsh discipline would be associated with children's peer relationship problems and aggression towards peers, was partly supported. Paternal harsh discipline, but not maternal harsh discipline or maternal sensitivity, was associated with peer relationship problems. An association of paternal harsh discipline with peer relationship problems is partly in line with social learning theory (Bandura, 1978), suggesting that parental harshness likely influences children's understanding of how to manage conflictual situations. The finding that harsh discipline was, but sensitivity was not directly associated with peer outcomes, is in line with results of a meta-analysis by Lereya et al. (2013), demonstrating that the aggregated effect of positive parenting was smaller than that of negative parenting. Yet, only higher levels of paternal, but not maternal, harsh discipline were associated with more peer relationship problems. Previous studies have also found that paternal negative parenting had an effect above maternal negative parenting (Chang et al., 2003; Lucassen et al. 2015). Chang et al. (2003) theorized that this may be related to father's traditional role as authority figure, as according to social learning theory, a model with more power or authority, would have a stronger effect on the child.

We found support for our hypothesis that children with self-regulation difficulties would exhibit more aggressive behavior towards their peers and encounter more peer relationship problems. However, our findings did not confirm our second hypothesis postulating mediation by self-regulation. Although maternal sensitivity in toddlerhood was associated with children's behavioral self-regulation at age three, and behavioral self-regulation was associated with children's peer relationship problems and aggression towards peers at age six, no statistically significant indirect effects via behavioral self-regulation were found. The absence of an indirect effect may be explained by the type of measures in the present study. We used multiple, independent, objective measures to operationalize our constructs, namely observed sensitivity, mother and father report of harsh discipline, laboratory, and observational tasks for behavioral self-regulation and, uniquely, child self-report of early peer relationship problems. Given this multitude of methods, the risk of shared informant and shared method variance was reduced, but it may have also resulted in smaller effect sizes than found in previous literature.

Results of the present study suggest that, even though mediation was not present, higher levels of maternal sensitivity were associated with higher levels of behavioral self-regulation, and that this was associated with lower levels of peer relationship problems. This is in line with results of previous studies, showing that less optimal self-regulation at age 3 years was prospectively associated with more aggression towards peers and peer relationship problems (e.g., Blandon et al., 2010; Olson et al., 2011; Verlinden et al., 2014).

In addition, we found that maternal sensitivity was, but paternal harsh discipline was not associated with child self-regulation. Yet, paternal harsh discipline was directly associated with children's peer relationship problems. Although the lack of a paternal sensitivity assessment in the present study precluded a direct comparison and future research should address this specific issue, these findings may be suggestive of a complementary effect of maternal sensitivity and paternal harsh discipline on children's development of self-regulation and peer relationships.

No mediation effect of self-regulation was found in this study. Given the absence of a mediation effect, other mechanisms contributing to the association between parenting and peer relationships should also be considered. Such mechanisms may include a shared genetic vulnerability and the impact of parents' own self-regulation skills on both parenting and child self-regulation. To be effective caregivers and to be able to provide a rearing context that promotes child development, parental self-regulation may be key (Bridgett et al., 2015). More research is needed to further disentangle the dynamics of parent-child relationships including parental contributions to child behavior and child contributions to parental behavior.

4.1 | Gender differences

In our sample, boys had higher levels of peer aggression and peer problems, they experienced more harsh discipline by their fathers and lower levels of maternal sensitivity and had more problems to regulate their behavior than girls. However, child gender did not moderate the associations between parenting and the quality of children's peer relationships. Thus, despite more negative parenting and child outcomes among boys, the mechanisms behind the development of peer aggression and peer relationship problems in the current study did not differ between boys and girls. Others have also reported that, despite an association of gender with different levels of peer aggression and regulation, gender did not moderate effects (Olson et al., 2011). In other words, girls experience lower levels of aggression and victimization, but the processes leading towards these outcomes may be similar to those in boys.

4.2 | Strengths and limitations

The current study was strengthened by the inclusion of both maternal and paternal parenting variables, enabling us to disentangle different parental roles; a large group of young, typically developing children; parenting being assessed prior to the outcome; observations of sensitivity and self-regulation; and, by using multiple informants and methods to reduce shared-method variance.

Nevertheless, some potential limitations should be discussed. First, even though our hypotheses were tested within the context of a longitudinal study, reports of harsh discipline and observations of behavioral self-regulation were around the same time. Thus, bidirectional influences cannot be ruled out. Given that behavioral self-regulation is at least partly constitutionally based, poor behavioral self-regulation may also precede harsh discipline. Similarly, a well-regulated child may elicit more sensitive parenting. Yet, several prospective studies on bidirectional parent-child interactions, suggest that parenting behaviors are primary precursors of children's behavioral self-regulation rather than the reverse (Belsky et al., 2007; Eisenberg et al., 2005).

Second, analyses were based on a rather homogenous sample, thus limiting the variability in some assessments. This may limit the generalizability of our findings to a more heterogeneous, or clinical populations. It is important to acknowledge that there may be variability in the consequences of parenting, depending on the study sample. For

instance, normativeness of parenting behaviors may play a role, just as contextual variables like the level of socioeconomic disadvantage (Lansford et al., 2005; White et al., 2015). However, because effects of certain contextual stressors like very low income and maternal education were limited in this relatively homogenous sample, the likelihood of confounding or effect modification as a result of these stressors was also reduced.

Third, effect estimates found in the present study were relatively small, as expected in a low-risk population-based sample. Yet, our findings suggest that even in families from the general population, mild forms of harsh discipline, and slightly lower behavioral self-regulation skills were associated with the quality of children's peer relationships. Moreover, small associations in a large low risk, non-clinical sample may well represent larger associations at the individual level.

Finally, in this sample, sensitivity was observed in mothers only. As such, a comparison of the effect of maternal versus paternal observed sensitivity could not be made. Future studies should aim at employing the same measures for mother and father to examine similarities and differences (Fagan et al., 2014). In addition, we relied on parent-reported harsh discipline. Internal consistencies of this scale were moderate, most probably given the low base rate of some items and the small number of items in the scale. Results should thus be interpreted with some caution. In addition, if parents report on their own harsh discipline, social desirability may lead to response bias. To reduce the chance of underreporting, only mild forms of harsh discipline were included, but parents may still have underreported their use of harsh verbal or psychological parenting tactics. However, once parents acknowledge the use of harsh discipline, misclassification is not very likely: if parents reported the use of harsh discipline, this was most probably the case.

5 | CONCLUSIONS

Knowledge of the developmental origins of peer relationship problems is important as these problems may cascade into later disruptive behavior and general adjustment difficulties (Laird et al., 2001). Results of this study suggest that mothers' sensitivity is important for children's development of self-regulation. Furthermore, fathers' harsh discipline was directly associated with lower quality of children's peer relationships. Our study suggests that various parenting characteristics may influence peer aggression and peer relationship problems in children. Future research should further explore potential unique or complementary roles of mothers' and fathers' parenting. The results highlight the importance of gaining nuanced insights in effects of early parenting of both parents for the quality of children's peer relationships.

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CONFLICT OF INTEREST DISCLOSURE

The authors declare that they have no conflict of interest.

ETHICAL STATEMENT

This study was embedded in The Generation R Study, a population-based prospective cohort from fetal life until young adulthood which is designed to identify early environmental and genetic determinants of growth, development and

health during the life course. The Generation R Study was approved by the Medical Ethics Committee of the Erasmus Medical Center, Rotterdam. Written informed consent was obtained from all participating children and their parents.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available upon request to the director of the Generation R study: prof.dr. Vincent Jaddoe (v.jaddoe@erasmusmc.nl).

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