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Aggression in infancy and toddlerhood: the roles of prenatal risk, parenting behavior and cognition

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AGGRESSION IN TODDLERHOOD: THE ROLES OF PARENTAL BELIEFS, PARENTING BEHAVIOR AND PRECURSORS OF THEORY OF MIND

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Chapter 4

Abstract

Parental beliefs, parenting behavior, and precursors of theory of mind have been related uniquely to each other and to early aggression, but have not yet been studied simultaneously. The present study combined these risk factors in the prediction of aggression during toddlerhood using a sample of 152 mother-child dyads. At 20 months, mothers' parental beliefs (parental self-efficacy and perceived parental impact) were examined with the Parental Cognitions and Conduct Toward the Infant Scale. Maternal parenting behavior (sensitivity, intrusiveness, and successful positive engagement) was observed during free play and teaching tasks, and children's precursors of theory of mind were assessed using a visual perspectives task and an imitation task. At 30 months, child aggression was examined using the Child Behavior Checklist. A regression analysis indicated that lower parental self-efficacy and lower imitation skills predicted more aggressive behavior. When estimating the indirect effects using bootstrapping, a final model was found indicating that lower perceived parental impact was related to less successful positive engagement, which, in turn, was associated with children's poorer imitation abilities which predicted more aggressive behavior. It can be concluded that aggression during toddlerhood is predicted significantly by interrelated parental beliefs, parenting behavior and children's early social cognitive abilities.

Introduction

It has been shown consistently that high levels of aggressive behavior during early childhood constitute increased the risk for a broad range of negative outcomes later in life, such as lower academic achievement, more peer rejection, and more internalizing and externalizing problem behavior (Bierman, Kalvin, & Heinrichs, 2015; Campbell, Spieker, Burchinal, & Poe, 2006; Mesman, Bongers, & Koot, 2001). Previous research has indicated that high levels of aggressive behavior during childhood have their onset early in life, even before the age of two (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Tremblay et al., 2004). Although it has been shown that maladaptive parenting and social cognitive problems, such as problems with theory of mind, are potential mechanisms involved in the development of aggression (Côté et al., 2006; Renouf et al., 2010), little is known about how these factors directly and indirectly predict early aggression, that is, during toddlerhood. Moreover, parental beliefs about their role as caregivers have received increasing attention in recent years and appear to play a significant role in both parenting skills and a wide range of behavioral child outcomes (Jones & Prinz, 2005; Zimmer-Gembeck & Thomas, 2010). Again, it is not yet clear through which pathways such parental beliefs influence early child aggression. Therefore, this study examined whether mothers' parental beliefs and parenting behavior, directly and via precursors of theory of mind, predicted aggressive behavior in toddlerhood.

Parental beliefs and parenting behavior

Because children are highly dependent on their parents during early childhood, parenting is assumed to have a large impact on children's social development at this stage (Pinquart, 2017). When parents try to control children's problem behavior by using ineffective parenting strategies, such as a lack of warmth, lack of responsiveness, and harsh caregiving behavior, this could lead to increased problem behavior in children, resulting in a negative cycle (Patterson, 1986, 2002). In line with this hypothesis, several studies have found that maladaptive parenting behaviors, such as low sensitivity and high hostility, have been related to higher levels of child aggression (Campbell et al., 2010; Côté et al., 2006; McKee, Colletti, Rakow, Jones, & Forehand, 2008).

In addition to observable parenting behavior, research has indicated the importance of parents' subjective beliefs about caregiving as predictors of children's social development. Examples of parental beliefs are parental self-efficacy (i.e., parents' views of their ability to perform parenting tasks successfully) and perceived parental impact (i.e., parents' perceptions of the degree to which their own behavior influences their children's behavioral development). Parental beliefs have been associated with child behavior because parents may serve as role models influencing their children's beliefs and attitudes (Ardelt & Eccles, 2001; Bandura, 1997). Empirically, low parental self-efficacy and perceived parental impact have been related

to negative child outcomes (Coleman & Karraker, 2003; Jones & Prinz, 2005) and in particular to aggressive behavior during toddlerhood (Côté et al., 2007; Mazza et al., 2017).

In addition to the direct influence of parental beliefs on child development, it has been documented that parental beliefs about childrearing tend to impact child outcomes indirectly through parenting practices (Jones & Prinz, 2005; Patterson, 2002). Parents who are more confident about caregiving or strongly believe that their own behavior is exemplary for their children, are more motivated to engage in cognitive activities and to show positive and effective caregiving behavior (Sigel & Mc Gillicuddy-De Lisi, 2002). More positive parental beliefs and greater self-efficacy have been associated with more parental warmth and parental involvement (Izzo, Weiss, Shanahan, & Rodriguez-Brown, 2000; Jones & Prinz, 2005; Shumow & Lomax, 2002), and less parental control and coercion (Bor & Sanders, 2004; Meunier, Roskam, & Browne, 2011). One study also found evidence for an indirect effect via parenting: lower parental self-efficacy concerning caregiving was associated with less parental warmth and more hostility, which, in turn, were related to more problem behavior during toddlerhood (Zimmer-Gembeck & Thomas, 2010).

Theory of mind

Theory of mind is the social cognitive ability to make inferences about one's own and others' mental states, such as beliefs, intentions, thoughts, and desires (Premack & Woodruff, 1978). Children's theory of mind is shaped largely by early social experiences with others, especially parents (Fernyhough, 2008). Moreover, children's theory of mind has been hypothesized to be a potential mechanism in a relation between behavior of the parents and child social functioning, including aggression (Pavarini, Souza, & Hawk, 2013). Parental beliefs may be considered to be the result, in part, of their own theory of mind abilities. Particularly when defined or conceptualized as maternal mind-mindedness or reflective functioning, parental beliefs have been related to parenting behavior (Smaling et al., 2016) and children's theory of mind (Meins et al., 2002). With respect to theory of mind, mothers' own ability to reflect upon beliefs, intentions and desires, was shown to be important for children's theory of mind understanding: treating the child as an intentional agent and helping the child recognize and regulate emotional experiences by being responsive and sensitive to the child's needs and desires, and talking about mental states during interaction, promotes the child's theory of mind understanding (Laranjo, Bernier, Meins, & Carlson, 2014; Meins et al., 2002; Pavarini et al., 2013). Indeed, several studies demonstrated a link between children's theory of mind during preschool and early childhood and parent's ability to reflect upon mental states as well as behavioral aspects of parenting: harsh discipline, an authoritarian parenting style, less sensitivity, and less use of appropriate mental state language by parents in interaction with the child were associated with lower scores on theory of mind (Centifanti, Meins, &

Fernyhough, 2016; Laranjo et al., 2014; McElwain & Volling, 2004; Meins et al., 2002; O'Reilly & Peterson, 2014; Pavarini et al., 2013).

Children with poorer theory of mind understanding supposedly are less able to explain and predict behavior of other people, and therefore will show less adequate social behavior (Baron-Cohen, Leslie, & Frith, 1985). Hughes and Leekam (2004) even suggested that a lack of theory of mind is one of the key processes related to problems in social interactions during early childhood. In line with this hypothesis, delays in theory of mind during preschool have been shown consistently to predict lower social competence (Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016) and higher levels of aggression (Capage & Watson, 2001; Olson, Lopez-Duran, Lunkenheimer, Chang, & Sameroff, 2011).

Precursors of theory of mind

Traditionally, it was thought that the ability to understand mental states of others explicitly develops during the preschool years (Wellman, Cross, & Watson, 2001). However, implicit understanding of beliefs, intentions, and desires has been observed as early as the second year of life (Baillargeon, Scott, & He, 2010; Perner & Roessler, 2012). Two important social cognitive abilities that may be considered “precursors of theory of mind” are imitation and visual perspective-taking (Gopnik, Slaughter, & Meltzoff, 1994; Rogers & Pennington, 1991).

The ability to imitate behavior has been observed in infants (Meltzoff & Moore, 1983), and develops from imitating facial mimicry in newborns to imitation demonstrating an understanding of the underlying intentions of modeled acts during the second year of life (Meltzoff, 1995; Olineck & Poulin-Dubois, 2005). During toddlerhood, children become aware of the relations between their own mental states and behavior in daily life (Meltzoff, 2005). Subsequently, they use this knowledge to project the corresponding mental states on others when they see another person acting the same as they did before.

Another precursor of theory of mind is the ability to take someone else's visual perspective (Barnes-Holmes, McHugh, & Barnes-Holmes, 2004; Laranjo et al., 2014). First, children learn to understand whether another person does or does not see an object (Barnes-Holmes et al., 2004; Flavell, Everett, Croft, & Flavell, 1981), which can be observed in 12 to 18-month-old children (Liszkowski, Carpenter, Striano, & Tomasello, 2006). Subsequently, perspective-taking develops during preschool from understanding that people's knowledge is dependent on their visual perspective to predicting behavior on the basis of true and false belief (Barnes-Holmes et al., 2004).

Mothers' parenting behavior and precursors of theory of mind in relation to aggression

Although it has been shown that parenting behavior, theory of mind, and aggression are interrelated at preschool age (Olson et al., 2011; Pavarini et al., 2013), research examining precursors of theory of mind in relation to parenting behavior and

aggression during toddlerhood are relatively scarce. Two studies have shown that maternal responsiveness and mother’s use of mind-related comments were related to aspects of social cognition, such as visual perspective-taking, joint attention, and self-recognition, before two years of age (Laranjo, Bernier, Meins, & Carlson, 2010; Wade, Moore, Astington, Frampton, & Jenkins, 2015). With regard to aggression, Hughes and Ensor (2007) found that a composite score of several social cognitive tasks, including deception, pretense, and understanding of mistaken belief in 2-year-old children was predictive of aggression during preschool. Despite their apparent interrelations, no studies to date have examined mothers’ parental beliefs, maternal parenting behavior, precursors of theory of mind, and aggressive behavior simultaneously, nor the indirect relations among these concepts during toddlerhood.

Current study

The current study focused on the direct and indirect associations among mothers’ parental beliefs (parental self-efficacy and perceived parental impact), maternal parenting behavior (sensitivity, intrusiveness, and positive engagement), children’s precursors of theory of mind (imitation and visual perspective-taking), and aggression during toddlerhood. Based on the previous research, it was hypothesized that lower levels of mothers’ parental beliefs, lower quality of maternal parenting behavior, and lower scores on precursors of theory of mind would predict higher levels of aggressive behavior. It was expected that there would be indirect effects of mothers’ parental beliefs and parenting behavior on aggressive behavior via precursors of theory of mind. Finally, indirect effects from mothers’ parental beliefs, via maternal parenting behavior, through precursors of theory of mind, on aggressive behavior were hypothesized (see Figure 1).

Because previous research has shown that gender, vocabulary, and maternal age are associated with aggressive behavior (Endendijk et al., 2017; Girard et al., 2014; Tremblay et al., 2004), these factors were tested as potential covariates.

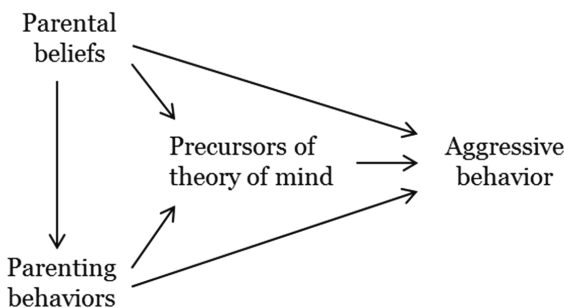


Figure 1. The hypothesized direct and indirect effects including parental beliefs, parenting behavior, precursors of theory of mind, and aggressive behavior.

Methods

Participants

For the current study, data from the Mother–Infant Neurodevelopment Study in Leiden (MINDS-Leiden, The Netherlands; Smaling et al., 2015; Suurland et al., 2017) were used. MINDS-Leiden is a longitudinal study examining the neurobiological and neurocognitive predictors of early behavior problems. Dutch-speaking pregnant women were recruited via midwifery clinics, prenatal classes, pregnancy fairs, and hospitals. To participate in the study women had to be between 17 and 25 years of age and expecting their first child. MINDS-Leiden consists of six data waves following mother-child dyads from pregnancy until the child was almost 4 years old. Data regarding mothers' parental beliefs, maternal parenting behavior, and precursors of theory of mind were collected during the fourth data wave (20 months post-partum) and data regarding child aggression were collected during the fifth data wave (30 months post-partum).

The sample consisted of 210 pregnant women at the first assessment. Fifty-eight (27.6%) mothers and children did not participate in the fourth and/or fifth waves of the study. Reasons for not participating were health problems ($n = 3$), withdrawal from the study for personal reasons or without further specification ($n = 30$), inability to contact the mother ($n = 22$), and emigration ($n = 3$). Dropouts more often had a non-Caucasian background, $\chi^2(1) = 4.91, p = .03$, were younger, $t(208) = -2.72, p < .01$, were more often single, $\chi^2(1) = 4.77, p = .03$, and had lower income, $t(204) = -2.03, p = .04$.

The final sample consisted of 152 mothers and children (76 boys). The mean age of the mothers was 23.60 years ($SD = 2.02$) during pregnancy, 8.6% of the mothers was single, 88.2% of the mothers was Caucasian and mean family income was 2,642 euros per month ($SD = 1,140$). Of participating mothers, 1.3% completed primary education, 18.4% completed lower secondary education, 46.1% completed higher secondary education, and 34.2% completed higher education. This sample of pregnant woman was comparable to the Dutch population of (young) pregnant woman with respect to most sociodemographic factors (e.g., income, education, and whether they were single, had a partner or were married), although women with a non-Caucasian background were underrepresented (Central Bureau for Statistics, 2019a, 2019b).

Procedures and instruments

The assessments consisted of a 2-2.5 hr home visit at 20 months ($M_{age} = 20.41$; $SD = 0.71$) and a laboratory visit at 30 months post-partum ($M_{age} = 30.62$; $SD = 1.04$). The study received approval from the ethics committee of the Department of Education and Child Studies at the Faculty of Social and Behavioral Sciences, Leiden University (ECPW-2011/025) and from the Medical Research Ethics Committee at Leiden University Medical Center (NL39303.058.12). All participating women provided informed consent. After the assessments, mothers received a gift card and children received a present.

Parental beliefs. The Parental Cognitions and Conduct Toward the Infant Scale (PACOTIS; Boivin et al., 2005) was used to assess mothers' parental beliefs regarding their role as a parent when the child was 20 months old. The PACOTIS is a self-report questionnaire consisting of 32 items examining parental beliefs and behavior toward their child. For this study, the total scores of the following subscales were used: parental self-efficacy (six items, e.g., "I feel that I am very good at attracting the attention of my baby" and "I feel that I am very good at calming my baby down when he/she is upset, fussy or crying") and perceived parental impact (five items, e.g., "My behavior has little effect on the personal development of my baby" and "Regardless of what I do, my baby will develop on his/her own"). Mothers rated their feelings, thoughts and actions on an 11-point Likert scale (0 = not at all what I think/do, 10 = exactly what I think/do). Internal consistency (Cronbach's alpha) was .75 for parental self-efficacy and .78 for perceived parental impact. One mother had missing data for parental beliefs, because the questionnaire was not completed during the assessment or returned afterward.

Parenting behavior. Maternal sensitivity (the extent to which mother reads and follows the child's cues), maternal intrusiveness (the degree of which the mother handles the child roughly and interferes with the child's needs or behavior), and successful positive engagement (the extent to which the mother is able to successfully engage the child in interaction or play) were assessed during an unstructured free play task and a teaching task at 20 months. The free play task lasted for 3 min, in which the mother was asked to play with her child as she would normally do using a set of age-appropriate toys. For the teaching task, mother was instructed to help her child solve a challenging puzzle for 2.5 min. The free play and teaching task were videotaped and parenting behavior was coded afterward on a 4-point scale (0 = absent to 3 = high levels or predominantly present) using an adapted version of the Mother Infant Coding System (Miller, McDonough, Rosenblum, & Sameroff, 2002). About 19% of the videotapes was double-coded: inter-class correlation (ICC) ranged from .70 to .79. Total scores of maternal sensitivity, intrusiveness, and positive engagement were computed by summing the scores of the free play task and teaching task. Data were missing for one mother-child dyad, due to problems with video recording.

Precursors of theory of mind.

Imitation. Imitation was assessed at 20 months of age using the imitation task of the Autism Diagnostic Observation Schedule (Lord et al., 2000; Luyster et al., 2009). The task consisted of two practice trials followed by six test trials (three functional imitations and three symbolic imitations). During the functional trials, the researcher introduced a toy (a cup, an airplane, and a flower) and modeled a corresponding act (e.g., flying through the air with an airplane, while making sounds of an engine). During the trials examining symbolic imitation, a rectangular block was used instead of the intended object (a cup, a dog, and a cookie). After each trial, the child was asked to imitate the act ("it is your turn"). The total score of the imitation task was used in

the analyses (possible range 0-6). Data on the imitation task were missing for four children.

Visual perspective-taking. An adaptation of a task from Carlson, Mandell, and Williams (2004) was used to examine children's early understanding of visual perspectives at 20 months of age. In five trials, the researcher introduced five different toys and asked the child to show the toy to his/her mother. To be able to show the toy, the child had to perform a physical or vocal act as the mother (a) had her eyes closed; (b) covered her eyes with her hands; (c) had her eyes blindfolded; (d) was sitting with her back toward the child, or (e) the toy itself needed to be turned by the child. Child's behavior during the trials was coded at a 6-point scale (0 = the child did not react to the request and/or did not show interest in the toy, 1 = the child did not show the toy to mother or dropped it close to her, 2 = the child held the toy close to mother, but did not perform the correction, 3 = the child performed a partial correction, 4 = the child performed the full correction but did not show the toy subsequently, and 5 = the child performed the correction and showed the toy). The total score of the five trials was used in the analyses (possible range 0-25). Data on visual perspective-taking were missing for two children.

Aggression. Mothers completed the Dutch version of the Child Behavior Checklist (CBCL) for 1.5 to 5-year-old children (Achenbach & Rescorla, 2000) to examine child's aggressive behavior at 30 months of age. The CBCL consists of 99 items examining a child's emotional and behavior problems during the preceding 2 months on a 3-point Likert scale (0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true of the child). For this study, the score on the subscale aggressive behavior was used, consisting of 19 items (potential range 0-38), such as "gets in many fights" and "hurts animals or people without meaning to". Reliability and validity of the CBCL were supported by several studies (e.g., Achenbach & Rescorla, 2000; Koot, van den Oord, Verhulst, & Boomsma, 1997). Internal consistency (Cronbach's alpha) for the aggression subscale in this sample was .78.

Vocabulary comprehension. The first two sections of the Dutch version of the Reynell Developmental Language Scales (Reynell & Gruber, 1990; van Eldik, Schlichting, Lutje Spelberg, van der Meulen, & van der Meulen, 1995) were used to measure verbal comprehension at 20 months. The first section consists of three items, measuring whether the child recognizes a word or a phrase, whether the child shows a nonverbal reaction to words or sentences, and whether the child looks at a named object or person. The second section consists of eight items, in which the child is asked to take the named object from a row of four objects. The sum score of the two sections was used in the analyses (possible range 0 -11).

Results

Preliminary analyses

All analyses were carried out using the Statistical Package for Social Sciences (SPSS; version 23.0). The descriptive statistics for the study variables are listed in Table 1. Outliers ($n = 2$) were recoded to a value of 3 *SD* from the group mean. First, gender, vocabulary, and maternal age were tested as potential covariates. Boys ($M = 11.92$, $SD = 5.45$) and girls ($M = 11.29$, $SD = 4.95$) did not significantly differ with respect to aggressive behavior, $t(148) = 0.74$, $p = .46$. In addition, vocabulary, $r = -.07$, $p = .41$, and maternal age, $r = -.08$, $p = .35$, were not significantly correlated with aggressive behavior. Therefore, these variables were not added as covariates in the main analyses.

Table 2 shows the correlations between mothers' parental beliefs, maternal parenting behavior, precursors of theory of mind, and aggression. Higher maternal self-efficacy was correlated with higher maternal sensitivity and marginally related to higher positive engagement. In addition, a lower perceived parental impact was related significantly to higher sensitivity, lower intrusiveness, and higher positive engagement. Higher positive engagement was associated significantly with better imitation and visual perspective-taking. Aggressive behavior was related significantly to lower levels of parental self-efficacy and child imitation, and marginally related to higher levels of intrusiveness.

Main analyses

Next, whether mothers' parental beliefs (parental self-efficacy or perceived parental impact), parenting behavior (maternal sensitivity, maternal intrusiveness or successful positive engagement), and precursors of theory of mind (imitation or visual perspective-taking) at 20 months predicted child's aggression at 30 months were tested using linear regression analysis. Mothers' parental self-efficacy and child's imitation abilities at 20 months were significantly correlated with aggressive behavior at 30 months and therefore entered in the linear regression analysis. The model

Table 1. *Descriptive statistics for the study variables (n = 152).*

	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max
20 months					
Parental self-efficacy	151	45.93	5.67	29.00	60.00
Perceived parental impact	151	37.45	8.39	12.00	50.00
Maternal sensitivity	151	4.51	0.98	2.00	6.00
Maternal intrusiveness	151	1.53	1.27	0.00	5.00
Successful positive engagement	151	4.30	1.14	1.00	6.00
Imitation	148	3.66	2.07	0.00	6.00
Visual perspective-taking	150	16.17	5.06	1.00	25.00
30 months					
Aggression	150	11.61	5.20	1.00	23.00

Table 2. *Correlation analysis between study variables (n = 152).*

	1.	2.	3.	4.	5.	6.	7.
1. Parental self-efficacy	-						
2. Perceived parental impact	.19*	-					
3. Maternal sensitivity	.19*	.18*	-				
4. Maternal intrusiveness	-.09	-.19*	-.63**	-			
5. Positive engagement	.16†	.19*	.40**	-.33**	-		
6. Imitation	.00	.11	.03	-.07	.19*	-	
7. Visual perspective-taking	.21*	-.08	.12	-.06	.29**	.19*	-
8. Aggression	-.22**	-.05	-.06	.15†	.02	-.20*	-.08

Note. † $p < .10$, * $p < .05$, ** $p < .01$

significantly predicted aggressive behavior, $F(2, 144) = 6.88$, $p < .01$, $R^2 = .09$. Lower parental self-efficacy, $\beta = -0.22$, $t(144) = -2.76$, $p < .01$, and poorer imitation abilities at 20 months, $\beta = -0.20$, $t(144) = -2.47$, $p = .02$, both significantly predicted aggressive behavior at 30 months.

Next, bootstrap procedures using the PROCESS macro (Hayes, 2013) with 5,000 resamples were conducted to examine whether there were indirect effects from mothers' parental beliefs (parental self-efficacy or perceived parental impact) or parenting behavior (maternal sensitivity, maternal intrusiveness or successful positive engagement) via precursors of theory of mind (imitation or visual perspective-taking) to child's aggressive behavior. The indirect effect is the product of the different individual paths in the model (in these analyses: the individual path from mothers' parental beliefs or behavior to precursors of theory of mind, and the path from precursors of theory of mind to aggressive behavior). This procedure is recommended, because the bootstrap method does not assume normally distributed variables and has more power and lower type 1 error rates compared to other types of mediation analyses (Hayes, 2013; Hayes & Scharkow, 2013). Bias-corrected (BC) percentile bootstrap confidence intervals (95%) were reported. The bootstrap analyses showed that the unstandardized indirect effect from successful positive engagement on aggressive behavior through imitation was significant, $ab = -0.19$, $SE = 0.11$, 95% BC CI [-.48, -.03], effect size $ab_{cs} = -0.04$, CI [-.10, -.01]. The standardized regression coefficients indicated that lower successful positive engagement was related to poorer imitation skills at 20 months, $\beta = 0.19$, $p = .02$, which, in turn, predicted higher levels of aggression in children at 30 months, $\beta = -1.11$, $p = .01$. The direct effect from successful positive engagement to aggressive behavior, while controlling for imitation, was not significant. There were no significant indirect effects when maternal sensitivity, maternal intrusiveness, mothers' parental self-efficacy or perceived parental impact were the predictors, or when visual perspective-taking was the mediator.

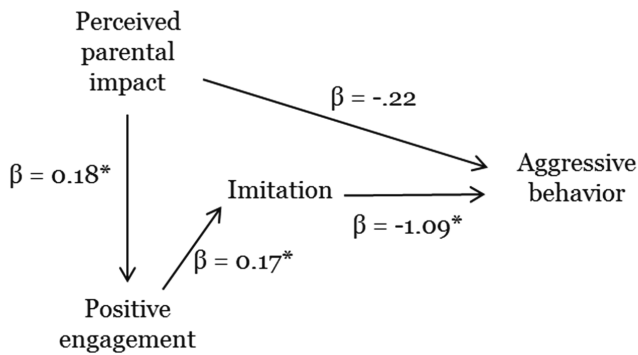


Figure 2. The standardized direct and indirect effects of the final model. * $p < .05$.

Next, it was tested whether there were indirect effects from mothers' parental beliefs (parental self-efficacy or perceived parental impact), through parenting behavior (maternal sensitivity, maternal intrusiveness or successful positive engagement), via precursors of theory of mind (imitation or visual perspective-taking), on aggressive behavior of the child. The bootstrap analyses indicated a significant indirect effect from mothers' perceived parental impact to children's aggressive behavior through successful positive engagement and children's imitation skills, $ab = -0.01$, $SE = 0.00$, 95% BC CI [-.0163, -.0003], effect size $ab_{es} = -0.01$, CI [-.0268, -.0006]. The standardized regression coefficients (as shown in Figure 2) indicated that lower perceived parental impact of mother was related to less successful positive engagement, $\beta = 0.18$, $p = .03$, which, in turn, predicted lower levels of child imitation, $\beta = 0.17$, $p = .04$, which was related to higher levels of aggression at 30 months, $\beta = -1.09$, $p = .01$. The direct effect from mothers' perceived parental impact on aggressive behavior, while controlling for successful positive engagement and imitation, was not significant. No other significant indirect effects were found.

Discussion

This study focused on the relations between mothers' parental beliefs, parenting behavior, children's precursors of theory of mind, and children's aggression during toddlerhood. Results showed that lower parental self-efficacy regarding caregiving of the mother and poorer imitation abilities of the child at 20 months predicted higher aggression at 30 months. In addition, an indirect effect was found involving specific aspects of mothers' parental beliefs, maternal parenting behavior, precursors of theory of mind at 20 months, and aggression at 30 months: lower perceived parental impact of mother was related to less successful positive engagement, which, in turn, was

associated with poorer imitation abilities of the child, which predicted higher aggressive behavior during toddlerhood.

Mothers' parental beliefs, parenting behavior, children's precursors of theory of mind and aggression

Previous research has indicated that mothers' parental beliefs and parenting behavior are important constructs with relations to the level of aggressive behavior in children during early childhood (Côté et al., 2007; McKee et al., 2008). With respect to parental beliefs, the results of this study are partly in agreement with earlier findings (Ardelt & Eccles, 2001; Bandura, 1997): low maternal self-efficacy, but not perceived parental impact, predicted more aggressive behavior. When parents feel incompetent with respect to caregiving, children may internalize such beliefs and attitudes, independent of the actual parenting behavior. Lower self-efficacy in children could, in turn, negatively affect their social behavior (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005).

Although the results of this study did not indicate a direct association between maternal parenting behavior and child aggression, an indirect effect was found via one of the precursors of theory of mind. This, in turn, is in accordance with the findings from several earlier studies showing associations between maladaptive parenting and deficits in theory of mind development (Pavarini et al., 2013; Wade, Madigan, et al., 2018), and between deficits in theory of mind and aggression during preschool (Olson et al., 2011). Whereas the reasoning relating parenting to theory of mind (Fernyhough, 2008), and, subsequently, theory of mind to aggression, is not new (Baron-Cohen et al., 1985), to our knowledge this indirect association has not been shown before, especially not using precursors of theory of mind examined in 20 month olds. Specifically, less positive engagement by mother and child during the interaction was related to a lower ability to imitate behavior, which, in turn, predicted higher levels of aggression. This pattern of behavior suggests that children with fewer positive interactions with their parents, have fewer social opportunities to develop precursors of theory of mind, such as the ability to imitate behavior, which, in turn, predicts aggression.

In addition, this study extends the literature by providing support for an indirect path from specific aspects of mothers' parental beliefs, via aspects of parenting behavior to (cognitive and behavioral) child development: lower perceived parental impact regarding caregiving led to less positive engagement, which, in turn, was related to poorer imitation abilities of the child and subsequent higher aggression. Previous research has provided evidence for bidirectional and singularly mediated relations between parental beliefs, parenting behavior, theory of mind, and aggressive behavior (Hughes & Ensor, 2007; Laranjo et al., 2010; Zimmer-Gembeck & Thomas, 2010), but no (indirect) effects involving these four components have been reported previously. The results suggest that mothers who believe that their behavior has little impact on their child's development may be less intrinsically motivated to show parenting

behavior that provides a warm, positive, and stimulating environment (Sigel & McGillicuddy-De Lisi, 2002), which, in turn, negatively affects children's cognitive and behavioral development. Although parental self-efficacy significantly predicted child aggression, no significant indirect effect was found via parenting behavior and child's precursors of theory of mind. This indirect path may have been more relevant for mother's perceived parental impact as answering questions on this scale of the PACOTIS probably require rather extensive mentalizing abilities whereas the self-efficacy questions often involve concrete examples of parenting situations or child behavior. The above-mentioned four-component indirect-effects model was significant only when perceived parental impact, positive engagement, imitation, and aggression were included. Whereas a number of other results supported the existence of such a model as well, the lack of further significant findings involving the four components also could be the result of our choice for specific parental beliefs, parenting behaviors and precursors of theory of mind variables. For example, visual perspective-taking was related to mothers' parental self-efficacy and successful positive engagement, but no relation was found with aggression. Visual perspective-taking possibly may be related more strongly to other aspects of social functioning, such as prosocial behavior (Carlo, Knight, McGinley, Goodvin, & Roesch, 2010). Evidence exists showing that children who are better at determining the perspective of others, show more helping and sharing behavior in interaction with others (Carlo et al., 2010; Cigala, Mori, & Fangareggi, 2015).

In addition, alternative pathways influencing theory of mind development such as individual differences in neurodevelopmental processes should be considered (Molenberghs, Johnson, Henry, & Mattingley, 2016). For example, it should be noted that toddlerhood is characterized by the development of other aspects of cognitive development, such as executive functioning (Garon, Bryson, & Smith, 2008). Neuroimaging studies show that brain regions involved in theory of mind, such as the medial prefrontal cortex and temporo-parietal junction, show substantial overlap with brain regions engaged in executive functioning (Rothmayr et al., 2011; Wade, Prime, et al., 2018). The simultaneous investigation of multiple aspects of early cognitive development in relation to children's brain development, parental beliefs, parenting behavior and social development is an important challenge for future studies.

Whereas the lack of investigation of bidirectional influences may be considered as a limitation of the present study, several other limitations need to be mentioned as well. First, aggressive behavior was measured using maternal reports. It would be valuable to examine the level of aggression using observations or using multiple informants to compare different raters and contexts (Grietens et al., 2004). Second, this study did not include father's beliefs or behavior, which were shown to have a unique impact, above maternal behavior, on the level of children's problem behavior (Rinaldi & Howe, 2012; Scott, Nelson, & Dix, 2018). Furthermore, parenting behavior was measured at one time point. Previous research has indicated that parenting behavior, especially negative parenting practices, is not highly stable over time from

infancy to early childhood (Dallaire & Weinraub, 2005). Next, we used the mothers to examine child's ability to take the other's visual perspective. As the quality of the mother-child relationship is particularly important for understanding mental states of mother compared to other people (Repacholi & Trapolini, 2004), future studies should also consider examining visual perspective-taking with unfamiliar individuals. In addition whereas the present study took different aspects of parental beliefs and specific forms of parenting in different contexts into account, it cannot claim to have been exhaustive regarding parenting beliefs or behavior. For example, reflective functioning and maternal mind-mindedness, which both have been related to children's aggressive behavior, may be of specific interest in this four-component model of early social development (Meins, Centifanti, Fernyhough, & Fishburn, 2013; Smaling et al., 2017). Finally, children's task compliance during the cognitive assessments may have influenced the results, because a low score on the cognitive tasks may be represented as noncompliance, which is related to aggressive behavior during childhood (Kalb & Loeber, 2003). Another consideration for the design of future studies is that child behavior also predicts parenting behavior (Gershoff, Lansford, Sexton, Davis-Kean, & Sameroff, 2012; Miner & Clarke-Stewart, 2008). For example, parents of children with high levels of aggression or difficult temperament may experience less self-efficacy and use more maladaptive parenting (Ardelt & Eccles, 2001; Kiff, Lengua, & Zalewski, 2011; Miner & Clarke-Stewart, 2008). In addition, parenting behavior also predicts parental beliefs: less promotive parenting practices were shown to decrease parental self-efficacy (Glatz & Buchanan, 2015). Future research should assess the temporal bidirectional influences between parental beliefs, parenting behavior and child aggression.

Implications

Interventions aiming to promote socio-emotional development seem to be most effective when started prenatally or in the first years of life (Peacock, Konrad, Watson, Nickel, & Muhajarine, 2013). Therefore, identifying early parent and child factors related to aggressive behavior could help in detecting mother-child dyads who might benefit from early interventions and could help to determine the focus of interventions. Our results suggest that interventions need an integrated model as a basis. Practically, this would mean that interventions need to incorporate elements associated with parental beliefs, parenting behavior, and children's social-cognitive skills, as some of these may only have indirect beneficial effects on child behavioral development through one or two of the other elements.

Specifically, the results of this study showed that lower parental self-efficacy was associated directly with higher child aggression whereas perceived parental impact was related indirectly to higher child aggression during toddlerhood via positive engagement and child imitation. Interventions enhancing maternal beliefs and improving parenting behavior showed promising results (Roskam, Brassart, Loop, Mouton, & Schelstraete, 2015; Shah, Kennedy, Clark, Bauer, & Schwartz, 2016).

Therefore, it may be important to combine the promotion of parental self-efficacy and the awareness that parents have an impact on their child's development, with the improvement of parenting behavior in the prevention of aggressive behavior. In addition, the results showed that poorer imitation ability was related to higher levels of aggression, which could be an additional target for intervention during toddlerhood. Although no interventions are known to focus on imitation, it has been shown that theory of mind can be trained during preschool age (Kloo & Perner, 2008). Intervention studies focusing on empathy, a construct often linked to theory of mind, showed promising results in reducing the levels of problem behavior during school age (Jagers et al., 2007; Schonert-Reichl, Smith, Zaidman-Zait, & Hertzman, 2012). Novel intervention studies are needed to examine whether simultaneous enhancement of parental beliefs, parenting behavior, and precursors of theory of mind decreases aggressive behavior during toddlerhood.

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