Maternal reflective functioning: influence on parenting practices and the early development of externalizing behavior

Smaling, H.J.A.

Chapter 4

Prenatal reflective functioning and accumulated risk as predictors of maternal interactive behavior during free play, the Still-Face Paradigm, and two teaching tasks.

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Abstract

This study examined whether prenatal reflective functioning (RF) was related to mothers' interactive style across contexts with their six-month-old infants (*M* age = 6.02 months, *SD* = 0.41, 54% boys), and to what extent quality of prenatal RF could account for the influence of accumulated risk on maternal interactive behavior. Accumulated risk was defined as the sum-score of a selection of risk factors that have been associated with suboptimal infant development. Mother-infant dyads (N = 133) were observed during free play, two teaching tasks, and the Still-Face Paradigm (SFP). Better prenatal RF was associated with more positive maternal behavior in all settings and less negative behavior during teaching and SFP-reengagement. Accumulated risk and prenatal RF predicted shared variance in maternal interactive behavior (with unique predictive effects observed only for RF on sensitivity during teaching and SFP-play, and for accumulated risk on sensitivity and positive engagement during SFP-play, and internalizing-helplessness during SFP-reengagement). Accumulated risk had an indirect effect on maternal sensitivity during teaching and SFP-play through prenatal RF. These findings suggest not only that RF may be targeted prenatally in order to improve mother-infant interactions, but also that enhancing RF-skills may ameliorate some of the negative consequences from more stable perinatal risk factors that influence parent-child interactions.

Introduction

Children's developmental outcomes have been associated with a large variety of biological and environmental risk factors (Appleyard, Egeland, Van Dulmen, & Sroufe, 2005; Cabaj, McDonald, & Tough, 2014; Walker et al., 2011). It has become evident that the presence of multiple risk factors or combinations of specific risk factors disproportionally increase the chances of poor socio-behavioral development among offspring (Appleyard et al., 2005; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). These risk factors influence child socio-behavioral development directly or indirectly through parenting capacities and parent-child interactions (Cyr, Euser, Bakermans-Kranenburg, & Van IJzendoorn, 2010; Seng & Prinz, 2008). Parental mentalizing (i.e., the ability to understand and interpret one's own and others' behavior in the light of mental states such as feelings, thoughts, fantasies, beliefs and desires (Fonagy, Gergely, Jurist, & Target, 2002)) has also been linked to child socio-behavioral development (Benbassat & Priel, 2012; Laranjo, Bernier, Meins, & Carlson, 2010; Sharp & Fonagy, 2008) and may be one of the driving forces of the quality of parenting behaviors and parent-child interactions (Farrow & Blissett, 2014; Grienenberger, Kelly, & Slade, 2005; Koren Karie, Oppenheim, Dolev, Sher, & Etzion-Carasso, 2002). The present study examined whether mothers' prenatal reflective functioning ability (RF), an operationalization of parental mentalizing, was linked to postnatal interactive style with their infants across different contexts, and whether prenatal RF accounted for any influence of accumulated risk (i.e., the sum-score of a selection of risk factors that have been associated with suboptimal infant socio-behavioral development) on maternal interactive behavior.

In the context of parenting, prenatal maternal RF is defined as the ability of the mother-to-be to think reflectively about herself as a mother, her (future) infant, and the developing relationship with her infant in terms of mental states and to use this understanding to direct her responses towards her infant (Slade, Sadler, & Mayes, 2005). Highly reflective mothers are aware of their own and infant's mental states, understand how these mental states impact behavior, and appear better equipped to regulate complex emotional experiences. Low reflective mothers, on the other hand, seem unaware of their own or their infant's mental states and deny (negative) emotional experiences related to parenting (Slade, 2005). Particularly in times of heightened emotions, a reflective mother is likely to respond to her infant's cues with acceptance and in an appropriate manner (Slade, Grienenberger,

Bernbach, Levy, & Locker, 2005). Therefore, maternal RF is viewed as a crucial component in helping mothers to provide cohesive responses to infant distress (Grienenberger et al., 2005), and to be sensitive in their caretaking (Fonagy et al., 2002).

Maternal RF has been related to different parenting behaviors during non-challenging and challenging tasks (Grienenberger et al., 2005; Huth-Bocks et al., 2014; Pajulo et al., 2008; Stacks et al., 2014). In general, mothers with better parental RF-skills show more sensitivity when interacting with their child (Grienenberger et al., 2005; Rosenblum, McDonough, Sameroff, & Muzik, 2008; Stacks et al., 2014). Sensitivity refers to the parental ability to respond to their child's signals in a contingent, timely and appropriate manner (Ainsworth, Bell, & Stayton, 1974). Conversely, lower maternal RF has been associated with higher levels of negative parenting behavior (Grienenberger et al., 2005; Stacks et al., 2014). Also, better maternal RF has been linked with enhanced mother–child relationships and communication (Borelli, West, DeCoste, & Suchman, 2012; Grienenberger et al., 2005). However, most studies linking maternal RF to parenting behavior either assessed the interactive behaviors during one task (Grienenberger et al., 2005; Pajulo et al., 2008) or used composite scores derived by averaging across the interactive tasks (Rosenblum et al., 2008; Stacks et al., 2014).

One of the few studies that reported separate correlations between maternal RF and parenting behavior across tasks showed that better postnatal RF was related to more positive parenting behavior during free play and teaching, and less negative parenting behavior but only during free play (Huth-Bocks, Muzik, Beeghly, Earls, & Stacks, 2014). Indicators of maternal mind-mindedness, another operationalization of parental mentalizing, have also been found to vary across contexts (Meins, 1997; Meins, Fernyhough, Fradley, & Tuckey, 2001). For example, more emotional and mental state discourse was used during play with toys compared to play without toys (Laranjo et al., 2010), and labeling mental states more often occurred during book reading compared to joint play (Drummond, Paul, Waugh, Hammond, & Brownell, 2014). Other studies examining whether maternal behavioral responses varied depending on context, play focus, and affective valence have reported mixed results (Calkins, Smith, Gill, & Johnson, 1998; Feldman, Greenbaum, Mayes, & Erlich, 1997; Joosen, Mesman, Bakermans-Kranenburg, & Van IJzendoorn, 2012; Mayes, 2000; Miller, McDonough, Rosenblum, & Sameroff, 2002). It is clear, however, that different contexts require flexible interactive behavior of the mother. Possibly, the influence of maternal RF also differs across contexts, with a larger role for maternal RF during more challenging tasks, due to its essential role in providing adequate

and cohesive responses to infant distress. Therefore, the current study examined maternal interactive behavior in relation to prenatal maternal RF during non-challenging (i.e., free play with toys and face-to-face play) and challenging (two teaching tasks and reengagement after stressor) tasks.

The context of pregnancy varies greatly in terms of type and amount of internal and external resources available, which, in turn, impact maternal RF. Several demographic and psychosocial risk factors are known to have detrimental effects on the parental RF-ability. Lower RF has been related to psychiatric problems (Perry, Newman, Hunter, & Dunlop, 2013; Toth, Rogosch, & Cicchetti, 2008), substance use during pregnancy (Pajulo et al., 2012; Smaling et al., 2015), single parenthood (Huth-Bocks, Levendosky, Theran, & Bogat, 2004), limited social support (Sadler et al., 2007; Smaling et al., 2015), and scarcity of material resources (Pajulo, Helenius, & Mayes, 2006; Sadler et al., 2007). Many of these risk factors have been directly associated with poor parenting and child socio-behavioral development as well (Hoff, Laursen, & Tardif, 2002; Leerkes et al., 2014; Mayes & Truman, 2002; Stacks et al., 2014), and poor parenting has been suggested to mediate associations between the risk factors listed above and child outcomes (Bank, Marion, Patterson, & Fetrow, 1993; Harold et al., 2011; Martinez-Torteya et al., 2014; Oyserman, Bybee, Mowbray, & Hart-Johnson, 2005). It is not yet clear through which processes these risk factors affect parenting in such a negative way. Quality of parental RF may be an important mechanism in this respect.

Many studies to date focused on specific risk factors for poor parenting and child outcomes, thereby often statistically controlling for other, potentially "confounding" risk factors in their data analyses. Other studies, however, have shown that combinations of risk factors (either cumulatively or in interaction) have the strongest effects on quality of parenting and child behavioral development (Appleyard et al., 2005; Atzaba-Poria, Pike, & Deater-Deckard, 2004; Evans & Kim, 2007; Evans, Kim, Ting, Tesher, & Shannis, 2007; Sameroff et al., 1987). However, no studies to date have examined the potential mediating role of prenatal RF in associations between accumulated risk and maternal interactive behavior in different contexts.

We investigated the effects of accumulated risk and prenatal maternal RF on maternal postnatal interactive behavior in a sample of first-time mothers with their 6-month-olds. Mother-infant dyads were observed interacting during a free play task with toys, two teaching tasks, and the play and reunion episodes of the Still-Face Paradigm (SFP). Our first aim was to examine whether prenatal RF was related to maternal interactive behavior across

contexts. We expected higher levels of prenatal RF to be associated with more sensitivity and positive engagement, and less intrusiveness and internalizing-helplessness behavior (defined as the degree to which mothers show resigned, helpless, or anxious behavior) during all tasks. This was based on the assumption that mothers with greater prenatal RF might also behave more adequately and sensitive towards their infant postnatally as maternal RF has been associated with more balanced and positive mental representations of the infant, and with more developmentally appropriate expectations (Schechter et al., 2005; Schechter et al., 2006). With maternal RF suggested to be especially important in providing adequate responses to infant distress (Grienenberger et al., 2005; Slade et al., 2005), it was hypothesized that the associations between prenatal RF and maternal behavior would be stronger for more challenging contexts (teaching tasks and reunion episode of the SFP). We also hypothesized that the presence of more risk factors would be related to more intrusiveness and internalizing-helplessness, and less sensitivity and positive engagement across contexts. The final goal was to examine whether prenatal RF explains the potential effects of accumulated risk on maternal interactive behavior across contexts. We expected an indirect effect of accumulated risk on maternal interactive behavior through prenatal RF across contexts.

Methods

Participants

The present study is part of the Mother-Infant Neurodevelopment Study in Leiden, The Netherlands (*MINDS* - Leiden). *MINDS* - Leiden is a large ongoing longitudinal study into neurobiological and neurocognitive predictors of early behavioral problems. The study was approved by the Medical Research Ethics Committee at the Leiden University Medical Centre, and by the ethics committee of the Department of Education and Child Studies at the Faculty of Social and Behavioral Sciences, Leiden University. Women were recruited during pregnancy via hospitals, midwifery clinics, prenatal classes, and pregnancy fairs. Dutch-speaking primiparous women between 17 and 25 years old with uncomplicated pregnancies were eligible to participate. We oversampled women characterized by presence of risk factors for suboptimal offspring behavioral development (Smaling et al., 2015).

The total sample at the first assessment (T1), around 27 gestational weeks, consisted of 142 women. Nine women did not participate in the second assessment (T2), 6 months post-partum. Attrition was due to inability to contact (n = 5), personal problems (n = 2), emigration (n = 1), and premature delivery (11 weeks early, n = 1). Sample attrition was unrelated (ps > .05) to demographic variables such as maternal age, ethnicity, and household income.

The final sample consisted of 133 first-time mothers and their healthy six-month-old infants who had completed both T1 and T2 of the study. Demographic variables and obstetric characteristics are summarized in Table 1. Of the 133 participants, 76 were not characterized by any of the eight predefined risk factors (see *Procedures and instruments*), 29 had one, 18 had two, 7 had three, 2 had four, and 1 had five risk factors present.

Procedures and instruments

The assessments consisted of a 2- to 2.5-h home visit, conducted by two female researchers. T1 included an interview regarding the emotional experience of the pregnancy, a semi-structured psychiatric interview, and a variety of questionnaires concerning demographic information, lifestyle and health. During T2, after some time to get familiar with the researchers, mother-infant dyads subsequently performed a free play task, two teaching tasks, watched a 2-minute Baby Einstein video (2002, The Baby Einstein, LLC), and underwent the Still-Face Paradigm. Finally, the Infant Mental Development Index of the

Bayley Scales of Infant Development, 2nd version (BSID-II; Bayley, 1993) was administered. After the infant tasks, three subtests of the Wechsler Adult Intelligence Scale, third version (WAIS-III; Wechsler, 2005) were administered to the mother and she was asked to complete several questionnaires.

Table 1. Demographic and obstetric sample characteristics.

	M	*SD*
Maternal age (years)	22.86	2.17
Family monthly income after tax earnings (Euros)	2,469.14	1,222.62
% mothers with a Bachelor's or Master's degree	31%	
% Caucasian	89%	
% single mothers	6%	
WAIS Vocabulary*	37.47	11.03
WAIS Matrix Reasoning*	19.99	3.50
WAIS Digit Span - backwards*	6.81	2.05
Infant gestational age at birth (weeks)	39.19	2.02
Infant birth weight (gram)	3328	544
Infant APGAR-score at 5 minutes	9.59	0.88
Infant sex (% male)	54%	
Infant age (months)	6.02	0.41
Mental Development Index (BSID-II)	101.44	17.86

Note. N = 133, *M* = mean, *SD* = standard deviation, WAIS = Wechsler Adult Intelligence Scale, BSID = Bayley Scales of Infant Development, 2nd edition, * = raw scores.

Maternal reflective functioning. At T1, the Pregnancy Interview – Revised (PI-R; Slade, 2007; Smaling & Suurland, 2011) was used to assess prenatal reflective functioning. The PI-R is a 22-item interview to assess the emotional experience of the pregnancy, mother's prenatal representations of her relationship with her unborn child, and of herself as a parent. The PI-R was digitally recorded and transcribed verbatim. Coding for RF was performed using the Reflective Functioning Scoring Manual (Slade & Patterson, 2005; Slade, Patterson, & Miller, 2007). The mother's responses to the individual questions were scored and from these an overall score ranging from -1 (negative RF) to +9 (full or exceptional RF) was assigned. Scores under 5 indicate either negative, absent, or low RF, whereas scores of 5 and above indicate clear evidence of mentalizing (Slade et al., 2007). An example of a response that would score a '-1' would be: "*Sometimes the baby kicks me in the ribs just to annoy me*." An example of a score '5' would be: "*My boyfriend was just really excited when I told him I was pregnant. This made me feel very happy*." An example of a '9' is: "*It's going to be hard when I have to go back to work. I try to not think about it too much, because that really puts me down and I know that feeling depressed is not good for the baby, because she feels what I feel. When I actually have to go to work I will probably feel guilty all the time. I decided to have this baby, so I feel like I must be there for her 24/7. Leaving her at daycare makes me feel like a bad mother. I will probably think about her all day and call a few times to know if she's alright. I can also imaging that after a while it might be nice to go back to work. I love the mental stimulation, so I know in the long run me staying at home won't make me happy either. I will just have to make the most of our time together. But I don't want to put too much pressure on the time we do have together, making her feel pushed. I don't want her to be affected by my issues. It's just going to be very hard for me*." Transcripts were coded by trained research assistants under supervision of the first author. Mean inter-rater agreement for individual passage scores was .87 and .90 for the overall RF-score.

Risk Factors. At T1, the absence or presence of eight risk factors (World Health Organization, 2005; Smaling et al., 2015), was determined. Positive screening on current psychiatric disorder(s) was established by the Mini-International Neuropsychiatric Interview – plus (M.I.N.I-plus; Van Vliet, Leroy, & Van Megen, 2000) (n = 28), limited social support network (<4 individuals listed in network) was assessed by using the Norbeck Social Support Questionnaire (NSSQ; Norbeck et al., 1981; Norbeck, Lindsey, & Carrieri, 1983) (n = 5), substance use during pregnancy (n = 26 continued substance use during pregnancy; 22 used tobacco, 1 drank alcohol, 2 drank alcohol and continued smoking, and 1

used marijuana), no secondary education (n = 3), unemployment (n = 6), financial problems (n = 10), single status (n = 8), and young maternal age (<20 years, n = 11) were all established by means of the Dutch translation of the 'Becoming a mother' questionnaire (Hay et al., 2011). Each risk factor was scored as present (1) or absent (0). Scores on the risk factors were added together to create a sum-score of risk factors to represent the accumulated risk score (possible range 0 – 8).

Mother-infant interaction tasks. Mother-infant dyads engaged in a series of recorded interactive tasks at T2 adapted from Miller and colleagues (2002). In the present study, we used data from an unstructured free play task with toys, two structured teaching tasks, a face-to-face free play task (without toys, Still-Face Paradigm (SFP) play-episode), and a challenging "reengagement after stressor" task (SFP reunion-episode). During the 3-minute unstructured free play task, mothers were given a set of age-appropriate toys and instructed to play with their infant as they would normally do. During the teaching tasks, mothers were given two challenging tasks to "teach their infant". Task 1 involved stacking a set of cups of various sizes and task 2 consisted of putting rings around a pole. All infants were unable to perform either of these tasks independently. Each teaching task lasted 2.5 minutes. Next, the infant watched a 2-minute relaxing movie, while lying on a blanket. Subsequently, mother-infant dyads participated in the Still-Face Paradigm (Tronick, Als, Adamson, Wise, & Brazelton, 1978). The SFP was used to assess maternal behavior during face-to-face play (play-episode) and reengagement after stressor (reunion-episode). The SFP consists of three consecutive two-minute episodes. During the task, infants were seated in an infant seat placed on a table. Mothers sat on a chair approximately 1 meter from the infant at eye level. Mothers were instructed to play with their infant as they normally would (without toys). Immediately following this play-episode, the Still-Face (SF) episode started. During the SF-episode, mothers were instructed to remain immobile, hold a neutral expression on their face, and not respond to or touch their infant. The procedure ended with the reunion-episode in which mothers could resume play and respond to their infant in any way they felt was appropriate, but without taking the infant out of the seat.

When infants became highly distressed, mothers were allowed to abort the SF-episode and move on to the reunion-episode (n = 2) (Tronick et al., 1978). The entire procedure was videotaped with one camera focused on the infant. A wooden frame with a mirror was placed behind the infant seat, through which the mother's facial expression and behavior could be recorded. Data of one mother-infant dyad was missing because the infant was too distressed to participate in the SFP.

Coding of maternal behavior. Maternal interactive behavior was coded with an adapted version of the 4-point global rating scales (0 = absent to 3 = high levels or predominantly present) of the Mother Infant Coding System (Miller et al., 2002). Maternal behavior was rated on four dimensions: positive engagement (PE; extent to which the mother succeeded in positively engaging her infant in interaction), sensitivity (SE; degree to which mother contingently, timely and appropriately responds to her infant), intrusiveness (IN; extent to which mother handles the infant roughly and interferes with the infant's needs and behaviors), and internalizing-helplessness behavior (IH; degree to which mother gives up trying to engage or soothe infant). The difference between sensitivity and positive engagement is that sensitivity is more about how well the mother is able to read and respond to her infant's cues (infant-centered; e.g., follow cues, acknowledge infant state, gently soothe, use appropriate pacing, soft tone), whereas positive engagement is more centered around how well the mother is able to engage her infant in toy play and/or playful dyadic interaction (Mesman, Van IJzendoorn, & Bakermans-Kranenburg, 2009; Miller et al., 2002).

Interactions were coded independently with different coders rating different tasks. All coders were trained extensively until intraclass correlations (ICC) were .70 or higher across dimensions on a subset of 20 recordings. A subset of recordings (15% of the sample) was double-coded to assess ongoing inter-rater reliability. ICCs ranged from .73 to .99.

Cognitive functioning. Global indicators of maternal and infant cognitive functioning were obtained as they could influence quality of prenatal RF and parenting abilities, and were likely to be associated with accumulated risk. The Infant Mental Development Index (MDI) of the Bayley Scales of Infant Development, 2nd version (BSID-II; Bayley, 1993) was used as a global measure of infant cognitive development at T2. The researchers who administered or scored the BSID-II were trained in developmental assessment and interpretation. Raw scores were converted to a scaled score (M = 100, SD = 15).

Three subtests of the WAIS-III-NL (Wechsler, 2005) - Vocabulary, Matrix Reasoning, and Digit Span – backwards - were used as indicators of maternal intellectual functioning. For each subtest, the raw scores were used in statistical analyses.

Data analyses

All variables were examined for outliers and violations of specific assumptions applying to the statistical tests used. Internalizing-helplessness showed a non-normal distribution in all tasks and was therefore dichotomized into 'no' or 'some' internalizing-helplessness behavior. Due to strong correlations between maternal behaviors for the two teaching tasks, average scores were calculated and used in further analyses.

Correlation analyses were performed to examine associations between prenatal RF, accumulated risk, and postnatal maternal interactive behavior. Fisher *r*-to-*z* transformations were conducted to test for significant differences in the correlation coefficients of prenatal RF and maternal behavior across contexts. Because of the multiple models tested, we applied the Benjamini and Hochberg False Discovery Rate (FDR) to correct for capitalization on chance (Benjamini & Hochberg, 1995, 2000; Benjamini & Yekutieli, 2001). To investigate the unique predictive value of prenatal RF and accumulated risk with respect to maternal behavior, multiple regression analyses were conducted.

Bootstrap procedures described by Preacher and Hayes (2008) were used to investigate whether accumulated risk had an indirect effect on maternal interactive behavior via prenatal RF. Separate analyses were conducted for the various maternal behaviors across the different tasks. Bias corrected and accelerated (BCa) confidence intervals (C.I.) were reported. BCa confidence intervals were set at 0.95 with 5000 resamples. All analyses were conducted using the Statistical Package for Social Sciences (SPSS for Windows, version 21.0, SPSS Inc., Chicago, IL).

Results

Preliminary analyses

Demographic and obstetric characteristics of the sample are presented in Table 1. The means and standard deviations for prenatal RF, accumulated risk, and maternal interactive behavior are listed in Table 2.

Accumulated risk was negatively related to infant birth weight (r = -.21, p < .01), indicating that the presence of more risk factors was linked to lower birth weight. Prenatal RF and maternal postnatal behavior were not associated with the BSID-II Mental Development Index, obstetric characteristics, and infant demographics listed in Table 1 (ps > .10). Hence, no obstetric characteristics and infant demographics were added as covariates in subsequent analyses.

Since maternal age, educational level, and financial status are part of the accumulated risk score, these variables were not included as potential covariates in subsequent analyses. The WAIS subtests Matrix Reasoning and Digit Span - backwards were not related to prenatal RF, accumulated risk or maternal interactive behavior. The subtest Vocabulary, however, correlated with prenatal RF (r = .37, p < .001), accumulated risk (r = -.30, p < .001), and more than half of maternal interactive behaviors and was therefore included (as predictor/covariate) in subsequent regression and mediation analyses.

Prenatal RF, accumulated risk, and maternal interactive behavior across contexts

Bivariate Pearson correlations between prenatal RF and accumulated risk, and postnatal interactive behavior across tasks are shown in Table 3. Accumulated risk was negatively associated with prenatal RF (r = -.39, p < .001), sensitivity during all four tasks, and positive engagement during free play, SFP-play, and SFP-reengagement, while positive associations were identified with intrusiveness during free play and teaching, and internalizing-helplessness behavior during free play, teaching, and SFP-reengagement.

Prenatal RF was also significantly related to maternal interactive behavior (see Table 3). Higher prenatal RF was associated with more sensitivity across tasks. Higher prenatal RF also related to more positive engagement during free play, teaching and SFP-play. Prenatal RF was negatively related to intrusiveness during teaching, and internalizing-helplessness during teaching and SFP-reengagement.

Table 2. Prenatal maternal reflective functioning and maternal interactive behavior across tasks.

Variable	*M* (*SD*)	Range
Prenatal Reflective Functioning	3.99 (1.05)	2 – 7
Positive Engagement		0 – 3
Free play	2.23 (0.71)	1 – 3
Teaching task	2.23 (0.50)	1 – 3
SFP – play	1.68 (0.65)	0 – 3
SFP – reengagement	1.36 (0.75)	0 – 3
Sensitivity		0 – 3
Free play	2.55 (0.62)	1 – 3
Teaching task	2.13 (0.62)	1 – 3
SFP – play	1.89 (0.54)	1 – 3
SFP – reengagement	1.78 (0.57)	1 – 3
Intrusiveness		0 – 3
Free play	0.33 (0.59)	0 – 3
Teaching task	1.16 (0.66)	0 – 3
SFP – play	2.25 (0.69)	0 – 3
SFP – reengagement	2.32 (0.70)	0 – 3
Internalizing-helplessness		0 – 3
Free play	0.04 (0.19)	0 – 2
Teaching task	0.05 (0.22)	0 – 1
SFP – play	0.05 (0.23)	0 – 1
SFP – reengagement	0.17 (0.38)	0 – 2

Note. N = 133, *M* = mean, *SD* = standard deviation, SFP = Still-Face Paradigm.

Table 3. Associations between prenatal reflective functioning, accumulated risk, and maternal interactive behavior across tasks.

	Prenatal RF	Risk factors		Prenatal RF	Risk factors
Free play			**SFP – play**		
PE	.20**	-.21**	PE	.17*	-.21**
SE	.21**	-.21**	SE	.31**	-.38**
IN	-.14	.16*	IN	-.09	.02
IH	-.11	.16*	IH	.04	.02
Teaching			**SFP – reengagement**		
PE	.19*	-.12	PE	.04	-.15‡
SE	.36**	-.26**	SE	.22**	-.26**
IN	-.20**	.16‡	IN	-.06	.08
IH	-.19*	.25**	IH	-.20**	.26**

Note. ** $p < .01$; * $p < .05$; ‡ = no longer significant after correction for False Discovery Rate, RF = reflective functioning, PE = positive engagement, SE = sensitivity, IN = intrusiveness, IH = internalizing-helplessness behavior, SFP = Still-Face Paradigm, Risk Factors = sum-score of risk factors.

Fisher *r*-to-*z* transformations were conducted to test whether the correlation coefficients between prenatal RF and maternal interactive behavior differed across contexts. The associations between internalizing-helplessness behavior and prenatal RF differed significantly between SFP-play and teaching ($z = 1.87$, $p < .05$), and SFP-play and SFP-reengagement ($z = 1.94$, $p < .05$), indicating that prenatal RF was more strongly related to internalizing-helplessness behavior during the more challenging (teaching and SFP-reengagement) tasks compared to the non-challenging face-to-face play (SFP-play).

Predicting maternal interactive behavior in different contexts

Multiple regression analyses were performed to determine the main effects of each of the following independent variables: prenatal RF, accumulated risk, and maternal vocabulary in predicting maternal interactive behaviors across the four contexts studied. Several significant models were identified after correcting for FDR, in which on one occasion prenatal RF was the only significant predictor (sensitivity during teaching [model: $F(3,128) = 4.48$, $p < .01$]), on two occasions accumulated risk was the only significant predictor (positive engagement during SFP-play [model: $F(3,128) = 3.05$, $p < .05$]; internalizing-

helplessness during SFP-reengagement [model: $\chi^2(3) = 9.49$, $p < .05$]), and on one further occasion both prenatal RF and accumulated risk remained significant unique predictors (sensitivity during SFP-play [model: $F(3,128) = 9.27$, $p < .001$]). Maternal vocabulary also predicted several parenting behaviors over and above the effects of prenatal RF and accumulated risk (sensitivity during free play [model: $F(3,128) = 4.48$, $p < .01$] and SFP-reengagement [model: $F(3,128) = 5.68$, $p < .01$]; and intrusiveness during free play [model: $F(3,128) = 3.75$, $p < .05$]) (see Table 4).

Does prenatal RF mediate associations between accumulated risk and maternal interactive behavior?

Based on significant cross-correlations of accumulated risk, prenatal RF, and maternal interactive behavior, as shown in Table 3, mediation analyses were performed for sensitivity during all four contexts, positive engagement during free play and SFP-play, and internalizing-helplessness during teaching and SFP-reengagement in order to determine if prenatal RF mediated the effects of accumulated risk on maternal interactive behavior, whilst controlling for maternal vocabulary. Results of the mediation analyses revealed a significant indirect effect of accumulated risk on sensitivity during teaching through prenatal RF (point estimate -.05, 95% C.I. = -.0944 – -.0123, Figure 1) and for sensitivity during SFP-play (point estimate -.03, 95% C.I. = -.0651 – -.0026, Figure 2).

Table 4. Regression analyses predicting maternal interactive behavior from prenatal reflective functioning, sum-score of risk factors, and maternal vocabulary.

Predictors	*ß*	*t*	*p*	η^2		*ß*	*t*	*p*	η^2
Sensitivity – Free play					**Sensitivity – Teaching**				
Prenatal RF	.10	1.02	.312	.04*	Prenatal RF	.28	3.03	.003**	.14**
Risk Factors	-.12	-1.26	.211		Risk Factors	-.13	-1.41	.162	
Vocabulary	.19	2.09	.039*		Vocabulary	.10	1.13	.259	
Sensitivity – SFP play					**Sensitivity – SFP reengagement**				
Prenatal RF	.18	2.01	.046*	.16**	Prenatal RF	.08	0.85	.404	.10**
Risk Factors	-.30	-3.35	.001**		Risk Factors	-.18	-1.95	.053	
Vocabulary	.05	0.57	.569		Vocabulary	.20	2.22	.029*	
Positive engagement – Free play					**Positive engagement – Teaching**				
Prenatal RF	.12	1.23	.222	.04‡	Prenatal RF	.14	1.44	.153	.03
Risk Factors	-.14	-1.51	.133		Risk Factors	-.04	-0.37	.709	
Vocabulary	.06	0.67	.507		Vocabulary	.10	1.07	.288	

Predictors	*ß*	*t*	*p*	η^2		*ß*	*t*	*p*	η^2
Positive engagement – SFP play					**Positive engagement – SFP reengagement**				
Prenatal RF	.15	1.50	.135	.05*	Prenatal RF	-.05	-0.46	.647	<.01
Risk Factors	-.19	-2.01	.046*		Risk Factors	-.14	-1.47	.144	
Vocabulary	-.13	-1.39	.168		Vocabulary	.08	0.87	.387	
Intrusiveness – Free play					**Intrusiveness – Teaching**				
Prenatal RF	-.02	-0.17	.863	.06*	Prenatal RF	-.16	-1.59	.114	.02
Risk Factors	.09	0.92	.360		Risk Factors	.09	0.98	.330	
Vocabulary	-.24	-2.58	.013*		Vocabulary	-.01	-0.12	.902	
Predictors	*B*	SE_b	*p*	*Exp(B)*		*B*	SE_b	*p*	*Exp(B)*
Internalizing-helplessness – Free play					**Internalizing-helplessness – Teaching** ǂ				
Prenatal RF	-.28	.59	.638	0.76	Prenatal RF	-.79	.61	.193	0.45
Risk Factors	.36	.38	.344	1.43	Risk Factors	.48	.34	.152	1.62
Vocabulary	-.04	.05	.386	0.96	Vocabulary	.01	.04	.889	1.01

Predictors	*B*	SE_b	*p*	*Exp(B)*		*B*	SE_b	*p*	*Exp(B)*
					Internalizing-helplessness – SFP reengagement				
					Prenatal RF	-.40	.31	.192	0.67
					Risk Factors	.46	.23	.046*	1.59
					Vocabulary	.01	.02	.701	1.01

Note. ** $p < .01$; * $p < .05$; [†] = no longer significant after correction for False Discovery Rate. RF = reflective functioning, SFP = Still-Face Paradigm, Risk Factors = sum-score of risk factors, Vocabulary = subtest Vocabulary of the Wechsler Adult Intelligence Scale.

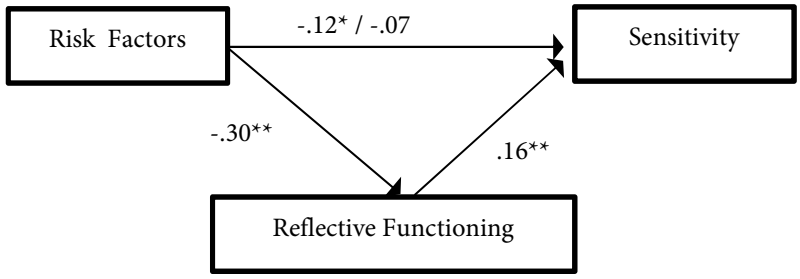

Figure 1. Direct and indirect effect of accumulated risk on sensitivity during teaching, whilst controlling for maternal vocabulary.

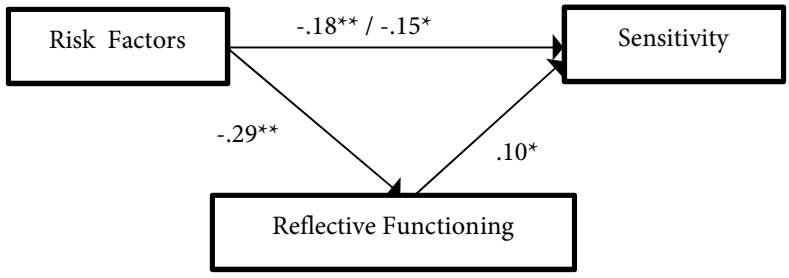

Figure 2. Direct and indirect effect of accumulated risk on sensitivity during face-to-face play, whilst controlling for maternal vocabulary.

Discussion

This study examined the effects of maternal prenatal reflective functioning and accumulated risk on maternal interactive behavior in first-time mothers and their six-month-old infants during free play, the Still-Face Paradigm, and two teaching tasks. Better prenatal RF was associated with more sensitivity and positive engagement across contexts, and with less intrusiveness and internalizing-helplessness behavior, but only during the more challenging tasks (teaching task and SFP-reengagement). The presence of more risk factors was associated with less sensitivity and positive engagement across contexts, more intrusiveness during free play, and more internalizing-helplessness behavior across contexts. Accumulated risk had an indirect effect on sensitivity during teaching and SFP-play through prenatal RF. Unique predictive value for both prenatal RF and accumulated risk was limited, as both constructs were related and predicted shared variance in maternal behavior across contexts, with additional effects for maternal vocabulary.

As expected, better prenatal maternal RF was associated with more sensitivity and positive engagement across contexts (more positive engagement and sensitivity during free play, teaching, and SFP-play, and sensitivity during SFP-reengagement). Reflective mothers seem more able to accurately understand their infant's internal states, and as a result, they are more likely to organize their behaviors to support the infant in a manner that is in line with its current emotions, needs, and interests. This is consistent with prior studies linking postnatal maternal RF to more sensitive and/or positive interactive behavior using either non-challenging tasks (Pajulo et al., 2008), challenging tasks (Grienenberger et al., 2005) or average scores across tasks (Rosenblum et al., 2008; Stacks et al., 2014). The current study adds to the literature by showing that prenatal maternal RF is related to postnatal maternal interactive behavior, that overall the strength of these associations does not differ across contexts, and that maternal RF is especially important for sensitive interactive behavior.

Better prenatal RF was associated with less intrusiveness and internalizing-helplessness behavior, but only during the more challenging tasks: teaching and SFP-reengagement. These results are in line with those of Grienenberger and colleagues (2005), who found that better postnatal maternal RF related to less negative parenting behavior in a challenging context, and with studies using average scores of maternal behavior across challenging and non-challenging tasks (Rosenblum et al., 2008; Stacks et al., 2014).

Teaching and SFP-reengagement are considered more challenging and stressful for mothers, since infants are generally (more) distressed and upset during these tasks (Mesman et al., 2009; Miller et al., 2002). Our results suggest that particularly in times of heightened emotions, a reflective mother seems better in reading the signals of her infant and is more likely to know how to respond to her infant's cues in an appropriate and non-intrusive manner. By reflecting on her infant's experience the mother is enabled to put her own affective experiences in a broader perspective, to better understand her own and her infant's reactions, and to learn from the experiences to become a 'better' parent (Slade, Grienenberger, Bernbach, Levy, & Locker, 2005). More indirect evidence for the significance of maternal RF in times of heightened emotions stems from studies linking better RF-levels with maternal persistence and self-awareness of their distress tolerance (Rutherford, Booth, Luyten, Bridgett, & Mayes, 2015; Rutherford, Goldberg, Luyten, Bridgett, & Mayes, 2013) and from neuro-imaging studies showing that interpersonal or attachment-related stress and heightened arousal negatively impact upon brain regions involved in mentalization (Fonagy & Luyten, 2009; Nolte et al., 2010).

As expected, the presence of more risk factors was associated with less positive interactive behavior (sensitivity and positive engagement) and higher levels of internalizing-helplessness behavior (and to a lesser extent intrusiveness) across three of the four contexts. These findings are largely consistent with prior research indicating that the presence of risk factors increases the chances of less optimal parent-child interactions (Martinez-Torteya et al., 2014; Prelow, Weaver, Bowman, & Swenson, 2010; Stacks et al., 2014).

Furthermore, indirect effects of accumulated risk on maternal interactive behavior through prenatal RF were also identified, but only for sensitivity during teaching and SFP-play. These mediation effects suggest that an accumulation of risk factors places a higher demand on the mothers, resulting in mothers' heightened focus on their own needs and thus less mental resources to think reflectively about their infant, and thereby negatively impacting their ability to respond to their infant in a responsive, sensitive manner.

Several limitations of our study should be noted. A possible limitation of coding RF based on verbal narrative is that it might not always best capture the true parental RF-capacity of women who have difficulty with expressive language or who are struggling with environmental adversity (Sadler et al., 2013). Indeed, we found that maternal vocabulary was related to prenatal RF and accumulated risk. However, unique effects for prenatal RF (and accumulated risk) in predicting maternal behavior were also identified, over and above

the effects of maternal vocabulary. This underlines the fact that prenatal RF is more than just a mere reflection of maternal verbal ability. Currently attempts are being made to move beyond parent's verbal capacities to get a grasp of parental mentalizing. Examples of concepts under investigation are parental mirroring behavior (Bigelow, Power, Bulmer, & Gerrior, 2015) and parental embodied mentalizing (ability to perceive, understand, and deduce infant's mental states from the infant's kinesthetic expressions and adjust one's own kinesthetic patterns accordingly) (Shai & Belsky, 2011). Future studies will hopefully be able to disentangle the contributions of verbal and nonverbal indicators of parental mentalizing to parental interactive behavior and child behavioral development.

Second, it may be considered a limitation that, in order to obtain a score for accumulated risk, a sum-score of risk factors was used. Whereas separate risk factors are often related or present simultaneously, and it might in fact be that this simultaneous presence has particularly strong effects on parenting and child outcomes (Appleyard et al., 2005; Sameroff et al., 1987; Stacks et al., 2014), it is also possible that different risk factors differentially influence parenting behavior. Future studies looking into accumulated risk might consider the use of weighted scores for accumulated risk. Third, little over half of our sample did not have any predefined risk factors, thereby limiting the impact of the accumulated risk variable, especially given that only a small group of participants had more than two risk factors. Finally, a global prenatal RF score was used based on the mother's responses across the whole interview. This could have masked distinctions that exist in relation to more specific aspects of prenatal RF. Future research should examine whether prenatal RF can be regarded as two-dimensional construct with a more self-reflective and interpersonal component. This has already been shown for postnatal measures of parental RF (Suchman, DeCoste, Leigh, & Borelli, 2010). This two-factor model should be replicated and examined further with regard to prenatal RF as well as parenting and child behavioral development.

Despite the limitations, the results of our study highlight the importance of prenatal RF, suggesting that women with low prenatal RF, are at heightened risk to display less optimal parenting behavior. Also, 'at risk' mothers seem to have more difficulty to think reflectively about themselves as a parent, their infant, and infant-related intent that (negatively) impact how they think about and respond to their infant (Milner, 2003; Pajulo, Savonlahti, Sourander, Piha, & Helenius, 2001). One of the important mechanisms through which risk factors seem to negatively impact upon parenting behavior, and possibly child developmental outcomes as well, is parental RF. Maternal RF is known to increase from the

prenatal to postnatal period (Poznansky, 2010; Sadler et al., 2013), possibly due to a 'natural' increase in maternal RF, with the baby actually being present and the mother becoming more experienced and familiar with her infant. Thus, it seems feasible that quality of parental RF at the time of testing or observation would be an even stronger predictor of parenting behavior (or mediator/moderator of associations between accumulated risk and parenting behavior).

Nonetheless, our results indicate that prenatal RF plays a particularly important role in sensitive, adequate interactions between mothers and their infants. Parental RF could be targeted prenatally to improve parent-infant interactions later, and positive RF-development may amend some of the negative consequences from other prenatal risk factors. The lack of (many) unique effects of both prenatal RF and accumulated risk on maternal interactive style may (albeit speculatively) be interpreted as an indication that negative effects of perinatal risk factors may be ameliorated by targeting RF. Programs that specifically focus on improving parental RF in 'at-risk' parents appear to improve the level of RF and parenting behavior (Katznelson, 2014; Suchman, DeCoste, Castiglioni, et al., 2010).

Future research should include measures of parental distress tolerance and/or emotion regulation capacities when examining the links between risk factors, parental RF, and maternal parenting behavior to further unravel its mechanisms. A better understanding of the factors and mechanisms that influence the dyadic processes during infancy and early childhood development, will enable us to develop more effective prevention and interventions programs.

References

Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Appleyard, K., Egeland, B., Van Dulmen, M. H. M., & Sroufe, L. A. (2005). When more is not better: The role of cumulative risk in child behavior outcomes. *Journal of Child Psychology & Psychiatry, 46*(3), 235-245. doi: 10.1111/j.1469-7610.2004.00351.x

Atzaba-Poria, N., Pike, A., & Deater-Deckard, K. (2004). Do risk factors for problem behaviour act in a cumulative manner? An examination of ethnic minority and majority children through an ecological perspective. *Journal of Child Psychology and Psychiatry, 45*(4), 707-718.

Bank, L., Marion, S. F., Patterson, G. R., & Fetrow, R. A. (1993). Parenting practices of single mothers: Mediators of negative contextual factors. *Journal of Marriage and Family, 55*(2), 371-384. doi: 10.2307/352808

Bayley, N. (1993). *Bayley Scales of Infant Development-Second Edition*. San Antonio, TX: The Psychological Corporation.

Benbassat, N., & Priel, B. (2012). Parenting and adolescent adjustment: The role of parental reflective function. *Journal of Adolescence, 35*(1), 163-174. doi: 10.1016/j.adolescence.2011.03.004

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society, Series B*(Methodological), 289-300.

Benjamini, Y., & Hochberg, Y. (2000). On the adaptive control of the false discovery rate in multiple testing with independent statistics. *Journal of Educational and Behavioral Statistics, 25*(1), 60-83. doi: 10.3102/10769986025001060

Benjamini, Y., & Yekutieli, D. (2001). The control of the false discovery rate in multiple testing under dependency. *Annals of statistics, 29*, 1165-1188.

Bigelow, A. E., Power, M., Bulmer, M., & Gerrior, K. (2015). The relation between mothers' mirroring of infants' behavior and maternal mind-mindedness. *Infancy, 20*(3), 263-282.

Borelli, J. L., West, J. L., DeCoste, C., & Suchman, N. E. (2012). Emotionally avoidant language in the parenting interviews of substance-dependent mothers: Associations with reflective functioning, recent substance use, and parenting behavior. *Infant Mental Health Journal, 33*(5), 506-519. doi: 10.1002/imhj.21340

Cabaj, J. L., McDonald, S. W., & Tough, S. C. (2014). Early childhood risk and resilience factors for behavioural and emotional problems in middle childhood. *BMC pediatrics, 14*(1), 166-177.

Calkins, S. D., Smith, C. L., Gill, K. L., & Johnson, M. C. (1998). Maternal interactive style across contexts: Relations to emotional, behavioral and physiological regulation during toddlerhood. *Social Development, 7*(3), 350-369. doi: 10.1111/1467-9507.00072

Cyr, C., Euser, E. M., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2010). Attachment security and disorganization in maltreating and high-risk families: A series of meta-analyses.

Development and Psychopathology, 22(01), 87-108. doi: 10.1017/S0954579409990289

Drummond, J., Paul, E. F., Waugh, W. E., Hammond, S. I., & Brownell, C. A. (2014). Here, there and everywhere: Emotion and mental state talk in different social contexts predicts empathic helping in toddlers. *Frontiers in Psychology, 5*(361), 1-11. doi: 10.3389/fpsyg.2014.00361

Evans, G. W., & Kim, P. (2007). Childhood poverty and health: Cumulative risk exposure and stress dysregulation. *Psychological Science, 18*(11), 953-957. doi: 10.1111/j.1467-9280.2007.02008.x

Evans, G. W., Kim, P., Ting, A. H., Tesher, H. B., & Shannis, D. (2007). Cumulative risk, maternal responsiveness, and allostatic load among young adolescents. *Developmental Psychology, 43*(2), 341–351. doi: 10.1037/0012-1649.43.2.341

Farrow, C., & Blissett, J. (2014). Maternal mind-mindedness during infancy, general parenting sensitivity and observed child feeding behavior: A longitudinal study. *Attachment & Human Development, 16*(3), 230-241. doi: 10.1080/14616734.2014.898158

Feldman, R., Greenbaum, C. W., Mayes, L. C., & Erlich, S. H. (1997). Change in mother-infant interactive behavior: Relations to change in the mother, the infant, and the social context. *Infant Behavior and Development, 20*(2), 151-163. doi: 10.1016/S0163-6383(97)90018-7

Fonagy, P., Gergely, G., Jurist, E. J., & Target, M. (2002). *Affect regulation, mentalization and the development of self*. New York: Other Press.

Fonagy, P., & Luyten, P. (2009). A developmental, mentalization-based approach to the understanding and treatment of borderline personality disorder. *Development and Psychopathology, 21*(Special Issue 04), 1355-1381. doi: 10.1017/S0954579409990198

Grienenberger, J., Kelly, K., & Slade, A. (2005). Maternal reflective functioning, mother–infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment & Human Development, 7*(3), 299-311. doi: 10.1080/14616730500245963

Harold, G. T., Rice, F., Hay, D. F., Boivin, J., Van den Bree, M., & Thapar, A. (2011). Familial transmission of depression and antisocial behavior symptoms: Disentangling the contribution of inherited and environmental factors and testing the mediating role of parenting. *Psychological Medicine, 41*(06), 1175-1185. doi: 10.1017/S0033291710001753

Hay, D. F., Mundy, L., Roberts, S., Carta, R., Waters, C. S., Perra, O., . . . Van Goozen, S. (2011). Known risk factors for violence predict 12-month-old infants' aggressiveness with peers. *Psychological Science, 22*(9), 1205-1211. doi: 10.1177/0956797611419303

Hoff, E., Laursen, B., & Tardif, T. (2002). Socioeconomic status and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting: volume 2 Biology and ecology of parenting* (Vol. 2, pp. 231-252). Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.

Huth-Bocks, A. C., Levendosky, A. A., Theran, S. A., & Bogat, G. A. (2004). The impact of domestic violence on mothers' prenatal representations of their infants. *Infant Mental Health Journal, 25*(2), 79-98. doi: 10.1002/imhj.10094

Huth-Bocks, A. C., Muzik, M., Beeghly, M., Earls, L., & Stacks, A. M. (2014). Secure base scripts are associated with maternal parenting behavior across contexts and reflective functioning among trauma-exposed mothers. *Attachment & Human Development, 16*(6), 535-556. doi: 10.1080/14616734.2014.967787

Joosen, K. J., Mesman, J., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2012). Maternal sensitivity to infants in various settings predicts harsh discipline in toddlerhood. *Attachment & Human Development, 14*(2), 101-117. doi: 10.1080/14616734.2012.661217

Katznelson, H. (2014). Reflective functioning: A review. *Clinical Psychology Review, 34*(2), 107-117. doi: 10.1016/j.cpr.2013.12.003

Koren Karie, N., Oppenheim, D., Dolev, S., Sher, E., & Etzion-Carasso, A. (2002). Mother's insightfulness regarding their infants' internal experience: Relations with maternal sensitivity and infant attachment. *Developmental Psychology, 38*(4), 534-542.

Laranjo, J., Bernier, A., Meins, E., & Carlson, S. M. (2010). Early manifestations of children's theory of mind: The roles of maternal mind-mindedness and infant security of attachment. *Infancy, 15*(3), 300-323. doi: 10.1111/j.1532-7078.2009.00014.x

Leerkes, E. M., Supple, A. J., O'Brien, M., Calkins, S. D., Haltigan, J. D., Wong, M. S., & Fortuna, K. (2014). Antecedents of maternal sensitivity during distressing tasks: Integrating attachment, social information processing, and psychobiological perspectives. *Child Development, 86*(1), 1-18. doi: 10.1111/cdev.12288

Martinez-Torteya, C., Dayton, C. J., Beeghly, M., Seng, J. S., McGinnis, E., Broderick, A., . . . Muzik, M. (2014). Maternal parenting predicts infant biobehavioral regulation among women with a history of childhood maltreatment. *Development and Psychopathology, 26*(02), 379-392.

Mayes, L. C. (2000). A developmental perspective on the regulation of arousal states. *Seminars in Perinatology, 24*(4), 267-279. doi: 10.1053/sper.2000.9121

Mayes, L. C., & Truman, S. (2002). Substance abuse and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting: Volume 4 Social conditions and applied parenting* (Vol. 2, pp. 329-359). Mahwah, NJ: Lawrence Erlbaum Associates.

Meins, E. (1997). *Security of attachment and the social development of cognition. Essays in developmental psychology*. Hove: Psychology Press.

Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry, 42*(5), 637-648. doi: 10.1111/1469-7610.00759

Mesman, J., Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2009). The many faces of the Still-Face Paradigm: A review and meta-analysis. *Developmental Review, 29*(2), 120-162. doi: 10.1016/j.dr.2009.02.001

Miller, A. L., McDonough, S. C., Rosenblum, K. L., & Sameroff, A. J. (2002). Emotion regulation in context: Situational effects on infant and caregiver behavior. *Infancy, 3*(4), 403-433. doi: 10.1207/S15327078IN0304_01

Milner, J. S. (2003). Social information processing in high-risk and physically abusive parents. *Child*

Abuse & Neglect, 27(1), 7-20. doi: 10.1016/S0145-2134(02)00506-9

Nolte, T., Hudac, C., Mayes, L. C., Fonagy, P., Blatt, S. J., & Pelphrey, K. (2010). The effect of attachment-related stress on the capacity to mentalize: An fMRI investigation of the bio-behavioral switch model. *Journal of the American Psychoanalytic Association, 58*(3), 566-573.

Norbeck, J. S., Lindsey, A. M., & Carrieri, V. L. (1981). The development of an instrument to measure social support. *Nursing research, 30*(5), 264-269.

Norbeck, J. S., Lindsey, A. M., & Carrieri, V. L. (1983). Further development of the Norbeck social support questionnaire: Normative data and validity testing. *Nursing research, 32*(1), 4-9.

Oyserman, D., Bybee, D., Mowbray, C., & Hart-Johnson, T. (2005). When mothers have serious mental health problems: Parenting as a proximal mediator. *Journal of Adolescence, 28*(4), 443-463.

Pajulo, M., Helenius, H., & Mayes, L. C. (2006). Prenatal views of baby and parenthood: Association with sociodemographic and pregnancy factors. *Infant Mental Health Journal, 27*(3), 229-250. doi: 10.1002.imlj.20090

Pajulo, M., Pyykkönen, N., Kalland, M., Sinkkonen, J., Helenius, H., Punamäki, R.-L., & Suchman, N. (2012). Substance-abusing mothers in residential treatment with their babies: Importance of pre- and postnatal maternal reflective functioning. *Infant Mental Health Journal, 33*(1), 70-81.

Pajulo, M., Savonlahti, E., Sourander, A., Piha, J., & Helenius, H. (2001). Prenatal maternal representations: Mothers at psychosocial risk. *Infant Mental Health Journal, 22*(5), 529-544.

Pajulo, M., Suchman, N., Kalland, M., Sinkkonen, J., Helenius, H., & Mayes, L. C. (2008). Role of maternal reflective ability for substance abusing mothers. *Journal of Prenatal & Perinatal Psychology & Health, 23*(1), 13-31.

Perry, N., Newman, L. K., Hunter, M., & Dunlop, A. (2013). Improving antenatal risk assessment in women exposed to high risks. *Clinical Child Psychology and Psychiatry, 20*(1), 84-105.

Poznansky, O. (2010). *Stability and change in maternal reflective functioning in early childhood*. Unpublished doctoral dissertation .New York, NY: The City University of New York.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879-891. doi: 10.3758/BRM.40.3.879

Prelow, H. M., Weaver, S. R., Bowman, M. A., & Swenson, R. R. (2010). Predictors of parenting among economically disadvantaged Latina mothers: Mediating and moderating factors. *Journal of Community Psychology, 38*(7), 858-873.

Rosenblum, K. L., McDonough, S. C., Sameroff, A. J., & Muzik, M. (2008). Reflection in thought and action: Maternal parenting reflectivity predicts mind-minded comments and interactive behavior. *Infant Mental Health Journal, 29*(4), 362-376. doi: 10.1002/imhj.20184

Rutherford, H. J. V., Booth, C. R., Luyten, P., Bridgett, D. J., & Mayes, L. C. (2015). Investigating the association between parental reflective functioning and distress tolerance in motherhood. *Infant Behavior and Development, 40*(0), 54-63. doi: 10.1016/j.infbeh.2015.04.005

Rutherford, H. J. V., Goldberg, B., Luyten, P., Bridgett, D. J., & Mayes, L. C. (2013). Parental reflective functioning is associated with tolerance of infant distress but not general distress: Evidence for a specific relationship using a simulated baby paradigm. *Infant Behavior and Development, 36*(4), 635-641. doi: 10.1016/j.infbeh.2013.06.008

Sadler, L. S., Slade, A., Close, N., Webb, D. L., Simpson, T., Fennie, K., & Mayes, L. C. (2013). Minding the Baby: Enhancing reflectiveness to improve early health and relationship outcomes in an interdisciplinary home-visiting program. *Infant Mental Health Journal, 34*(5), 391-405. doi: 10.1002/imhj.21406

Sadler, L. S., Swartz, M. K., Ryan-Krause, P., Seitz, V., Meadows-Oliver, M., Grey, M., & Clemmens, D. A. (2007). Promising outcomes in teen mothers enrolled in a school-based parent support program and child care center. *Journal of School Health, 77*(3), 121-130. doi: 10.1111/j.17461561.2007.00181.x

Sameroff, A. J., Seifer, R., Barocas, R., Zax, M., & Greenspan, S. (1987). Intelligence quotient scores of 4-year-old children: Social-environmental risk factors. *Pediatrics, 79*(3), 343-350.

Schechter, D. S., Coots, T., Zeanah, C. H., Davies, M., Coates, S. W., Trabka, K. A., . . . Myers, M. M. (2005). Maternal mental representations of the child in an inner-city clinical sample: Violence-related posttraumatic stress and reflective functioning. *Attachment & Human Development, 7*(3), 313-331. doi: 10.1080/14616730500246011

Schechter, D. S., Myers, M. M., Brunelli, S. A., Coates, S. W., Zeanah, J. C. H., Davies, M., . . . Liebowitz, M. R. (2006). Traumatized mothers can change their minds about their toddlers: Understanding how a novel use of videofeedback supports positive change of maternal attributions. *Infant Mental Health Journal, 27*(5), 429-447. doi: 10.1002/imhj.20101

Seng, A., & Prinz, R. (2008). Parents who abuse: What are they thinking? *Clinical Child & Family Psychology Review, 11*(4), 163-175. doi: 10.1007/s10567-008-0035-y

Shai, D., & Belsky, J. (2011). When words just won't do: Introducing parental embodied, mentalizing. *Child Development Perspectives, 5*(3), 173-180.

Sharp, C., & Fonagy, P. (2008). The parent's capacity to treat the child as a psychological agent: Constructs, measures and implications for developmental psychopathology. *Social Development, 17*(3), 737-754. doi: 10.1111/j.1467-9507.2007.00457.x

Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment & Human Development, 7*(3), 269-281. doi: 10.1080/14616730500245906

Slade, A. (2007). *The pregnancy interview - revised*. Unpublished Manuscript. New York: The City College of New York.

Slade, A., Grienenberger, J., Bernbach, E., Levy, D., & Locker, A. (2005). Maternal reflective functioning, attachment, and the transmission gap: A preliminary study. *Attachment & Human Development, 7*(3), 283-298. doi: 10.1080/14616730500245880

Slade, A., & Patterson, M. (2005). *Addendum to reflective functioning scoring manual for use with the pregnancy interview*. Unpublished Manuscript. New York: The City College of New York.

Slade, A., Patterson, M., & Miller, M. R. (2007). *Addendum to reflective functioning scoring manual*

for use with the pregnancy interview, version 2.0. Unpublished Manuscript. New York: The City College of New York.

Slade, A., Sadler, L. S., & Mayes, L. C. (2005). Minding the Baby: Enhancing parental reflective functioning in a nursing/mental health home visiting program. In L. J. Berlin, Y. Ziv, L. Amaya-Jackson, & M. T. Greenberg (Eds.), *Enhancing early attachments: Theory, research, intervention, and policy* (pp. 152–177). New York: Guilford Press.

Smaling, H. J. A., Huijbregts, S. C. J., Suurland, J., Van der Heijden, K. B., Van Goozen, S. H. M., & Swaab, H. (2015). Prenatal reflective functioning in primiparous women with a high-risk profile. *Infant Mental Health Journal, 36*(3), 251-261. doi: 10.1002/imhj.21506

Smaling, H. J. A., & Suurland, J. (2011). *Zwangerschapsinterview – herziene versie [Pregnancy Interview - Revised]*. Unpublished instrument. Leiden, the Netherlands: Faculty of Social and Behavioural Sciences, Leiden University.

Stacks, A. M., Muzik, M., Wong, K., Beeghly, M., Huth-Bocks, A., Irwin, J. L., & Rosenblum, K. L. (2014). Maternal reflective functioning among mothers with childhood maltreatment histories: Links to sensitive parenting and infant attachment security. *Attachment & Human Development, 16*(5), 515-533. doi: 10.1080/14616734.2014.935452

Suchman, N. E., DeCoste, C., Castiglioni, N., McMahon, T. J., Rounsaville, B., & Mayes, L. C. (2010). The Mothers and Toddlers Program, an attachment-based parenting intervention for substance using women: Post-treatment results from a randomized clinical pilot. *Attachment & Human Development, 12*(5), 483-504. doi: 10.1080/14616734.2010.501983

Suchman, N. E., DeCoste, C., Leigh, D., & Borelli, J. (2010). Reflective functioning in mothers with drug use disorders: Implications for dyadic interactions with infants and toddlers. *Attachment & Human Development, 12*(6), 567-585. doi: 10.1080/14616734.2010.501988

Toth, S. L., Rogosch, F. A., & Cicchetti, D. (2008). Attachment-theory informed intervention and reflective functioning in depressed mothers. In H. Steele & M. Steele (Eds.), *Clinical applications of the Adult Attachment Interview* (pp. 154-172). New York: Guilford.

Tronick, E., Als, H., Adamson, L., Wise, S., & Brazelton, T. B. (1978). The infant's response to entrapment between contradictory messages in face-to-face interaction. *Journal of the American Academy of Infant and Adolescent Psychiatry, 17*(1), 1-13.

Van Vliet, I. M., Leroy, H., & Van Megen, H. J. G. M. (2000). *MINI plus. International neuropsychological interview*. Nederlandse Versie 5.0. 0. [Dutch Version 5.0. 0.].

Walker, S. P., Wachs, T. D., Grantham-McGregor, S., Black, M. M., Nelson, C. A., Huffman, S. L., . . . Richter, L. (2011). Inequality in early childhood: Risk and protective factors for early child development. *The Lancet, 378*(9799), 1325-1338. doi: 10.1016/S0140-6736(11)60555-2

Wechsler, D. (2005). *WAIS-III NL. Wechsler Adult Intelligence Scale WAIS-III*. Dutch version. Manual (3rd ed.). Amsterdam: Harcourt Test Publishers.

World Health Organization. (2005). *Child abuse and neglect*. Retrieved November 21, 2013, from http://who.int/violence_injury_prevention/violence/neglect/en/print.html