

Early psychosocial risk factors and postnatal parental reflective functioning

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Abstract

Psychosocial factors have been found to relate to parental reflective functioning (PRF), a parent's ability to mentalize about themselves and their child. Relations between maternal psychosocial risk factors and PRF were investigated in a community sample. A sample of mothers ($n = 146$) was assessed for risk factors when infants were 6 months, infant temperament was assessed using an observational measure, and PRF was assessed with the Parent Development Interview-Revised (PDI). PRF was measured again with the Parental Reflective Functioning Questionnaire (PRFQ) when children were 4 years ($n = 105$) and 5 years ($n = 92$), with an additional sample of mothers ($n = 48$) tested at these two timepoints. Results showed that in infancy, total maternal psychosocial risk related to lower PDI-PRF; regression analyses highlighted low socioeconomic status, unplanned pregnancy, and low maternal anxiety as independent predictors of lower PDI-PRF. PDI-PRF scores at 6 months did not relate to PRFQ scores, but PRFQ subscales showed stability over time from age 4–5. Results are discussed with regard to the impact of maternal psychosocial risk and infant temperament on PRF and the stability and concordance of PRF measures.

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1 | INTRODUCTION

Parental reflective functioning (PRF) describes a parent's ability to mentalize about themselves, their child, and the parent–child relationship (Slade, 2005). A high capacity for PRF means parents recognize and appreciate that their child has their own subjective thoughts and feelings which directly influence their behavior. Furthermore, a highly reflective parent can appreciate the reciprocal relation between their own mental states and those of the child, acknowledging that mental states are complex, variable, and often ambiguous (Slade, 2005, 2008). High PRF is associated with more optimal parenting and a range of positive outcomes for children (see Camoirano, 2017, for a review), whereas low PRF is associated with lower levels of self-regulation in infants (Heron-Delaney et al., 2016) and more externalizing and internalizing behavior in childhood (Ensink et al., 2017). Low PRF is also associated with greater difficulties with parenting in a sensitive manner (Krink et al., 2018; Rostad & Whitaker, 2016).

PRF is commonly assessed via semi-structured interview measures: the Parent Development Interview (PDI; Aber et al., 1985), and for prenatal PRF specifically, the Pregnancy Interview (Slade et al., 1987). Interviews provide a global measure of PRF as transcripts are scored using continuous scales from -1 to 9 (Fonagy et al., 1998; Slade, Patterson, & Miller, 2005). Lower scores represent a lack of PRF or an anti-reflective stance; for example, parents may produce hostile attributions or dismiss invitations to reflect. Higher scores represent consistent and complex PRF, as indicated by the caregiver frequently commenting in depth on their child's mental state, recognizing that they may not always fully understand their child's internal experiences, and reflecting on their own internal processes around parenting (e.g., holding conflicting perspectives, understanding mental states underlying their own and others' behavior and interactions).

As an alternative to the interview measures, the Parental Reflective Functioning Questionnaire (PRFQ; Luyten Mayes et al., 2017) was developed to assess PRF via self-report. The PRFQ is an 18-item measure which explores three dimensions of PRF: 'pre-mentalizing modes', 'certainty about mental states', and 'interest and curiosity in mental states'. The pre-mentalizing modes dimension refers to a caregiver's tendency to make distorted or malevolent interpretations of their child's behavior. The certainty about mental states dimension refers to a parent's tendency to be either over- or under-confident in interpreting their child's mental states. Finally, the interest and curiosity in mental states dimension refers to a parent's tendency to show genuine interest in their child's mental states. The authors of the PRFQ propose that lower pre-mentalizing modes scores, higher interest and curiosity in mental states scores, and mid-range certainty about mental states scores generally indicate optimal PRF (Luyten, Mayes et al., 2017).

Multiple maternal psychosocial factors have been found to relate to PRF. Perry et al. (2015) reported that prenatal PRF, as measured by the Pregnancy Interview, was negatively correlated with depression and impulsivity for women with borderline personality disorder. PRF assessed using the PDI was found to be lower in those with Axis II disorders compared to those without (Bly et al., 2012), and in women with substance abuse disorder (Handeland et al., 2019). Furthermore, PRFQ scores on the pre-mentalizing modes subscale have been found to be positively associated with mothers' post-partum depression symptoms (Krink et al., 2018; Wendelboe et al., 2021), psychological distress levels (including anxiety and depression symptoms) (Khoshroo & Seyed Mousavi, 2021; Luyten et al., 2017), and disordered personality traits (Wendelboe et al., 2021), as well as difficulties with emotion regulation (Schultheis et al., 2019). Certainty about mental states has also been found to be lower in mothers who were experiencing complex mental health difficulties (i.e., postpartum depression with elevated personality disorder symptoms and high psychological distress) (Wendelboe et al., 2021). Mental ill health in mothers therefore appears to be associated with greater difficulty in engaging in PRF.

Low self-esteem may also relate to lower levels of PRF. Caregivers who have problems recognizing their self-worth may be more critical of themselves in the caregiving role and less willing or able to interpret their children's internal states and reflect on the parent–child relationship. While no previous studies have examined this link in relation to PRF, self-esteem has been found to be reduced in those with ‘low’ as opposed to ‘medium’ reflective functioning in relation to their attachment figures, suggesting that higher RF may relate to better functioning with regard to self and other (Antonsen et al., 2016). Parental mentalization also appears to be inhibited or impaired by trauma, such as maternal history of childhood maltreatment (Håkansson et al., 2018; Luyten, Mayes et al., 2017), with adverse experiences in early childhood relating to lower PRF (Håkansson et al., 2018). Importantly, PRF has been found to moderate the relation between mothers' adverse childhood experiences and negative parenting behavior, showing the potential protective effect of high PRF (Kolomeyer et al., 2016).

Demographic risk factors have also been associated with lower PRF. These include single parenthood (Wong, 2016), younger maternal age (Crugnola et al., 2018), lower maternal educational attainment (Sleed et al., 2020; Smaling et al., 2015), unemployment (Cordes et al., 2017; Sleed et al., 2020), and low social support (Smaling et al., 2015). Low socioeconomic status (SES) has been found to relate to psychological distress in adults (Fryers et al., 2003), which inhibits PRF (Sharp & Fonagy, 2008). It is likely that these demographic factors relate to PRF as both cognitive capacities and educational/occupational environments support the advancement of mentalization and the ability to express associated thoughts (Cordes et al., 2017; Crugnola et al., 2018; Sleed et al., 2020). Furthermore, it is possible that mothers who have better support systems have more opportunity to engage in reflective thinking, since social support buffers against emotional stressors and promotes mental well-being (Cordes et al., 2017; Smaling et al., 2015).

Thus, the capacity for, and practice of, PRF is related to psychosocial and demographic risk factors affecting mothers. Of note, most research into the role of demographic or psychosocial risk factors in relation to PRF has focused on single factors in isolation. However, Smaling et al. (2015) conducted the first study to examine multiple risk factors concurrently in a sample of 162 primiparous women, 83 of whom were deemed “high-risk” (defined by positive screening for a psychiatric disorder or substance abuse during pregnancy). Cumulative risk scores ranging from 1 to 7 were also calculated for high-risk participants, based on demographic and maternal psychosocial factors (e.g., unplanned pregnancy, unemployment, single parenthood). The results showed that prenatal PRF, as measured by the Pregnancy Interview, was significantly lower in the high-risk group. The cumulative risk score accounted for 12% of the variance in PRF in this group. Subsequent regression analyses showed that maternal education, size of social support network, and substance use during pregnancy were all unique predictors of prenatal PRF. The primary aim of the present study was to investigate how maternal cumulative risk and individual risk factors during the early postnatal period (cf. the antenatal period) relate to PRF when infants are 6 months of age. It may be that, once the infant is born, different risk factors will be associated with lower PRF.

As well as factors relating to mothers, individual differences in infants may be associated with PRF. From a theoretical perspective, it makes sense that child temperament may relate to PRF; for example, an irritable temperament in infants can provoke higher stress responses in parents (Pratt et al., 2015), which could inhibit mentalizing (Sharp & Fonagy, 2008). One study to investigate this found that parental report of negative affect in 7-month-olds was not associated with PRF as measured by the PDI 9 months later (Wong et al., 2017). Similarly, Smaling et al. (2016) did not find significant associations between interview-based PRF and parent-reported infant temperament at 20 months. By contrast, in a large infant and toddler sample, Álvarez et al. (2021) found significant associations between all subscales of the PRFQ and child emotion regulation measured by parent report

on the Ages and Stages Questionnaire. Better reported emotion regulation was negatively related to pre-mentalizing modes scores and positively related to scores on the interest and curiosity in mental states and certainty about mental states subscales. It is interesting that studies in this area typically utilize parental report of infant temperament (e.g., Álvarez et al., 2021; Smaling et al., 2016), despite the fact that parent report is likely to be influenced by PRF, given that it measures parents' capacity to notice and understand the mental states underlying child behavior. The present study thus investigated whether an observational measure of infant temperament related to mothers' concurrent PRF.

We also investigated two further issues: (a) how stable is PRF over time? and (b) are interview and questionnaire measures of PRF associated with each other? Research has not yet addressed the first question directly, but data from control groups in intervention studies speak to this issue. Perry et al. (2015) assessed interview-based PRF in control ($n = 13$) and high-risk ($n = 5$) groups in the third trimester of pregnancy and up to 8 months postpartum. Results revealed a non-significant correlation ($r = 0.33$) between prenatal and postnatal PRF scores across both groups, and a linear regression indicated prenatal PRF did not significantly predict postnatal PRF; seven of the control mothers did not change PRF score over time, while one increased, and five decreased. However, this study was underpowered to detect the medium-sized effect for the correlation between prenatal and postpartum PRF, making its results somewhat difficult to interpret. Sadler et al. (2013) found significant increases in interview-based PRF from the third trimester of pregnancy to 24 months postpartum in both control and intervention groups (correlations between the two time points were not reported). In studies with much smaller time intervals, Suchman et al. (2011) found that a control group of mothers of children aged 0–36 months showed no change in PRF as assessed using the PDI over the course of 12 weeks, a finding that was replicated in a subsequent study (Suchman et al., 2017). In a study with parents of autistic children (aged 3–18 years), Enav et al. (2019) reported no change in interview-based PRF over a 4-week period in their control group. Similarly, Adkins et al. (2018) reported no change in PRF as assessed from a five-minute speech sample over a period of 4–6 weeks in a control group of foster carers, whose children were aged between 2 months and 18 years. The latter is the only study to have investigated longitudinal relations in PRF as assessed by the PRFQ. In the control group of foster carers, scores on the pre-mentalizing modes and certainty about mental states subscales did not change over time, but there was a significant decrease in scores for curiosity and interest in mental states (Adkins et al., 2018). Taken together, these studies do not provide a consistent picture of how PRF at one time point relates to future PRF. By measuring PRF at three time points (6 months, age 4, and age 5), the present study enables investigation of longitudinal stability in PRF and is the first to explore longitudinal stability in PRFQ scores in a sample of parents and their biological children.

The second question relates to how interview measures of PRF relate to the PRFQ. Pajulo et al. (2015) examined associations between a prenatal version of the PRFQ (P-PRFQ) and PRF in the Pregnancy Interview in 29 women, finding strong correlations between PRF on the interview and all three P-PRFQ subscales (r s between 0.53 and 0.78; note that the three subscales of the P-PRFQ are different to the PRFQ subscales). Anis et al. (2020) assessed PRF concurrently using the PDI and PRFQ in a sample of mothers and fathers. They reported that PDI-based PRF did not correlate significantly with the pre-mentalizing modes subscale ($r = -0.15$), but it did correlate significantly with the PRFQ interest and curiosity subscale ($r = 0.27$), and with the certainty about mental states subscale ($r = 0.24$, when scores were transformed so that high certainty scores were optimal). The present study was the first to investigate longitudinal relations between PRF as assessed using both interview (PDI) and questionnaire (PRFQ) measures.

In summary, the present study investigated how a range of maternal psychosocial risk factors, at both an individual level and in combination, related to concurrent PRF. We hypothesized that an accumulation of risk factors would be associated with lower levels of PRF. Difficult infant temperament

was also hypothesized to relate to lower PRF. Finally, the study explored longitudinal stability in PRF and continuity in PRF when assessed using interview and questionnaire measures. We expected positive associations over time and between interview- and questionnaire-based PRF.

2 | METHOD

2.1 | Participants

Participants were 146 mother–child dyads (68 girls) who were initially assessed when the children were approximately 6 months old. They were recruited via local maternity services, parent–baby groups, community centers and events, social media, and word of mouth. The average age of mothers at recruitment was 29.5 years ($SD = 6.69$, range 16–47 years), infant age was 6.1 months on average ($SD = 1.0$, range = 4–10 months), and the majority of infants were White (96%), reflecting the racial profile of the area from which the sample was drawn. SES as assessed with Hollingshead scale scores (Hollingshead, 1975) ranged from 11 to 66, with 12% of families classed as low SES (no post-16 education and unemployed or in menial or manual employment). Families ($n = 105$) were followed up when their children (54 girls) were approximately 4 years old ($M = 48.3$ months, $SD = 1.14$, range = 46–55 months; 97% White, 6% low SES), and 5 years old ($n = 92$, 44 girls, $M = 60.46$ months, $SD = 1.16$, range = 59–66; 96% White, 5% low SES). At follow-up, data were included for an additional sample of 48 participants who completed the assessments at ages 4 ($n = 47$, 25 girls, $M = 48.17$ months, $SD = 0.52$, range = 47–50 months) and 5 ($n = 42$, 22 girls, $M = 60.19$ months, $SD = 0.59$, range = 60–63 months), but did not participate in the PDI assessment session at age 6 months (See Figure 1). Their data were included in analyses with the PRFQ at ages 4 and 5 only. The study was conducted according to guidelines laid down in the Declaration of Helsinki, and all mothers provided written informed consent for themselves and their infants to participate prior to any assessment or data collection. All procedures were approved by the by the National Health Service Health Research Authority Research Ethics Committee (REC reference: 14/NE/0114, IRAS project ID: 126036) and the Research Ethics Committee of the Department of Psychology, University of York. Mothers received a payment of £20 for participating at each testing phase.

2.2 | Measures

2.2.1 | Assessment at 6 months

All mothers completed a range of questionnaires assessing their demographics and psychosocial health in the order described below. Afterward, they participated in the Parent Development

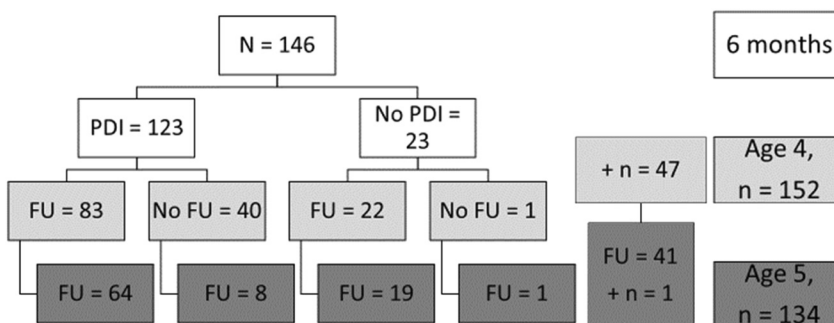


FIGURE 1 Participant Flow through Phases of the Study. FU = Follow up.

Interview-Revised Short Form (PDI-R2-S; Slade, 2003) to assess their PRF. The majority of testing was undertaken at the University developmental laboratory (88%), with some assessments in community centers (11%), and one at home (1%).

Family SES. Participants' SES was measured using the Hollingshead scale (Hollingshead, 1975), which is widely recognized for its validity and reliability (Cirino et al., 2002; Edwards-Hewitt & Gray, 1995). Mothers were asked to identify their highest level of completed education and their own and their partner's/parents' employment status. If mothers identified that they were living with either a partner or their parents, their employment score was calculated as an average of all members of their household (See Supporting Information S1). Participants were divided into high and low family SES groups in order to dichotomize the variable for calculating total risk scores. The criteria for low family SES were no post-16 education and unemployed or in menial or manual employment.

Other Demographic Risk Factors. Within the demographic questionnaire, mothers were asked to identify their age in years, if they were a single parent (i.e., not living with a partner), whether they were currently or ever had been looked after under the care system, and whether their current pregnancy was planned. Participants were asked to rate their general health from 0 (poor) to 3 (excellent); this single-item measure is well-validated and used extensively in health research (Cullati et al., 2020). Poor physical health in parents is associated with difficulties in parenting and the parent-child relationship (Popper-Cordts et al., 2020). For the calculation of risk scores, an 'at risk' point was allocated for each of the following: younger than 23 years, single parent, history of being in care, current pregnancy was unplanned, scores of 'poor' and 'fair' on physical health.

Maternal Mental Health. The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is a 14-item self-report questionnaire used to measure symptoms of anxiety and depression. Half of the items assess anxiety (e.g., "I get sudden feelings of panic") and the other half assess depression (e.g., "I have lost interest in my appearance"). Each item is rated on a 4-point Likert scale from 0 to 3. Therefore, the range for each subscale is 0–21 and the total score range is 0–42. In the respective subscales, scores of 0–7 are considered "normal", 8–10 are considered "borderline", and scores of 11 or more are considered "clinical". The HADS is widely recognized as a highly reliable and valid measure of mental health (Bjelland et al., 2002). Internal reliability overall was $\alpha = 0.79$. Participants received an 'at risk' point for a score ≥ 8 on the anxiety and depression subscales. Previous research has suggested this cut off score is optimal for both sensitivity and specificity (Hansson et al., 2009).

Maternal Self-esteem. The Rosenberg Self-Esteem Scale (Rosenberg, 1965) is a 10-item self-report questionnaire used to generate a global measure of self-esteem. Each item (e.g., "At times I think I am no good at all") is rated on a 4-point Likert scale ranging from 0 ("Strongly Disagree") to 3 ("Strongly Agree"). Scores are summed for all 10 items, providing a total score between 0 and 30. Higher scores indicate higher levels of self-esteem. The scale had excellent internal reliability, $\alpha = 0.89$. In order to dichotomize this variable for the calculation of total risk scores, a median split (Median = 21.00) was utilized, with an 'at risk' point allocated for low self-esteem.

Perceived Social Support. The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) is a 12-item self-report questionnaire used to measure perceived social support related to three sources: family, friends, and a significant other. Each item (e.g., "My family really tries to help me") is rated on a 7-point Likert scale ranging from 1 ("Very Strongly Disagree") to 7 ("Very Strongly Agree"). Scores are summed for all 12 items, providing a total score range between 12 and 84. Higher scores indicate higher levels of perceived social support. The scale had excellent internal reliability, $\alpha = 0.95$. For the calculation of risk, a median split was performed (Median = 75) and an 'at risk' point for low social support was allocated for scores below this.

Recent Life Events. The Recent Life Events Questionnaire (RLEQ; Brugha et al., 1985) asks respondents to select, from a list of 21 stressful life events (e.g., moving home, separation, bereavement),

which ones they have undergone in the previous 12 months. A score of 1 is allocated for each event which has occurred, allowing for scores from 0 to 21. The sum of events which had occurred was used as a count of recent stresses in the present study. A median split of 3 was used to indicate those with high life stresses to include as a risk factor.

Total Risk. The total risk score based on maternal psychosocial and demographic factors was calculated based on the presence of the following 11 factors: younger than 23 years, low SES, high depression, high anxiety, low self-esteem, low social support, high number of life events, single parent, current pregnancy unplanned, scores of 'poor' and 'fair' on physical health, history of being in care.

Infant Temperament. The restraint in car seat episode from the Laboratory Temperament Assessment Battery (LabTAB: Goldsmith & Rothbart, 1996) was used to assess infant temperament. Mothers strapped their infants into a car seat and stood to the side; the infant was video recorded for 30 s. Recordings were divided into six 5-s epochs and coded for visible signs of frustration and sadness, including facial anger, facial sadness, distress vocalisations, and physical struggle; the 6 scores were averaged to give a composite measure of temperament. All observations were coded by a trained researcher, blind to all other data. A second trained, blind researcher coded 25% of the videos, and inter-rater reliabilities were: Intensity of Struggle, ICC = 0.81; Distress Vocalization, ICC = 0.85; Facial Anger, ICC = 0.74; Facial Sadness, ICC = 0.77. A composite measure of the four scores had good internal reliability, $\alpha = 0.71$. Higher scores indicate more difficult temperament.

Interview-Based Reflective Functioning. The PDI-R2-S (Slade, 2003) is a semi-structured interview that explores an individual's ability to reflect on representations of themselves as a parent, of their child, and of the parent-child relationship (e.g., "Describe a time in the last week when you and [child's name] really 'clicked'"). For the present study, permission to reduce the interview to 20 items by leaving out sections D (Parent's Family History) and E (Separation and Loss) was obtained from the author of the measure (Slade, pers comm). The interviews were conducted by the second author; they were audio recorded and transcribed verbatim. The second author, who had trained in the coding system, read the transcripts and assigned each an overall score for PRF using the Reflective Functioning Manual (Fonagy et al., 1998) and the Addendum to Reflective Functioning Scoring Manual (Slade, Bernbach, et al., 2005). PRF is rated on an 11-point continuous scale from -1 ("Negative or Bizarre PRF") to 9 ("Marked PRF"). A randomly selected subset of the transcripts ($N = 21$) was double-coded by the sixth author, who was also trained in the PRF coding system, in order to measure inter-rater reliability; ICC = 0.76. Both coders were blind to all other measures. The PDI is recognized as the gold-standard for assessing parental PRF (Anis et al., 2020) and has high levels of validity and reliability (Sleed et al., 2020).

2.2.2 | Assessment at 4 and 5 years

The majority of age-4 testing was carried out at the University ($n = 118$, 77%), with 20 (13.1%) at home, and 15 (9.8%) online due to COVID-19 restrictions. At age 5, the majority were online ($n = 111$, 81.6%) due to the pandemic, with 10 taking place at the university (7.4%), and 15 at home (11%).

Self-Reported Reflective Functioning. The PRFQ (Luyten, Mayes et al., 2017) is an 18-item self-report questionnaire used to measure three areas of parents' PRF. The three subscales are pre-mentalizing modes, certainty about mental states, and interest and curiosity in mental states, and each have six corresponding items. The pre-mentalizing modes subscale explores a parent's tendency to make negative attributions about their child's behavior (e.g., "My child cries around strangers to embarrass me"). The certainty about mental states subscale explores a parent's ability to

recognize the opacity of their child's mental states (e.g., "I can completely read my child's mind"). The interest and curiosity in mental states subscale explores a parent's level of genuine interest in their child's mental states (e.g., "I like to think about the reasons behind the way my child behaves and feels").

Each item is rated on a 7-point Likert scale, and scores are summed for each subscale separately (range 6–42). There are no well-established cut-offs for the subscales (Anis et al., 2020), but generally lower pre-mentalizing modes scores, higher interest and curiosity in mental states scores, and mid-range certainty about mental states scores indicate higher parental PRF (Luyten, Mayes et al., 2017). While the PRFQ is a relatively new measure, preliminary findings suggest it is valid and reliable for use with parents with children aged 5 years and younger (De Roo et al., 2019; Luyten, Mayes et al., 2017). Reliability analyses at age four indicated that the certainty about mental states, $\alpha = 0.76$, and interest and curiosity in mental states, $\alpha = 0.65$, subscales reached acceptable levels of reliability. However, the pre-mentalizing modes subscale did not, $\alpha = 0.39$. Similarly, at age 5, internal reliabilities were acceptable for the certainty about mental states, $\alpha = 0.78$, and interest and curiosity in mental states, $\alpha = 0.66$, subscales, but not the pre-mentalizing modes subscale, $\alpha = 0.21$. The pre-mentalizing modes subscale was therefore not used in the analyses.

Because medium scores on the certainty about mental states subscale are thought to represent better PRF (i.e., very low certainty and very high certainty are both problematic), we transformed this variable following the method of Anis et al. (2020): $\text{score} = (y - \text{mean})^2$, but without reverse coding. This meant that scores closer to the mean were now lower on the linear scale. Both the transformed and untransformed scores are included for comparison.

3 | RESULTS

3.1 | Descriptive statistics and preliminary analyses

Descriptive statistics are presented in Tables 1 and 2. Total risk scores were calculated for each participant based on the 11 identified risk factors (low SES; younger than 23 years, single parent, history of being in care, current pregnancy unplanned, scores of 'poor' and 'fair' on physical health, high depression, high anxiety, low self-esteem, low social support, high number of life events). For each risk factor, a score of 1 was given if risk was present or a score of 0 if risk was absent. Therefore, the possible range for total risk scores was 0–11.

PDI data were available for 123 mothers at age 6 months; instructions for administering the PDI state that the infant should not be present during the interview and the $n = 23$ cases with missing PDI data were due to interviews being terminated because of the infants' needs. These data were judged to be missing at random. Participant flow through the study phases can be seen in Figure 1. Rosenberg self-esteem scores were missing for two participants, Hospital Anxiety and Depression Scale scores for $n = 7$, Recent Life Events for $n = 5$. Where a score was missing, the total risk score was still calculated based on the variables which were present, as the amount of missing data was very low.

PDI-RF scores revealed 35 (28.5%) mothers had low PRF (scores of –1 to 3), 81 (65.9%) had moderate PRF (scores of 4–6), and only 7 (5.7%) had high PRF (scores of 7–9). This is comparable to a large study of the PDI, which showed a predominance of moderate to low scores, and a mean of 4.6 for a normative, community sample of mothers (Sleed et al., 2020). Note that the PDI-PRF –1 to 9 scores were used in the analyses reported below.

Shapiro-Wilk tests indicated non-normal distributions for all age 6 months variables and the PRFQ subscales at ages 4 and 5, therefore non-parametric statistics are reported where necessary.

TABLE 1 Descriptive statistics for risk factor variable.

	<i>n</i>	M (SD) Range	Risk Present, <i>n</i> (%)
Maternal age	146	29.45 (6.69) 16–47	30 (20.5%)
SES	146	44.74 (17.24) 11–66	17 (11.6%)
Anxiety	139	5.92 (3.23) 0–17	40 (27.4%)
Depression	139	3.21 (2.23) 0–10	7 (4.8%)
Self esteem	144	21.65 (4.61) 9–30	73 (50%)
Social support	146	71.63 (13.71) 12–84	74 (50.7%)
Life events	141	3.23 (2.28) 0–13	90 (61.6%)
Planning of pregnancy	146		41 (28.1%)
Relationship status	146		14 (9.6%)
Physical health	146		3 (2.1%)
Care history	146		1 (0.7%)
Total risk score	146	2.67 (1.62) 0–8	

TABLE 2 Descriptive statistics for parental reflective functioning and child variables.

	<i>n</i>	M (SD) Range
Age 6 Months		
Infant temperament	127	2.91 (2.26) 0–9.17
PDI-PRF score	123	4.33 (1.35) 0–7
Age 4		
Certainty about mental states (transformed)	151	1.15 (1.51) 0–10.43
Certainty about mental states	151	4.23 (1.08) 1–6.50
Interest and curiosity in mental states	151	6.14 (0.61) 4.33–7
Age 5		
Certainty about mental states (transformed)	134	1.08 (1.42) 0–7.78
Certainty about mental states	134	4.29 (1.04) 1.5–6.67
Interest and curiosity in mental states	134	6.10 (0.70) 3.67–7.00

Abbreviation: PDI-PRF, Parent Development Interview Parental Reflective Functioning.

3.2 | Do maternal psychosocial risk factors relate concurrently to PRF?

PDI-RF score was positively correlated with total risk score, $\rho(121) = -0.38$, $p < 0.001$, representing a medium effect size. Therefore, the presence of greater risk at age 6 months was associated concurrently with lower PRF on the PDI.

Very few participants scored in the at-risk group for two of the individual risk factors (see Table 1), and these variables (physical health, care history) were therefore not included in the following analyses. Zero-order correlation analyses were performed between the nine remaining risk factors, and between the risk factors and concurrent PDI-PRF (see Table 3). As shown in Table 3, PRF was positively correlated with maternal age, SES, and social support, and negatively correlated with unplanned pregnancy and being single.

3.3 | Does infant temperament relate concurrently to PRF?

Infant temperament at age 6 months was positively correlated with concurrent PRF scores on the PDI, $\rho(127) = 0.21, p = 0.031$, with more difficult temperament associated with higher PRF.

3.4 | Predictors of PDI-PRF at age 6 months

In order to establish independent predictors of PDI-PRF at 6 months, a linear regression was conducted with the nine maternal risk factors and infant temperament as independent variables (see Table 4). Tests for multicollinearity were within acceptable limits: correlations were less than 0.7, VIF statistics were all under 2.5, and the Durbin-Watson statistic was 1.6. As shown in Table 4, the model was significant and explained 39% of the variance in PRF score. Three variables predicted independent variance in PRF: higher SES predicted higher PRF, unplanned pregnancy predicted lower PRF, and, somewhat counterintuitively, higher maternal anxiety predicted higher PRF.

3.5 | Do PDI scores at age 6 months relate to PRFQ scores in the preschool years?

Spearman's correlations were conducted between PRF based on the PDI at age 6 months and the *Certainty about mental states* and *Interest and curiosity in mental states* subscales of the PRFQ at ages 4 and 5. Contrary to hypotheses, there were no associations between PRF at 6 months and later PRF as assessed by the PRFQ (see Table 5). However, scores on the respective subscales of the PRFQ correlated significantly at ages 4 and 5, with medium to large effect sizes for these relations, indicating longitudinal stability in the two individual subscales (see Table 5). The two subscales correlated weakly with each other at age 4, but not at age 5. Note that these associations held for the transformed and non-transformed scores for the *Certainty about mental states* subscale. There was also a positive association between the *Certainty about mental states* subscale at age 4 and the *Interest and curiosity in mental states* subscale at age 5, but this held only for the transformed *Certainty about mental states* scores.

4 | DISCUSSION

This study investigated how PRF in the first year of life related to maternal psychosocial risk and PRF in later childhood. In addition, the stability of PRF as assessed by the PRFQ was examined. Robust associations were found between maternal psychosocial risk and PRF as assessed by the PDI at age 6 months. Total risk scores were negatively correlated with PDI-PRF, with a medium to large effect for this association. These findings replicate those of Smaling et al. (2015), who reported that an accumulation of risk factors in a high-risk sample of mothers during pregnancy predicted lower PRF scores as assessed using the Pregnancy Interview. Our analyses explained greater variance in PRF (39%) than Smaling et al.'s study (12%), potentially showing the importance of the risk factors investigated, or the greater impact of these factors in the postnatal period as opposed to the antenatal period. Adjusting to caring for a new baby in the face of adverse circumstances may make it particularly challenging for PRF to develop.

Our results also showed that particular risk factors were associated with PDI-PRF: lower SES, unplanned pregnancy, and lower maternal anxiety predicted lower PDI-PRF. The associations with

TABLE 3 Spearman's zero-order correlations between psychosocial risk factors and PRF at age 6 months.

	1	2	3	4	5	6	7	8	9	10
1. Maternal age										
2. SES	0.65***									
3. Anxiety	0.04	-0.07								
4. Depression	-0.04	-0.11	0.37***							
5. Self-esteem	0.02	0.00	-0.37***	-0.26**						
6. Social support	0.21**	0.24**	-0.19*	-0.32**	0.26**					
7. Life events ^a	0.19*	0.22**	-0.16	-0.24**	0.12	0.06				
8. Unplanned pregnancy ^a	-0.49***	-0.48***	0.02	0.12	-0.08	-0.23**	-0.20*			
9. Single ^a	-0.39***	-0.41***	0.20*	0.15	-0.10	-0.27**	-0.13	0.42***		
10. Infant temperament	0.13	0.14	-0.003	-0.08	0.04	0.16	-0.02	0.22*	-0.14	
11. PDI-PRF	0.49***	0.56***	0.16	0.01	-0.07	0.18*	0.12	-0.46**	-0.25**	0.21*

^apoint biserial correlation.

Abbreviation: PDI-PRF, Parent Development Interview Parental Reflective Functioning.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE 4 Summary of regression analysis for predictors of PDI-PRF at age 6 months.

	PDI-PRF			
	b	SE	β	p
Maternal age	0.03	0.03	0.14	0.201
SES	0.03	0.01	0.33	0.005
Anxiety	0.11	0.04	0.25	0.013
Depression	-0.09	0.06	-0.15	0.133
Self-esteem	-0.02	0.03	-0.07	0.413
Social support	-0.001	0.01	-0.01	0.938
Life events	0.03	0.06	0.04	0.644
Unplanned pregnancy	-0.66	0.33	-0.20	0.049
Single status	-0.28	0.58	-0.05	0.636
Infant temperament	0.01	0.05	0.01	0.921

$F(10, 101) = 5.78, p < 0.001, R^2 = 0.39$

Note: Values in bold are statistically significant.

Abbreviation: PDI-PRF, Parent Development Interview Parental Reflective Functioning.

TABLE 5 Spearman's correlations between measures of PRF at ages 6 months, 4 years, and 5 years.

	1	2	3	4	5	6
1. 6-Month PDI-RF score						
2. Age 4 certainty about mental states	-0.01					
3. Age 4 certainty about mental states (transformed)	0.05	0.03				
4. Age 4 interest and curiosity in mental states	0.10	0.19*	0.20*			
5. Age 5 certainty about mental states	0.06	0.66***	-0.02	0.08		
6. Age 5 certainty about mental states (transformed)	-0.05	-0.02	0.37***	0.20*	-0.01	
7. Age 5 interest and curiosity in mental states	0.14	-0.03	0.21*	0.61***	-0.001	-0.04

* $p < 0.05$, *** $p < 0.001$.

Abbreviations: PDI, Parent Development Interview; PRF, Parental Reflective Functioning.

low SES and unplanned pregnancy suggest that living in socially and economically disadvantaged conditions and adjusting to an unexpected life change may require such high mental resources that mothers are less able to devote time and effort into mentalizing about themselves as a parent, their child, and the parent-child relationship. The finding that levels of maternal anxiety were positively associated with PDI-PRF scores is intriguing. The present study used a community sample, and while 27% obtained HADS Anxiety scores at or above the cut-off of 8, only 7 participants reported that they were seeing a mental health professional. A certain degree of maternal anxiety has been argued to be adaptive for parenting, ensuring that sufficient care is taken of the child (Matthey, 2016). As such, this association may suggest that PRF is higher where anxiety is heightened, but not pathological, whereas clinical levels of anxiety may inhibit PRF (Luyten et al., 2017). By contrast, in a similar community sample in which PRF was assessed at age 6 months using the PRFQ, Nobre-Trinidad et al. (2021) reported that higher anxiety scores on the HADS related to lower certainty about mental states and higher pre-mentalizing modes scores, with no association with interest and curiosity in mental states. Research on parental anxiety and PRF is lacking, as a recent systematic review highlighted (Risi

et al., 2021), and it is therefore difficult to draw strong conclusions on the relation between these factors without further investigation.

Turning to longitudinal relations in PRF, there were no associations between PDI-PRF scores at age 6 months and scores on the PRFQ subscales (*Certainty about mental states* and *Interest and curiosity in mental states*) at ages 4 and 5. In contrast, there was robust longitudinal stability in the scores for the individual PRFQ subscales at ages 4 and 5. One potential explanation for this is that the interview and questionnaire measures do not measure the same construct. In line with this proposal, Anis et al. (2020) reported weak correlations between the PDI and these subscales of the PRFQ when measured at the same timepoint in early childhood. Arguably, there are substantial differences between a parent's self-report about PRF using a brief questionnaire and the rich insights provided through the PRF coding scheme applied to the PDI, a difference that is acknowledged by the developers of the PRFQ (Luyten et al., 2017). Stuhmann et al. (2022) suggested that the PDI has a relational focus on more dynamic aspects of the parent-child relationship, whereas the PRFQ captures generic key features of the parental mentalizing process. The findings of the study reported here provide further caution against conflating research findings from the two PRF measures.

An alternative explanation for the lack of concordance between the PDI-PRF and the PRFQ in the present study is that PRF may mature over the early years of a child's life before becoming more stable. Previous research has found that PRF shifts significantly from the antenatal period to the post-natal period (Sadler et al., 2013), which is proposed to relate to the arrival of the infant, catalyzing a major shift in the parent's psychological orientation toward the child. In support of this explanation, the present study found stability in PRF between the ages of 4 and 5 for both of the PRFQ subscales. Álvarez et al. (2021) reported how scores for these subscales showed overall stability, but shifted in a non-linear manner across the first 2 years of life, with scores decreasing from highest to lowest in the following sequence: 0-8 months, 21-26 months, 15-20 months, and 9-14 months. Further studies to shed light on the evolution and stability of PRF across childhood are therefore required. A related construct, mind-mindedness, has been found to be stable from infancy to age 4 (Meins et al., 2003) and 5 (Fishburn et al., 2021); it would thus be interesting to compare how these distinct measures of parental mentalizing evolve. In these investigations, it is also important to examine how life events and shifts in family circumstance may exert an influence on parental mentalization throughout early childhood.

The study reported here also provides data relevant to the validity of the PRFQ. At both assessment phases, scores for the pre-mentalizing modes had poor internal reliability and were therefore not used in the analyses. In a study of Korean parents that attempted to validate a Korean translation of the PRFQ, Lee et al. (2021) found that items on the pre-mentalizing modes subscale did not load onto a single factor, and clustered into two additional subscales. Other studies have reported quite low internal reliability for the pre-mentalizing subscale (e.g., $\alpha = 0.60$ in Khoshroo & Seyed Mousavi, 2021). It is possible that, because many of the items on this subscale use negatively laden words (e.g., *child embarrassing*, *annoying*, or *confusing* the parent, *parent finding play hard*), it may elicit a social desirability bias which affects reporting on some of the items. However, a range of studies have found acceptable internal consistency for this subscale (e.g., Álvarez et al., 2021; Anis et al., 2020; Ghanbari et al., 2022), so there is no clear consensus regarding the reliability and validity of the prementalizing modes subscale.

We assessed mothers' *Certainty about mental states* in two ways, treating the scores as a linear scale and also transforming them so that mid-point rather than higher scores were deemed optimal. This transformation recognizes that both very high and very low levels of certainty about the infants' thoughts and feelings are not indicative of high PRF. In general, the findings using the transformed scores were similar to those using the non-transformed scores. At age 4, *Interest and curiosity in mental states* scores were positively correlated with both the transformed and non-transformed

Certainty about mental states scores, suggesting that mothers' self-reported tendency to engage with and reflect on their children's mental states is associated with both optimal and high certainty about the child's actual mental states. However, these associations were not replicated at age 5, and thus should be interpreted with caution. There was one longitudinal association between the different subscales: a positive association between the *Certainty about mental states* subscale at age 4 and the *Interest and curiosity in mental states* subscale at age 5, but this held only for the transformed *Certainty about mental states scores*. The fact that the concurrent associations between the different PRFQ subscales were not replicated at age 5, together with the largely null findings for inter-relations between the subscales, suggest that the two subscales are not robustly related. These findings therefore support construing self-reported PRF as a multidimensional construct, with separate subscales to assess distinct aspects of PRF.

To our knowledge, the present study is the first to investigate relations between PRF and infant temperament as assessed using an observational measure, thus avoiding shared method variance. More difficult infant temperament at age 6 months, was positively related to concurrent PDI-PRF. While this may at first appear counter-intuitive, as difficult temperament has been theorized to impede parents' ability to mentalize (e.g., Sharp & Fonagy, 2008), it has also been proposed that infants who show more negative affect prompt their parents to have to think about the reasons for their behavior. Indeed, it has been previously reported that, in the absence of additional parenting risk factors, negative emotionality in infants is associated with more sensitive responding by parents (Crockenberg & Leerkes, 2003). Temperament did not, however, predict independent variance in PDI-PRF in the regression analysis. The fact that more difficult temperament was associated with unplanned pregnancy—identified as an independent predictor of PDI-PRF—may explain the bivariate correlation. Further research using observational measures of temperament is warranted to explore how maternal psychosocial risk factors and infant temperament in concert relate to PRF.

The present study should be interpreted in light of certain limitations. The sample was limited in terms of racial and socioeconomic diversity, and our findings may thus not generalize to all populations. It would have been preferable to have measured maternal psychosocial risk and reflective functioning at additional timepoints (e.g., ages 2 and 3) to examine how the shifting profile of maternal risk factors relates to PRF over time. While our results showed no association between the interview and questionnaire measures of PRF, these measures were administered several years apart. Future research employing concurrent interview and questionnaire measure of PRF is needed to provide definitive data on the extent to which the different methods assess the same construct. Other potential correlates of PRF were not explored. Mothers with low nonverbal IQ have been found to have lower PRF than those with higher nonverbal IQ (Sleed et al., 2020); including a measure of IQ would have enabled us to explore how this factor relates to PRF in the context of varying maternal psychosocial risk. Including a measure of parental perception of infant temperament would also have been interesting, and would have helped to shed further light on the relation between infant temperament and PRF.

In summary, the present study provides evidence that a greater burden of maternal psychosocial risk factors in infancy is concurrently associated with lower PRF. We provide novel results on the longitudinal stability of PRFQ subscales scores over childhood, but our results suggest that interview and questionnaire measures may assess distinct aspects of PRF. The present study's findings are in line with construing self-reported PRF as a multidimensional construct, but raise questions over the validity and reliability of the *Prementalizing modes* subscale of the PRFQ.

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CONFLICT OF INTEREST STATEMENT

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REFERENCES

- Aber, J. L., Slade, A., Berger, B., Bresgi, I., & Kaplan, M. (1985). *The parent development interview*. The City University of New York. Unpublished protocol.
- Adkins, T., Luyten, P., & Fonagy, P. (2018). Development and preliminary evaluation of family minds: A mentalization-based psychoeducation program for foster parents. *Journal of Child and Family Studies*, 27(8), 2519–2532. <https://doi.org/10.1007/s10826-018-1080-x>
- Álvarez, N., Lázaro, M. H., Gordo, L., Elejalde, L. I., & Pampliega, A. M. (2021). Maternal mentalization and child emotion regulation: A comparison of different phases of early childhood. *Infant Behavior and Development*, 66, 101681. <https://doi.org/10.1016/j.infbeh.2021.101681>
- Anis, L., Perez, G., Benzies, K. M., Ewashen, C., Hart, M., & Letourneau, N. (2020). Convergent validity of three measures of reflective function: Parent development interview, parental reflective function questionnaire, and reflective function questionnaire. *Frontiers in Psychology*, 11, 3385. <https://doi.org/10.3389/fpsyg.2020.574719>
- Antonsen, B. T., Johansen, M. S., Rø, F. G., Kvarstein, E. H., & Wilberg, T. (2016). Is reflective functioning associated with clinical symptoms and long-term course in patients with personality disorders? *Comprehensive Psychiatry*, 64, 46–58. <https://doi.org/10.1016/j.comppsy.2015.05.016>
- Bjelland, I., Dahl, A. A., Haug, T. T., & Neckelmann, D. (2002). The validity of the hospital anxiety and depression scale: An updated literature review. *Journal of Psychosomatic Research*, 52(2), 69–77. [https://doi.org/10.1016/S0022-3999\(01\)00296-3](https://doi.org/10.1016/S0022-3999(01)00296-3)
- Bly, E. M., Wright, A. J., & Tuber, S. B. (2012). Unemployed and poor in New York: The impact of mentalization and Axis II psychopathology on job outcome. *Bulletin of the Menninger Clinic*, (Vol. 76(2), pp. 101–129)
- Brugha, T., Bebbington, P., Tennant, C., & Hurry, J. (1985). The list of threatening experiences: A subset of 12 life event categories with considerable long-term contextual threat. *Psychological Medicine*, 15(1), 189–194. <https://doi.org/10.1017/s003329170002105x>
- Camoirano, A. (2017). Mentalizing makes parenting work: A review about parental reflective functioning and clinical interventions to improve it. *Frontiers in Psychology*, 8, 14. <https://doi.org/10.3389/fpsyg.2017.00014>
- Cirino, P. T., Chin, C. E., Sevcik, R. A., Wolf, M., Lovett, M., & Morris, R. D. (2002). Measuring socioeconomic status: Reliability and preliminary validity for different approaches. *Assessment*, 9(2), 145–155. <https://doi.org/10.1177/10791102009002005>
- Cordes, K., Smith-Nielsen, J., Tharner, A., Katznelson, H., Steele, H., & Væver, M. (2017). Reflective functioning in postpartum depressed women with and without comorbid personality disorder. *Psychoanalytic Psychology*, 34(4), 414–421. <https://doi.org/10.1037/pap0000135>
- Crockenberg, S., & Leerkes, E. (2003). Infant negative emotionality, caregiving, and family relationships. In A. C. Crouter & A. Booth (Eds.), *Children's influence on family dynamics: The neglected side of family relationships*. Taylor & Francis Group.
- Crugnola, C. R., Ierardi, E., & Canevini, M. P. (2018). Reflective functioning, maternal attachment, mind-mindedness, and emotional availability in adolescent and adult mothers at infant 3 months. *Attachment & Human Development*, 20(1), 84–106. <https://doi.org/10.1080/14616734.2017.1379546>

- Cullati, S., Bochatay, N., Rossier, C., Guessous, I., Burton-Jeangros, C., & Courvoisier, D. S. (2020). Does the single-item self-rated health measure the same thing across different wordings? Construct validity study. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 29(9), 2593–2604. <https://doi.org/10.1007/s11136-020-02533-2>
- De Roo, M., Wong, G., Rempel, G. R., & Fraser, S. N. (2019). Advancing optimal development in children: Examining the construct validity of a parent reflective functioning questionnaire. *JMIR Pediatrics and Parenting*, 2(1), e11561. <https://doi.org/10.2196/11561>
- Edwards-Hewitt, T., & Gray, J. J. (1995). Comparison of measures of socioeconomic status between ethnic groups. *Psychological Reports*, 77(2), 699–702. <https://doi.org/10.2466/pr0.1995.77.2.699>
- Enay, Y., Erhard-Weiss, D., Kopelman, M., Samson, A. C., Mehta, S., Gross, J. J., & Hardan, A. Y. (2019). A non-randomized mentalization intervention for parents of children with autism. *Autism Research: Official Journal of the International Society for Autism Research*, 12(7), 1077–1086. <https://doi.org/10.1002/aur.2108>
- Ensink, K., Bégin, M., Normandin, L., & Fonagy, P. (2017). Parental reflective functioning as a moderator of child internalizing difficulties in the context of child sexual abuse. *Psychiatry Research*, 257, 361–366. <https://doi.org/10.1016/j.psychres.2017.07.051>
- Fishburn, S., Meins, E., Fernyhough, C., Centifanti, L. C. M., & Larkin, F. (2021). Explaining the relation between early mind-mindedness and children's mentalizing abilities: The development of an observational preschool assessment. *Developmental Psychology*, 58(1), 17–31. <https://doi.org/10.1037/dev0001272>
- Fonagy, P., Target, M., Steele, H., & Steele, M. (1998). *Reflective functioning manual, for application to adult attachment interviews*. Version 5.0. University College London.
- Fryers, T., Melzer, D., & Jenkins, R. (2003). Social inequalities and the common mental disorders. *Social Psychiatry and Psychiatric Epidemiology*, 38(5), 229–237. <https://doi.org/10.1007/s00127-003-0627-2>
- Ghanbari, S., Vahidi, E., Behzadpoor, S., Goudarzi, Z., & Ghabezi, F. (2022). Parental reflective functioning and preschool children's psychosocial functioning: The mediating role of children's emotion regulation. *European Journal of Developmental Psychology*, 20(2), 1–22. <https://doi.org/10.1080/17405629.2022.2079631>
- Goldsmith, H. H., & Rothbart, M. K. (1996). *Prelocomotor and locomotor laboratory temperament assessment Battery, lab-TAB; version 3.0*. Technical Manual, Department of Psychology, University of Wisconsin.
- Håkansson, U., Watten, R., Söderström, K., Skårderud, F., & Øie, M. G. (2018). Adverse and adaptive childhood experiences are associated with parental reflective functioning in mothers with substance use disorder. *Child Abuse & Neglect*, 81, 259–273. <https://doi.org/10.1016/j.chiabu.2018.05.007>
- Handeland, T. B., Kristiansen, V. R., Lau, B., Håkansson, U., & Øie, M. G. (2019). High degree of uncertain reflective functioning in mothers with substance use disorder. *Addictive Behaviors Reports*, 10, 100193. <https://doi.org/10.1016/j.abrep.2019.100193>
- Hansson, M., Chotai, J., Nordstöm, A., & Bodlund, O. (2009). Comparison of two self-rating scales to detect depression: HADS and PHQ-9. *British Journal of General Practice*, 59(566), e283–e288. <https://doi.org/10.3399/bjgp09x454070>
- Heron-Delaney, M., Kenardy, J. A., Brown, E. A., Jardine, C., Bogossian, F., Neuman, L., de Dassel, T., & Pritchard, M. (2016). Early maternal reflective functioning and infant emotional regulation in a preterm infant sample at 6 Months corrected age. *Journal of Pediatric Psychology*, 41(8), 906–914. <https://doi.org/10.1093/jpepsy/jsv169>
- Hollingshead, A. B. (1975). Four factor index of social status
- Khoshroo, S., & Seyed Mousavi, P. S. (2021). Parental reflective functioning as a moderator for the relationship between maternal depression and child internalizing and externalizing problems. *Child Psychiatry and Human Development*, 53(6), 1319–1329. <https://doi.org/10.1007/s10578-021-01214-6>
- Kolomeyer, E., Renk, K., Cunningham, A., Lowell, A., & Khan, M. (2016). Mothers' adverse childhood experiences and negative parenting behaviors: Connecting mothers' difficult pasts to present parenting behavior via reflective functioning. *Zero to Three*, 37(1), 5–12. <https://www.zerotothree.org/resources/series/journal-archiv>
- Krink, S., Muehlhan, C., Luyten, P., Romer, G., & Ramsauer, B. (2018). Parental reflective functioning affects sensitivity to distress in mothers with postpartum depression. *Journal of Child and Family Studies*, 27(5), 1671–1681. <https://doi.org/10.1007/s10826-017-1000-5>
- Lee, Y., Meins, E., & Larkin, F. (2021). Translation and preliminary validation of a Korean version of the parental reflective functioning questionnaire. *Infant Mental Health Journal*, 42(1), 47–59. <https://doi.org/10.1002/imhj.21883>
- Luyten, P., Mayes, L. C., Nijssens, L., & Fonagy, P. (2017). The parental reflective functioning questionnaire: Development and preliminary validation. *PLoS One*, 12(5), e0176218. <https://doi.org/10.1371/journal.pone.0176218>

- Matthey, S. (2016). Anxiety and stress during pregnancy and the postpartum period. In A. Wenzel (Ed.), *The oxford handbook of perinatal Psychology* (pp. 133–165). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199778072.013.25>
- Meins, E., Fernyhough, C., Wainwright, R., Clark-Carter, D., Das Gupta, M., Fradley, E., & Tuckey, M. (2003). Pathways to understanding mind: Construct validity and predictive validity of maternal mind-mindedness. *Child Development, 74*(4), 1194–1211. <https://doi.org/10.1111/1467-8624.00601>
- Nobre-Trindade, C., Caçador, M. I., Canavarró, M. C., & Moreira, H. (2021). Mothers' psychopathology symptoms and mindful parenting in the postpartum period: The role of parental reflective functioning. *Infant Mental Health Journal, 42*(6), 784–795. <https://doi.org/10.1002/imhj.21947>
- Pajulo, M., Tolvanen, M., Karlsson, L., Halme-Chowdhury, E., Öst, C., Luyten, P., Mayes, L., & Karlsson, H. (2015). The prenatal parental reflective functioning questionnaire: Exploring factor structure and construct validity of a new measure in the Finn Brain Birth Cohort pilot study. *Infant Mental Health Journal, 36*(4), 399–414. <https://doi.org/10.1002/imhj.21523>
- Perry, N., Newman, L. K., Hunter, M., & Dunlop, A. (2015). Improving antenatal risk assessment in women exposed to high risks. *Clinical Child Psychology and Psychiatry, 20*(1), 84–105. <https://doi.org/10.1177/1359104513499355>
- Pratt, M., Singer, M., Kanat-Maymon, Y., & Feldman, R. (2015). Infant negative reactivity defines the effects of parent-child synchrony on physiological and behavioral regulation of social stress. *Development and Psychopathology, 27*(4 Pt 1), 1191–1204. <https://doi.org/10.1017/S0954579415000760>
- Risi, A., Pickard, J. A., & Bird, A. L. (2021). The implications of parent mental health and wellbeing for parent-child attachment: A systematic review. *PLoS One, 16*(12), e0260891. <https://doi.org/10.1371/journal.pone.0260891>
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton University Press.
- Rostad, W. L., & Whitaker, D. J. (2016). The association between reflective functioning and parent-child relationship quality. *Journal of Child and Family Studies, 25*(7), 2164–2177. <https://doi.org/10.1007/s10826-016-0388-7>
- 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. <https://doi.org/10.1002/imhj.21406>
- Schultheis, A. M., Mayes, L. C., & Rutherford, H. J. (2019). Associations between emotion regulation and parental reflective functioning. *Journal of Child and Family Studies, 28*(4), 1094–1104. <https://doi.org/10.1007/s10826-018-01326-z>
- 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. <https://doi.org/10.1111/j.1467-9507.2007.00457.x>
- Slade, A. (2003). *Parent development interview revised: Short version (PDI-R2-S)*. The City University of New York. Unpublished protocol.
- Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment & Human Development, 7*(3), 269–281. <https://doi.org/10.1080/14616730500245906>
- Slade, A. (2008). Working with parents in child psychotherapy: Engaging the reflective function. *Mentalization: Theoretical considerations, research findings, and clinical implications, 302*, 207–234.
- Slade, A., Bernbach, E., Grienemberger, J., Levy, D. L., & Locker, A. (2005). Addendum to reflective functioning scoring manual. Version 2.0.
- Slade, A., Grunebaum, L., Huganir, L., & Reeves, M. (1987). *The pregnancy interview*. The City University of. Unpublished manuscript.
- Slade, A., Patterson, M., & Miller, M. (2005). *Pregnancy Interview coding manual*. The Psychological Center at the City College of. Unpublished manuscript.
- Sleed, M., Slade, A., & Fonagy, P. (2020). Reflective functioning on the parent development interview: Validity and reliability in relation to socio-demographic factors. *Attachment & Human Development, 22*(3), 310–331. <https://doi.org/10.1080/14616734.2018.1555603>
- 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. <https://doi.org/10.1002/imhj.21506>
- Smaling, H. J. A., Huijbregts, S. C. J., van der Heijden, K. B., van Goozen, S. H. M., & Swaab, H. (2016). Maternal reflective functioning as a multidimensional construct: Differential associations with children's temperament and externalizing behavior. *Infant Behavior and Development, 44*, 263–274. <https://doi.org/10.1016/j.infbeh.2016.06.007>

- Stuhrmann, L. Y., Göbel, A., Bindt, C., & Mudra, S. (2022). Parental reflective functioning and its association with parenting behaviors in infancy and early childhood: A systematic review. *Frontiers in Psychology, 13*. <https://doi.org/10.3389/fpsyg.2022.765312>
- Suchman, N. E., Decoste, C., McMahon, T. J., Rounsaville, B., & Mayes, L. (2011). The mothers and Toddlers Program, an attachment-based parenting intervention for substance-using women: Results at 6-week follow-up in a randomized clinical pilot. *Infant Mental Health Journal, 32*(4), 427–449. <https://doi.org/10.1002/imhj.20303>
- Suchman, N. E., DeCoste, C. L., McMahon, T. J., Dalton, R., Mayes, L. C., & Borelli, J. (2017). Mothering from the inside Out: Results of a second randomized clinical trial testing a mentalization-based intervention for mothers in addiction treatment. *Development and Psychopathology, 29*(2), 617–636. <https://doi.org/10.1017/S0954579417000220>
- Wendelboe, K. I., Smith-Nielsen, J., Stuart, A. C., Luyten, P., & Skovgaard Væver, M. (2021). Factor structure of the parental reflective functioning questionnaire and association with maternal postpartum depression and comorbid symptoms of psychopathology. *PLoS One, 16*(8), e0254792. <https://doi.org/10.1371/journal.pone.0254792>
- Wong, K., Stacks, A. M., Rosenblum, K. L., & Muzik, M. (2017). Parental reflective functioning moderates the relationship between difficult temperament in infancy and behavior problems in toddlerhood. *Merrill-Palmer Quarterly*. https://www.jstor.org/stable/10.13110/merrpalmquar1982.63.1.0054?casa_token=iQ3fwauVQEIAAAAA:nIcb-nvK82ZLpF5fN_QXORcfGF_R2w6QLtsgwgX-XiOOi_eAM4W18jP7GR3L6r2mVbY3Hi783yygs_cn4yGL-2h61OghLQTO6awCxi6sHS-GpxzoAQ
- Wong, K. M. (2016). *A study of stability: Maternal reflective functioning from pregnancy to seven months postpartum [unpublished doctoral dissertation]*. Wayne State University.
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta. Psychiatrica Scandinavica, 67*(6), 361–370. <https://doi.org/10.1111/j.1600-0447.1983.tb09716.x>
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment, 52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

SUPPORTING INFORMATION

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