

## RESEARCH ARTICLE

# The parental reflective functioning questionnaire: Infant version in fathers of infants and association with paternal postpartum mental health

Katrine Isabella Wendelboe  | Johanne Smith Nielsen | Anne Christine Stuart |  
Mette Skovgaard Væver

Center for Early Intervention and Family Studies, Department of Psychology, University of Copenhagen, Copenhagen, Denmark

**Correspondence**

K. I. Wendelboe, Center for Early Intervention and Family Studies, Department of Psychology, University of Copenhagen, Øster Farimagsgade 2A, 1353 Copenhagen, Denmark.  
Email:

[Katrine.isabella.wendelboe@psy.ku.dk](mailto:Katrine.isabella.wendelboe@psy.ku.dk)

**Abstract**

The parents' capacity to reflect upon the psychological processes in their child, termed parental reflective functioning (PRF) can be impaired by parental mental health problems. The present study aimed to investigate the factor structure of an infant version of the Parental Reflective Functioning Questionnaire (PRFQ-I) in a low-risk sample of 259 Danish fathers of 1–11-month-old infants to investigate measurement invariance of the PRFQ-I between fathers and mothers; and to examine the association between PRF and paternal depressive symptoms, psychological distress, and parenting stress. Confirmatory factor analysis supported a three-factor model of the PRFQ-I. Multi-group factor analysis indicated partial measurement invariance. Multiple linear regressions showed that paternal depressive symptoms were not associated with PRF. There was an interaction effect of paternal depressive symptoms and general psychological distress on paternal interest and curiosity in their infant's mental state and certainty of infant mental state. Increased parenting stress was associated with impaired PRF on all three subscales of the PRFQ-I. These results provide further evidence for a multidimensional, brief assessment of paternal reflective skills and insight into how variability in paternal psychological functioning relates to impaired PRF in the postpartum period.

**KEYWORDS**

parental reflective functioning, paternal depression, paternal parenting stress, paternal psychological distress, postpartum period

## 1 | INTRODUCTION

For many decades, traditional societal norms and family polices have impacted the gendered division of labor

within and outside the home, influencing the scientific focus on mothers versus fathers within the field of parent-child research, and thus, the majority of studies are based on mothers and their children (Cabrera et al., 2018). Hence,

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it is uncertain how much of our current knowledge of parenting behaviors and associated mechanisms that can be generalized to fathers and their children (Camoirano, 2017). That said, in many countries today, fathers are becoming increasingly acknowledged as important caregivers and involved in childrearing from early on, and research on parenting has therefore begun to include fathers, unfolding our understanding of paternal parenting skills (Ahnert & Schoppe-Sullivan, 2020; Lucassen et al., 2011). Indeed, emerging evidence indicates that fathers' involvement with and contribution to parenting practices is uniquely influencing child development (Grossmann et al., 2002; Lamb & Lewis, 2010; Steenhoff et al., 2019).

Parental reflective functioning (PRF), that is, the parent's ability to treat the child as a psychological agent (Sharp & Fonagy, 2008), is hypothesized to play an important role in parenting as it enables the parent to infer intentions underlying child behavior and thereby react appropriately to the child's emotional needs (Slade, 2005a). PRF is considered of particular significance for the quality of the parent-infant relationship (Kelly et al., 2005; Luyten et al., 2017b), and a recent review on PRF presented empirical support for the association between high parental reflective skills and sensitive parenting (Camoirano, 2017). Emerging literature indicates that fathers' PRF—as with mothers'—is also associated with the quality of parenting behavior. For instance, paternal PRF has been found to be positively associated with paternal emotionally supportive behaviors (Buttitta et al., 2019) and parenting competence (Gordo et al., 2020), and negatively with coercive behavior and power-assertive discipline (An & Kochanska, 2020). In addition, studies suggest that paternal PRF is associated with child outcomes, such as child attachment security (Arnott & Meins, 2007; Miller et al., 2019) and socio-emotional functioning (Benbassat & Priel, 2015; Gordo et al., 2020).

Up until recently, studies examining parental reflective skills have done so using methods assessing reflective capacity in general, such as with the Reflective Functioning Scale (RFS; Fonagy et al., 1998) for the Adult Attachment Interview (AAI; George et al., 1996), which assesses reflective skills based on narratives of parents' own childhood experiences and relationship with important caregivers. However, a growing body of research has emphasized that the ability to take on a reflective stance towards mental states is relationship-specific (Larkin et al., 2020; Rutherford et al., 2013; Sharp & Fonagy, 2008; Smaling et al., 2016). The parent-child relationship is a special one, calling for a parenting-specific type of reflective functioning, and as such, PRF is proposed to concern the parents' capacity to envision and reflect upon the psychological processes in their child as well as in themselves as a parent, and to develop within the ongoing parent-child

## KEY FINDINGS

1. Findings confirm the factor structure of a modified infant version of the PRFQ (PRFQ-I) in Danish fathers of infants.
2. Partial measurement invariance across fathers and mothers was obtained on the PRFQ-I
3. Variability in fathers' postpartum mental health problems is differently associated with paternal reflective functioning

## STATEMENT OF RELEVANCE

Fathers are still underrepresented in parenting research, which does not adequately reflect their increasing involvement in childrearing. Investigating the factor structure of parenting measures, such as the PRFQ-I, as well as its association with different paternal mental health problems contributes to our understanding of paternal psychological functioning.

relationship (Luyten et al., 2017b; Slade, 2005a), and should therefore be considered a contextual function as well. Furthermore, considering that reflective functioning involves different processes, such as understanding how mental states influence behaviors of both self and others, as well as emotional and cognitive components of reflective functioning, PRF is also suggested to be a multidimensional rather than unitary capacity (Luyten et al., 2020, 2017b). Indeed, research indicates that contextual and/or parental factors might affect some dimensions of PRF, while others remain intact (Borelli et al., 2016; Smaling et al., 2016).

### 1.1 | Assessment of PRF: The parental reflective functioning questionnaire

The multidimensional nature of PRF and the association between different aspects of PRF and parental factors are also indicated by recent studies applying a multi-factor, self-report measure of PRF, the Parental Reflective Functioning Questionnaire (PRFQ) (Luyten et al., 2017a; Mazzeschi et al., 2019; Pazzagli et al., 2018). The PRFQ assesses three central dimensions of PRF on a 7-point Likert scale, specifically, a) interest and curiosity in the child's state of mind and perspective (interest and curiosity, IC), b) the awareness of limitations of one's insight into the child's

thoughts and feelings (certainty of mental states, CMS), and c) the tendency to make maladaptive attributions about the child's intentions and needs (prementalizing, PM).

Since its development, several studies on PRF using the PRFQ have been published, demonstrating that the PRFQ is sensitive to differences regarding contextual factors and that the multidimensionality of PRF is manifested by variability in how the three subscales are impacted by such factors (e.g., Claydon et al., 2016; Rostad & Whitaker, 2016; Rutherford et al., 2013, 2017). Concerning the PRFQ applied to fathers, studies are still emerging. For instance, Mazzeschi et al. (2019) found that fathers of 8–11-year-old children with ADHD showed less interest and curiosity in their child's mind and reported more prementalizing compared to fathers of non-clinical children. In another study, fathers demonstrated more prementalizing toward daughters, and if the child were older (8–10 years old vs. 3–5 years old) (Pazzagli et al., 2018). Furthermore, higher levels of parental self-reported secure attachment were associated with more optimal PRF on the PRFQ. In a community study of 113 fathers of toddlers (Gordo et al., 2020), paternal certainty about mental states (CMS) and interest and curiosity (IC) were positively correlated with a parental sense of competence, while there was a negative correlation for prementalizing (PM). Additionally, both CMS and IC were positively associated with child socioemotional adjustment, whereas PM was negatively associated with child adjustment.

The PRFQ has also been used to assess paternal PRF in infancy, although studies on fathers are scarce. In a community sample of fathers of 12-month-old infants, higher paternal PRF levels on the PRFQ were associated with more paternal self-efficacy, family functioning, and positive attitudes about the fathering role (Cooke et al., 2017). In another community sample of parents of 8–10-month-old infants, the relationship between adult attachment anxiety on the Experiences in Close Relationships questionnaire – Revised (Fraley et al., 2000) and parenting stress was mediated by PM in fathers (Nijssens et al., 2018). However, keeping the notion of the contextual nature of reflective skills in mind, it may be considered if research on PRF across child- and parenthood should apply the same measure to different samples. This is of particular interest to parenting research with infants, as infancy is a period characterized by unique demands for parents' reflective skills due to the infant's non-verbal communication (Rutherford et al., 2013; Slade, 2005a). Also, some people tend to rely primarily on external behavior, such as gestures, language, and facial expressions, to make inferences about other's mental states, and with infants, this may be challenging (Luyten et al., 2017b). Parents of infants are thus required to take on a specific

developmental perspective about the infant's capacities in terms of their communicative skills and needs, to adequately infer the infant's mental state from behavior and act accordingly (Slade, 2005a). Based on this, a recent study was conducted to examine the application of the PRFQ in a subclinical and clinical sample of 423 Danish mothers of young infants (age 1–11 months, mean age 3 months) (Wendelboe et al., 2021). Factor analysis indicated that a modified 15-item infant version of the PRFQ, the PRFQ-I, was a more accurate measure of PRF in mothers of infants.

## 1.2 | PRF and paternal mental health problems

Given the importance of PRF to sensitive responsiveness to the child's socio-emotional needs, impairments in PRF can compromise caregiving quality (Camoirano, 2017; Slade, 2005b), which in turn poses a risk for the parent-child relationship (Buttitta et al., 2019; Senehi et al., 2018; Verhage et al., 2016; Zeegers et al., 2017). One factor that has been found to affect reflective skills negatively is parental mental health problems (Bateman & Fonagy, 2012; Katznelson, 2014; Luyten et al., 2020). Within the last decades, research on fathers' postpartum mental health issues and the implications for paternal parenting has been receiving increasing focus, as studies indicate that the prevalence of postpartum psychological difficulties in fathers may be comparable to the prevalence found in mothers (Giallo et al., 2012; Rao et al., 2020; Takehara et al., 2020). However, whereas the impact of postpartum mental health issues on PRF in mothers has been widely investigated (e.g., Cordes et al., 2017; Krink et al., 2018; Marcoux et al., 2017; Schacht et al., 2013), research on the association between paternal mental health and reflective skills in the early postpartum period has been limited to a few studies. For instance, Sethna et al. (2012) found that clinical postpartum depression (PPD) in fathers was associated with impaired mentalizing speech on The Paternal Cognitive Attributions and Mentalizing Scale (Sethna, Murray & Ramchandani, 2012) with their 3-month-old infant, in terms of less infant focused comments and more negative attributions, compared to healthy control fathers. In another study, Vismara et al. (2020) found that at 6 months postpartum, paternal depressive symptoms were associated with lowered reflective functioning on the AAI (Fonagy et al., 1998; George et al., 1996). Conversely, Lundy (2003) found no association between fathers' depressive symptoms and frequency of mind-related comments, as measured with the Mind-Mindedness coding scheme (Meins & Fernyhough, 2006) during interaction with their 6-month-old infant.

It has been suggested that when investigating parental postpartum mental health difficulties, studies should focus more broadly on psychological maladjustment and distress in relation to childbirth, such as both cognitive, affective and physiological symptoms (Miller et al., 2006; Skari et al., 2002; Wilson et al., 2019). Psychological distress refers to non-syndrome-specific psychological malfunctioning, based on an assessment of a variety of symptoms (Derogatis et al., 1974; Olsen et al., 2006). Psychological distress can interfere with the parent's capacity to interact sensitively with their infant and with child development (Kingston et al., 2012; Lovejoy et al., 2000). Concerning fathers, findings show that higher levels of psychological distress are associated with child behavioral and emotional problems in early to middle childhood (Flouri et al., 2019), and research indicates that the implications of paternal psychological distress extend beyond infancy. For example, longitudinal findings have demonstrated that increased and persistent levels of paternal postpartum psychological distress is associated with less parenting warmth and more hostility beyond the first year following childbirth and up to when children are 8–9 years of age (Giallo et al., 2015). This suggests that psychological distress in the postpartum period is critical for the development and course of the parenting competencies of fathers. Yet, despite the growing body of literature on paternal psychological distress, studies on the association with PRF are limited.

While psychological distress is generally defined and measured as an overarching term for different symptoms of psychopathology (Skari et al., 2002), stress responses following childbirth have been suggested to occur on a continuum ranging from non-pathological stress responses to those indicative of mental health problems (Emmanuel & St John, 2010). Such non-syndrome-specific stress in response to the demands of parenthood, or parenting stress, is best understood as a broad construct encompassing parental, child, and familial characteristics as well as external factors such as work and social life, all of which influence the parent's functioning and mental resources (Abidin, 1992; Cronin et al., 2015). Studies show that fathers indeed experience heightened parenting stress, especially in the early postpartum phase (Philpott et al., 2017). Furthermore, findings indicate that parenting stress in fathers is a risk factor for developing psychiatric conditions, such as paternal PPD (deMontigny et al., 2013; Vismara et al., 2016) and anxiety (Philpott et al., 2017). Concerning the relation between PRF and parenting stress in the postpartum period, only a few studies have been conducted. Vismara et al. (2020) found that higher parenting stress on the Parenting Stress Index–Short Form (PSI-SF; Abidin, 1995) was related to lowered reflective skills in fathers of 6-month-old infants. However, reflectivity was measured on the AAI (Fonagy et al., 1998; George et al.,

1996). Looking specifically at PRF, one study found that in fathers of 8–13-month-old infants, reflective skills measured with the PRFQ were related to parenting stress on the PSI (Abidin, 1995), although only for the prementalizing subscale (Nijssens et al., 2018).

In sum, as fathers are becoming increasingly involved with child-rearing, research on fathers is expanding, with evidence indicating that fathers are important contributors in child development (Cabrera et al., 2000; Zandoni et al., 2013). Despite these advances, fathers continue to be underrepresented in parenting research, also concerning paternal reflective capacities in early infancy and in the context of paternal mental health problems (Benbassat & Priel, 2015). In the present study, we add to the literature on fathers' parenting skills in infancy by investigating the psychometric properties of the recently developed Danish infant version of the PRFQ, the PRFQ-I (Wendelboe et al., 2021) in a sample of fathers, and examine how fathers' PRF on the PRFQ-I is associated with paternal mental health in the postpartum period.

### 1.3 | The present study

In this study, we investigate parental reflective functioning and its association with mental health in Danish fathers of infants aged 1–11 months. The aim is twofold: First, on the basis of a previous study finding evidence for a modified infant version of the Parental Reflective Functioning Questionnaire (PRFQ-I) in Danish mothers, (Wendelboe et al., 2021) the present study will examine the PRFQ-I in a sample of fathers. This will be done with both confirmatory and multi-group confirmatory factor analysis; the latter by including a group of mothers. Emerging research applying the PRFQ and modified versions of it has confirmed the proposed multidimensional factor structure of the scale, as well as measurement invariance between fathers and mothers, meaning that the questionnaire measures the same construct across these groups (Luyten et al., 2017a; Mazzeschi et al., 2019; Mousawi & Bahrami Ehsan, 2020; Pajulo et al., 2018; Pazzagli et al., 2018). Analyses of factor structure and measurement invariance are increasingly gaining more focus in psychological research and are highly relevant if we want to expand our knowledge of the applicability of measures on parenting skills to fathers (Adamsons & Buehler, 2007). This is particularly the case for research areas such as parenting and infant psychology, where theory, conceptualization, and methodology have primarily been based on studies with mothers (Fagan et al., 2014). Thus, we test the following hypotheses: (H1) The three-factor model of the PRFQ-I will be confirmed in fathers by confirmatory factor analysis (CFA), and (H2) multi-group confirmatory factor analysis (MG-CFA) will

indicate measurement invariance between mothers and fathers on the configural, metric and scalar level.

Second, we investigate the association between fathers' PRF, as measured with the PRFQ-I, and paternal postpartum mental health problems. Specifically, we examine the effect of paternal depressive symptoms, general psychological distress, and parenting stress on fathers' PRF. Based on previous findings (Luyten et al., 2017a; Mazzeschi et al., 2019; Nijssens et al., 2018) we hypothesize that (H3) increased levels of mental health problems, that is, more depressive symptoms, more psychological distress, and more parenting stress are associated with impaired PRF on one or more PRFQ subscales. More specifically, we expect a main effect of each symptomatology measures on PRF (H3.a.) as well as interaction effects between measures, that is, increased comorbidity in terms of more depressive symptoms combined with more psychological distress and/or parenting stress poses a greater risk on PRF than if fathers report depressive symptoms alone (H3.b).

## 2 | METHOD

### 2.1 | Procedure

The sample of fathers in the current study is a subsample from a larger study, The Copenhagen Infant Mental Health Project (CIMHP), which evaluates early screening methods used by public health visitors and the effect of an attachment-based intervention program (Væver et al., 2016). The study was conducted in compliance with the ethical standards for research and was ethically approved by the institutional Ethical Committee at the Department of Psychology, University of Copenhagen (approval number: 2015-10). At the time of the approval, the committee consisted of Associate Professor Jan Nielsen, Professor MSO Barbara Hoff Esbjørn and Associate Professor Tone Roald. National health care services in Denmark include support to families by public health visitors, who provide regular home visits for families, examining infant physical and mental health well-being, guiding parenting practices, and using universal screening methods for tracking parental mental health. Participating families were recruited from July 2015 until July 2019 by the public health visitors, who routinely visit families at 2, 4, and 8 months postpartum. As part of routine practice, mothers were screened for signs of PPD on the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) at 2 months postpartum by the health visitor; however, screening could also be administered at other times upon clinical judgment. If the mother scored above cut-off on the EPDS ( $\geq 10$ , range 0–30) during any of the visits, the family was invited to participate in the project. If interested, families

would receive a home visit from a clinical psychologist from the project, during which informed written consent would be obtained from both mothers and fathers. Also, a diagnostic interview was performed with the mother to assess current clinical postpartum depression, bipolar disorder, psychotic disorder and risk of suicide. Both parents received an online survey at the time of the home visit. Exclusion criteria for the family's participation in CIMHP were: mother did not understand or speak Danish sufficiently to take part in the study's intervention, maternal bipolar I disorder or present psychotic disorder, maternal severe intellectual impairment, present maternal suicide ideation and/or recent suicide attempt, present maternal alcohol and/or substance abuse, and/or infant diagnosed with autism and/or early retardation. Fathers were excluded from participation if they did not speak or understood Danish sufficiently to complete the home visit assessments and online survey.

### 2.2 | Participants

The sample for the factor analyses consists of 259 fathers, all of whom completed the PRFQ in the online survey. In order to assess invariance between fathers and mothers, the sample for MGCFA also includes 423 mothers, of whom 186 did not meet diagnostic criteria for PPD and 237 who fulfilled diagnostic criteria for PPD. Of the total sample, data was available for 192 fathers for analyses of the association between paternal mental health measures and PRF. The change in sample size for this part of the present study was due to incomplete reporting on the online questionnaire, as the participants were able to pause and stop filling out the questionnaire, while still saving already completed sections. As shown in Table 1, in general, this is a well-resourced sample of both mothers and fathers with low diversity. The majority of parents were of Danish ethnicity (fathers = 86.9 %, mothers with/without PPD = 84.8% and 84.9 %), and had an educational level equivalent to a bachelor's degree or higher (fathers = 68.3 %, mothers with/without PPD = 78.5% and 75.3 %). Due to incomplete self-report of the online questionnaire, only 224 fathers had completed the EPDS. Of these, 26 (10%) scored above cut-off for depressive symptoms, which is in accordance with previous findings on the prevalence of PPD symptoms in fathers (Rao et al., 2020).

### 2.3 | Measures

*The Parental Reflective Functioning Questionnaire (PRFQ)* is a self-report questionnaire assessing parents' reflective functioning with regard to their child (Luyten et al., 2017a)

**TABLE 1** Sample characteristics for confirmatory factor analysis with fathers ( $N = 259$ ), and multi-group factor analysis including mothers ( $N = 423$ )

	<b>Father</b>	<b>Mother, no PPD (<math>n = 186</math>)</b>	<b>Mother, PPD (<math>n = 237</math>)</b>
Parent age, mean ( <i>SD</i> )	33.43 (5.14)	31.4 (4.6)	32.3 (4.6)
Range	24–51	22–44	22–47
Missing, $n$ (%)			1 (.4)
Infant age in months, mean ( <i>SD</i> )	3.17 (1.95)	2.9 (1.6)	3.2 (2.1)
Range	1–11	1–9	1–11
Infant gender, male, $n$ (%)	138 (53.3)	101 (54.3)	124 (53.3)
Parent ethnicity			
Danish, $n$ (%)	225 (86.9)	158 (84.9)	201 (84.8)
Immigrant, $n$ (%)	14 (5.4)	16 (8.6)	24 (10.1)
Descendant of immigrants, $n$ (%)	3 (1.2)	5 (2.7)	2 (.8)
Missing, $n$ (%)	17 (6.6)	7 (3.8)	10 (4.2)
Living with the mother of the child, $n$ (%)	239 (92.3)		
Missing, $n$ (%)	19 (7.3)		
Primiparous, yes (%)	169 (65.3)	137 (73.7)	154 (65)
Missing, $n$ (%)	32 (12.3)	9 (4.8)	13 (5.5)
ISCED level of education			
Level 1–3 (lower secondary or less), $n$ (%)	22 (8.5)	17 (9.1)	18 (7.6)
Level 4 and 5 (post-secondary, short-cycle tertiary), $n$ (%)	40 (15.4)	20 (10.8)	24 (10.1)
Level 6 (bachelor or equivalent), $n$ (%)	69 (26.6)	66 (35.5)	83 (35)
Level 7 and 8 (master + doctor or equivalent), $n$ (%)	108 (41.7)	74 (39.8)	103 (43.5)
Missing, $n$ (%)	20 (7.7)	9 (4.8)	9 (3.8)
EPDS above cut-off, $n$ (%)	26 (10%)		
Missing, $n$ (%)	35 (13.5)		

Abbreviations: *ISCED*, International Standard Classification of Education by UNESCO; *EPDS*, Edinburgh Postnatal Depression Scale.

and was included in the online questionnaire. The original PRFQ consists of 18 statements about the child that correspond to one of three PRFQ dimensions of parental reflective functioning: (1) interest and curiosity (IC) (e.g., “I like to think about the reasons behind the way my child behaves and feel”), (2) certainty of mental state (CMS) (e.g., “I can completely read my child’s mind”), and (3) premenstrualizing (PM) (e.g., “My child cries around strangers to embarrass me”). Statements are rated on a 7-point Likert scale from “completely agree” to “completely disagree”. In their validation paper, Luyten et al. (2017a) describe how scores indicating adequate PRF might differ depending on the sample characteristics and the specific PRFQ scale, and there are no established cut-offs. A recent study on the psychometric properties of the Danish PRFQ in mothers of infants resulted in a three-factor, 15-item infant version, the PRFQ-I (Wendelboe et al., 2021), in which items 7, 10, and 13 on the PM subscale of the original PRFQ have been removed. It is on the basis of this modified infant version that the analyses of the present study will be conducted.

*The Edinburgh Postnatal Depression Scale* (EPDS; Cox et al., 1987), Danish version (Nielsen et al., 2000), is a 10-item self-report questionnaire screening for symptoms of postpartum depression occurring within the previous seven days. The total score is based on scores on each item, which is rated on a 4-point Likert scale, with higher scores indicating more symptom severity (range 0–30). In this study, internal consistency of the EPDS was good, with  $\alpha = .84$ . The EPDS was included in the online questionnaire.

*The Hopkins Symptom Checklist* (SCL; Derogatis et al., 1974) is a well-established questionnaire assessing psychological distress and symptom severity across multiple domains, such as somatization, anxiety, depression, interpersonal sensitivity, obsession-compulsion, paranoid ideation, hostility, and psychoticism, on a 5-point Likert scale. We used the Danish version of the SCL with 63 items based on Olsen et al.’s (2004) validation of the original 92-item version in a Danish population sample of 1153 adults, in which the items of the psychoticism, paranoid ideation,

and hostility subscales have been excluded. The total score of all 63 items corresponds to an overall indication of psychological distress on the composite Global Severity Index (GSI), with higher scores indicating greater severity of symptoms. In the present study, the SCL63 was included in the online questionnaire, and the total GSI score was used to assess general psychological distress. Internal consistency of the SCL-63 subscales was good, ranging from  $\alpha = .74$  to  $.90$ .

*The Parenting Stress Index* (PSI; Abidin, 1995), Danish version (Hogrefe Forlag) is a well-validated, self-report measure of stress related to parenting specifically. The PSI builds upon the theory that parents experience stress as a function of a variability of stressors related to parenthood, such as certain child and parent characteristics, and situational factors. The PSI consists of 120 statements that are rated on a 5-point Likert scale, ranging from “completely disagree” to “completely agree”. Responses yield a Total Stress score and stress scores related to specific areas assessed by different subscales. For this study, we use the Total Stress composite to indicate overall parenting stress. Internal consistency of the PSI was high ( $\alpha = .94$ ). The PSI was given to fathers as part of the online questionnaire.

## 2.4 | Data analyses

Confirmatory Factor Analysis (CFA) using maximum likelihood estimation was performed to examine whether the data fit the factor structure of the recently obtained version of the Danish PRFQ – Infant Version (Wendelboe et al., 2021). Model fit indices include  $\chi^2$ -test statistics ( $\chi^2/df$ ), comparative fit indices (CFI), non-normed fit index (NNFI), and root mean square error of approximation (RMSEA). A good model fit is obtained when  $\chi^2/df \leq 3$ , CFI and NNFI  $> .90$ , and RMSEA  $< .08$ . With  $\chi^2/df$  values  $< 2$  and RMSEA  $< .05$ , the model has an excellent fit (Shek & Yu, 2014). Internal consistency was examined using Cronbach's Alpha.

Based on the CFA model (, we ran a multi-group CFA (MGCF) with maximum likelihood estimation to investigate the measurement invariance across mothers and fathers. The MGCF tested for configural invariance (equality in the construction of the model), metric invariance (equality in factor loadings onto the latent factor), and scalar invariance (equality of item intercepts, or item means) by comparing a) an unconstrained model (M0) to a model with constrained factor loadings (M1) and a constrained factor loading model with constrained factor loadings and intercepts model (M2) (Putnick & Bornstein, 2016). The fit indices used for the overall MGCF model fit were the same as for the CFA. As the Chi-

square test has been proven influenced by sample size (Cheung & Rensvold, 2002), and invariance testing can be biased with uneven groups (Yoon & Lai, 2018), we applied the following criteria for establishing invariance for unequal sample sizes proposed by Chen (2007): (a)  $\Delta$ CFI threshold at  $.005$  and (b)  $\Delta$ RMSEA threshold at  $.010$  as well as overall model fit indices. The sample size is considered sufficient for CFA and MGCF (Kline, 2015; Kyriazos, 2018).

To examine the hypothesized association between fathers' PRF and mental health problems as indicated by fathers' scores on the EPDS, GSI, and PSI, we performed multiple linear regressions for each PRFQ-I subscale, that is, with PM, IC, and CMS as the dependent variable. As both EPDS, GSI, and PSI scores were continuous variables, they were mean-centered in order to perform interaction analyses. Based on previous studies indicating that paternal reflective skills on the PRFQ may be associated with the father's educational level, we included fathers' ISCED educational level as a covariate (Cooke et al., 2017; Pajulo et al., 2018). To include the level of education as a covariate, we created a dummy variable for ISCED grouped level of education with ISCED level one, primary education, as the baseline reference. Furthermore, as previous findings have shown that PRFQ scores may vary according to child age (Pazzagli et al., 2018) we also included infant age in months as a covariate. Finally, mothers' EPDS scores and DSM-IV depression diagnosis were also included as covariates, to control for the potential influence of maternal PPD onto fathers' mental health (Goodman, 2008; Paulson & Bazemore, 2010). Effect sizes from the regression analyses were interpreted according to the conventions by Cohen (1988): small effect size ( $R^2 = .02$ ), medium ( $R^2 = .13$ ), and large effect size ( $R^2 = .26$ ). Prior to analyses, we examined the data. Variance Inflation Factors (VIF) values did not indicate issues with multicollinearity. Casewise diagnostics indicated few outliers ( $n = 5$ ) with a standardized residual greater than the common cut-off criteria of  $\pm 3$  standard deviations. After inspection, these cases were considered genuine values, and they were therefore not omitted from analyses. Both the PM and IC scales showed non-normal distribution, and we, therefore, ran all regression analyses using log-transformed PRFQ-I scale values. However, for the matter of interpretability, mean scores and associated standard deviations are reported with back-transformed and non-centered values. Correlation between the PRFQ subscale scores and measures of paternal mental health was examined using Pearson's product moment correlation coefficient with log-transformed PRFQ-I subscales. IBM® SPSS® AMOS® version 26.0 was used for factor analyses, and all other analyses were conducted using IBM® SPSS® Statistics version 26.0.

**TABLE 2** Parental reflective functioning questionnaire, infant version (PRFQ-I)

	$\chi^2$	df	$\chi^2/df$	CFI	NNFI	RMSEA [90% CI]
CFA ( $n = 259$ )	143.285	81	1.769	.923	.900	.055 [.040, .069]
MGCFA ( $n = 259$ fathers, 423 mothers)						
Unconstrained model (M0)	291.449	160	1.822	.941	.923	.035 [.028, .041]
Constrained factor loadings (M1)	303.748	172	1.766	.941	.928	.034 [.027, .040]
Difference M0—M1	12.299	12	–	.000	–	.001
Constrained factor loadings & intercepts (M2)	381.691	187	2.041	.913	.923	.039 [.033, .045]
Difference M1—M2	77.943***	15	–	.028	–	.005
Partial invariance model (MF3)	325.752	181	1.800	.935	.925	.034 [.028, .040]
Difference M1—M3	22.004***	9	–	.003	–	.000

Fit of the model for CFA in fathers ( $n = 259$ ). Group comparison (multi-group CFA) between fathers ( $n = 259$ ) and mothers ( $n = 423$ ).

Abbreviations: CFI, Comparative Fit Index; NNFI, Non Normed-Fit Index (also Tucker Lewis Index, TLI); RMSEA, Root Mean Square Error of Approximation.

\* $p \leq .05$ ; \*\* $p \leq .01$ , \*\*\* $p \leq .001$ .

### 3 | RESULTS

#### 3.1 | Confirmatory factor analysis

Initial results of the CFA showed that the model did not fit in our sample. After inspection of modifications suggested by AMOS and applying theoretically meaningful error correlations (items 1–4, 3–12, 9–12, 8–12, 10–12, 10–14), the CFA showed a good model fit for the PRFQ-I. Final CFA results are presented in Table 2. All items had significant loadings on their respective factor. PM correlated significantly with both CMS and IC ( $r = -.50$ ,  $p = .006$  and  $r = -.28$ ,  $p = .021$ ). IC and CMS did not correlate significantly ( $r = .09$ ,  $p = .238$ ). Cronbach's alpha was .48 for the PM subscale, .69 for the IC subscale, and .75 for the CMS subscale.

#### 3.2 | Multi-group CFA

MGCFA results are presented in Table 2. The MGCFA revealed a good model fit for the unconstrained model, indicating configural invariance, that is, equality of factor structure across mothers and fathers. The  $\Delta$ CFI and  $\Delta$ RMSEA between the unconstrained model (M0) and the model with constrained factor loadings (M1) were below thresholds, indicating metric invariance ( $p = .422$ ). Concerning the model with constrained loadings and intercepts (M2), the model showed good overall fit indices. However,  $\Delta$ CFI from M1 was well above the threshold. Partial invariance was, therefore, tested where some parameters were allowed to differ between groups. Following Van de Schoot et al. (2012), we compared intercepts between mothers and fathers and removed constraints from the items with the largest unstandardized difference (PRFQ-I item 1, 3, 6, 7, 10, and 13), and partial invari-

ance was then obtained at the scalar level according to the criteria for change in CFI. In the final model (M3), all item-to-factor loadings were significant in both groups. In mothers, all three factors correlated significantly; however, the CMS and IC subscale did not correlate significantly in fathers ( $p = .143$ ).

#### 3.3 | Associations between paternal mental health and prementalizing

Of the total sample of 259 fathers, data for multiple regression analyses was available for 192 fathers. The distribution of scores on EPDS, GSI, PSI, and all PRFQ-I subscales, as well as covariates, are displayed in Table 3 and correlations are presented in Table 4. Significant regression coefficients and standard errors are presented in Table 5.

The results of the regression on the PM subscale showed a significant equation model,  $F(13, 178) = 7.13$ ,  $p < .001$ . The model consisted of factors of paternal mental health (EPDS, GSI, and PSI) and explained 29.4% of the variance in PM, which corresponds to a large effect size. Contrary to expectations, symptoms of depression on the EPDS were not associated with fathers' prementalizing ( $b = .004$ ,  $t(178) = .38$ ,  $p = .707$ ). For general psychological distress, there was a significant association with PM ( $b = -.31$ ,  $t(178) = -2.21$ ,  $p = .028$ ); however, not in the expected direction as results indicate that higher levels of general psychological distress were associated with lower levels of PM. There was a significant relationship between total parenting stress and PM ( $b = .007$ ,  $t(178) = 7.67$ ,  $p < .001$ ), indicating that as fathers' parenting stress increases so does PM. There were no significant interaction effects between EPDS, GSI, and PSI on PM (all  $t(178) \leq .537$ , all  $ps \geq .514$ ).



**TABLE 3** Descriptives of variables for multiple regression ( $n = 192$ )

Variable	<i>M</i>	<i>SD</i>
<b>PRFQ subscales</b>		
PM	2.07	.91
CMS	3.56	1.03
IC	5.67	.80
EPDS	5.91	4.1
GSI	.42	.37
PSI total stress	221.08	42.09
Infant age, months	3.15	1.93
Mother EPDS score	12.98	5.06
	<i>n</i>	%
Maternal clinical PPD	111	57.8
Father ISCED Level 1	17	8.9
Level 2	34	17.7
Level 3	56	29.2
Level 4	85	44.3

Abbreviations: PRFQ, Parental Reflective Functioning Questionnaire (Luyten et al., 2017a); PM, Pre-mentalizing; CMS, certainty about mental states; IC, interest and curiosity; EPDS, Edinburgh Postnatal Depression Scale (Cox et al., 1987); SCL63-GSI, Global Severity Index on the Hopkins Symptom Checklist, 63 items version (Olsen et al., 2004); PSI, Parenting Stress Index (Abidin, 1995); PPD, postpartum depression; ISCED, International Standard Classification of Education.

**TABLE 4** Correlations for study variables ( $n = 192$ )

Variable	1	2	3	4	5
1. PM					
2. CMS	-.31**				
3. IC	-.18*	-.04			
4. EPDS	.23**	-.17*	-.06		
5. SCL63-GSI	.15*	-.17*	-.07	.78**	
6. PSI total stress	.54**	-.37**	-.12	.59**	.54**

Abbreviations: PM, Prementalizing; CMS, Certainty about mental states; IC, Interest and curiosity; EPDS, Edinburgh Postnatal Depression Scale; SCL63-GSI, Hopkins Symptom Checklist 63-items version General Severity Index; PSI, Parenting Stress Index.

\* $p < .05$ , \*\* $p < .01$ .

### 3.4 | Associations between paternal mental health and certainty of mental states

The regression equation for the CMS subscale was significant,  $F(13, 178) = 3.78, p < .001$ . The model consisted of factors of paternal mental health (EPDS, GSI, and PSI) and explained 15.9% of the variance in CMS, which corresponds to a medium effect size. There were no significant main associations between paternal depressive symptoms on the EPDS ( $t(178) = .70, p = .488$ ) or general psychological distress ( $t(178) = -.39, p = .701$ ). However, there was

a significant interaction effect between depressive symptoms and general psychological distress on CMS ( $b = .034, t(178) = 2.25, p = .026$ ), indicating that fathers who report both more depressive symptoms and distress show higher levels of certainty about their infant's mental state. Total parenting stress in fathers was associated with CMS ( $b = -.003, t(178) = -3.39, p = .001$ ), indicating that fathers who experience higher levels of parenting stress show decreased certainty about infant mental state.

### 3.5 | Associations between paternal mental health and interest and curiosity

The regression equation for the IC subscale was non-significant,  $F(13, 178) = 1.32, p = .208$ . The model consisted of factors of paternal mental health (EPDS, GSI and PSI) and explained 2.1% of the variance in IC, which corresponds to a small effect size. There were no significant main associations between paternal depressive symptoms on the EPDS ( $t(178) = .23, p = .815$ ) or general psychological distress ( $t(178) = .63, p = .527$ ). There was, however, a significant interaction effect between depressive symptoms and general psychological distress on IC ( $b = -.016, t(178) = -2.13, p = .035$ ), indicating that fathers who report both more depressive symptoms and distress also show less interest and curiosity. Total parenting stress in fathers was significantly related to IC ( $b = -.001, t(178) = -2.44, p = .016$ ), indicating that fathers who experience higher levels of parenting stress show decreased interest and curiosity in their infant's mental state.

## 4 | DISCUSSION

This study investigated the psychometric properties of the PRFQ infant version (PRFQ-I; Wendelboe et al., 2021), in Danish fathers of infants and the association between paternal reflective functioning, symptoms of depression, general psychological distress, and parenting stress. As a first step, we conducted both a confirmatory factor analysis and multi-group analyses of the PRFQ-I between fathers and mothers. Findings are discussed in the following.

### 4.1 | Factor analysis

Confirmatory factor analysis of the PRFQ-I indicated that the proposed model is a good fit with our sample. Regarding the very low alpha value of the PM subscale ( $\alpha = .48$ ), results concerning its association with other measures should be interpreted with caution. However, internal consistency values correspond to the number of scale items

**TABLE 5** Results of multiple linear regression analysis of paternal mental health on parental reflective functioning

	PM				CMS				IC			
	<i>b</i>	95% CI	<i>SE b</i>	$\beta$	<i>b</i>	95% CI	<i>SE b</i>	$\beta$	<i>b</i>	95% CI	<i>SE b</i>	$\beta$
Main effects												
EPDS	.004	[−.019; .028]	.012	.043	.007	[−.013; .027]	.010	.086	.001	[−.009; .011]	.005	.031
GSI	−.314*	[−.594; −.034]	.142	−.270	−.046	[−.283; .190]	.120	−.051	.037	[−.079; .154]	.059	.091
PSI	.007***	[.005; .008]	.001	.663	−.003**	[−.004; −.001]	.001	−.319	−.001**	[−.002; .000]	.000	−.249
Interaction effects												
EPDS*GSI	.010	[−.026; .045]	.018	.068	.034*	[.004; .064]	.015	.310	−.016*	[−.030; −.001]	.007	−.317
EPDS*PSI	.000	[.000; .001]	.000	.057	−5.222x10 <sup>−5</sup>	[.000; .000]	.000	−.037	−2.394x10 <sup>−5</sup>	[.000; .000]	.000	−.037
GSI*PSI	.000	[−.006; .006]	.003	−.011	−.001	[−.007; .004]	.003	−.071	.001	[−.002; .003]	.001	.059
EPDS*GSI*PSI	.000	[−.001; .000]	.000	−.099	.000	[−.001; .000]	.000	−.209	.000	[.000; .000]	.000	.260

Abbreviations: PM, Prementalizing; CMS, Certainty about Mental States; IC, Interest and Curiosity; EPDS, Edinburgh Postnatal Depression Scale; GSI, General Severity Index, Hopkins Symptom Checklist 63 items; PSI, Parenting Stress Index.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

and thus cannot be considered a true reflection of scale reliability on which a scale should be accepted or rejected if the scale consists of few items (Cortina, 1993), such as the PM subscale. In addition, the low alpha may reflect the complexity of the PM subscale, as prementalizing can be expressed in various ways, each indicating a different prementalizing stance, which may vary across parents (Luyten et al., 2017b). For instance, item 1 (“the only time I am certain my child loves me is when s/he is smiling at me”) may tap into a more teleological stance, which entails an extreme external focus. Likewise, a pretend mode of mentalizing, that is, seeing mental states as separate from reality, may be better captured by item 4 (“my child cries around strangers to embarrass me”). Whereas the teleological and pretend mode do concern mental states, although in an impaired manner, item 13 may tap into a complete disavowal of engaging with the mental world (“Often, my child’s behavior is too confusing to bother figuring out”).

Invariance between fathers and mothers was only established partially at the scalar level. Scalar invariance is used to establish invariance on item intercepts, or item means, across groups, meaning that mean scores on the latent variable can be compared between different groups. When non-invariance is present, it becomes difficult to interpret group differences in scores, as they could be a reflection of true between-group variability or simply be differences in the psychometric properties of the measure across groups (Millsap & Kwok, 2004; Putnick & Bornstein, 2016). However, scalar invariance has been proposed too strict, particularly in psychology research where models are rarely exact reflections of reality but rather hypothesized approximations (Byrne et al., 1989). Therefore, more researchers are adopting models with partial invariance, advocating that this level is sufficient for

detecting differences in latent factor means (Cheung & Rensvold, 2002; Vandenberg & Lance, 2000).

Theoretical and qualitative differences may explain the cause for non-invariance among groups concerning the freely estimated parameters (Shi et al., 2019). The items that were freely estimated in our model were items 1 and 13 on the PM subscale, item 8 on the CMS subscale, and items 3, 6, and 10 on the IC subscale. The non-invariant PRFQ-I item 1 (“The only time I’m certain my child loves me is when s/he is smiling at me”) may be a better indicator of prementalizing modes in mothers than in fathers, particularly considering that the MGCFA was fitting the model to a large group of mothers with internalizing psychopathology. This specific item of the PRFQ-I taps into a so-called teleological mode of mentalizing, which in many depressed individuals is manifested by only feeling appreciated though observable, physical expressions of affection (Luyten et al., 2013), such as a smile from their infant. Likewise, both item 3 (“I like to think about the reasons behind the way my child behaves and feels.”) and item 6 (“I wonder a lot about what my child is thinking and feeling.”) on the IC subscale might be stronger indicators of interest and curiosity in mothers, who, compared to fathers, tend to spend more time with the infant (Goodman, 2005; Henwood & Procter, 2003) and thus may experience a greater demand for more deliberate attunement to the infant’s mental world. Accordingly, one study found that mothers talked more about topics related to meeting their infants’ needs and understanding their infants’ mental states on the Parent Development Interview (PDI; Slade et al., 2004), as opposed to fathers, who were more elaborate with topics concerning the more practical issues of parenting, and that mothers’ and fathers’ PRF were associated with these topics differently (Ruiz et al., 2020). Nevertheless, acceptance of partial invariant models for cross-group comparisons

and their consequences for the interpretation of study results is still a controversial subject among researchers, and interpretation of results obtained with partially invariant models should, therefore, always be considered with caution for bias (Shi et al., 2019).

## 4.2 | PRF and paternal mental health

Our finding that paternal depressive symptoms on the EPDS were not associated with impaired PRF on the PRFQ-I indicates that impaired paternal PRF may not be inevitably associated with depressive symptoms as measured by the EPDS. However, this sample is an overall well-functioning, non-clinical sample, and different associations between paternal depression and PRF might be found in more at-risk samples and clinically depressed fathers. Furthermore, previous studies on the use of the EPDS in male samples have questioned its effectiveness as a screening tool for paternal PPD. For instance, one study investigated the factor structure of the EPDS in a Swedish community sample of fathers ( $n = 882$ ), and found that the EPDS seemed to capture distress in terms of anxiety, worry and unhappiness rather than depression (Massoudi et al., 2013). Similar results were found in an Italian study of both clinical and non-clinical new fathers ( $n = 334$ ) (Loscalzo et al., 2015). Based on this, it is preliminary to infer that our results indicate that paternal PPD is not associated with PRF on the PRFQ-I, as the EPDS in this sample may indeed measure something other than depressive symptoms, emphasizing a need for validation studies on the use of the EPDS in male samples in Denmark.

Contrary to our expectations, fathers who report more distress are less prementalizing toward their infant. One potential explanation for this result might be that although heightened psychological distress is generally considered a risk factor for parenting, experience of distress can also have a more positive, adjusting function, potentially activating the caregiving system and promoting the development of adaptive parenting skills (Emmanuel & St John, 2010; Epifanio et al., 2015). PM has been suggested an automatic and “maladaptive” mode of PRF, reflecting a tendency to misinterpret infants in terms of manipulative intentions and to make hostile attributions about infant behavior (Luyten & Fonagy, 2015; Nijssens et al., 2018). It is possible that in generally well-resourced fathers, non-critical levels of psychological distress do not lead to automatic reflective modes but instead to more controlled and adjusted reflective processes. This potential adaptive function of distress might also explain the significant finding of paternal depressive symptoms in interaction with psychological distress on fathers’ increased certainty about

infant mental state. In the current sample, fathers’ SCL63-GSI mean levels were below the cut-off for clinical levels of distress (Olsen et al., 2006), and the mean EPDS score of 5.91 (SD = 4.1) was also well below the suggested Danish cut-off of 11 (Smith-Nielsen et al., 2018), although this cut-off has not yet been validated in male samples. Therefore, as previously mentioned, it is possible that different results will be obtained in samples where paternal symptomatology is more severe.

That said, studies emphasize that distress might not always be positively associated with adequate parenting skills, particularly in cases where parents experience more severe and/or prolonged distress (Emmanuel & St John, 2010; Epifanio et al., 2015). It is possible that by demonstrating an interaction effect of both paternal depressive symptoms *and* general psychological distress, these results reflect a more maladaptive and intrusive stance towards the infant. Accordingly, high scores on CMS might be related to difficulties with recognizing the opacity of mental states or hypermentalizing (Luyten et al., 2017a). This notion on the negative association between paternal depressive symptoms, psychological distress, and CMS may be supported by another finding from this study, namely, that fathers’ increased depressive symptoms together with general psychological distress were related to lower interest and curiosity in the infant’s mental state. As interest and curiosity are considered a core feature of PRF and indicative of adaptive reflective skills (Rutherford et al., 2013; Slade, 2005a), our findings might reflect a certain profile of impaired PRF, where increased and comorbid paternal symptomatology results in fathers being overly certain about their infants’ mental state, while at the same time demonstrating a lack of genuine interest and curiosity (Luyten et al., 2017b). Indeed, The PRFQ allows for identifying certain within-scale deficits of PRF based on extreme scores on the certainty of mental state and/or interest and curiosity scale (Luyten et al., 2017a). Whereas too low scores on the CMS and IC subscales reflect an almost complete lack of certainty about what the child may be thinking and feeling, or a disinterest in the child’s perspective, too high scores on either scale may conversely reflect hypermentalizing (Luyten et al., 2017b). When hypermentalizing, the parent shows a tendency to make unnuanced presumptions about the child’s mental state or jump to conclusions about the child’s needs, although these are not linked with the child’s signals or developmental capacities (Luyten et al., 2020). Although fathers’ CMS mean scores in this study are not at the very high end of the scale, there are yet no established cut-offs for the PRFQ subscales, and optimal scores might depend on sample characteristics. Thus, to fully address group differences in terms of inadequate PRF such as hypermentalizing, more research is needed on the

potential curvilinear association between PRFQ and other measures.

We investigated whether a non-symptom-specific measure of stress, the Parenting Stress Index, would be associated with PRF. Our findings indicated that even in a well-functioning sample of fathers, an elevated level of parenting stress was related to impaired PRF on all three PRFQ-I subscales: lower interest and curiosity in and certainty about infant mental states and more premenstrualization. The PSI assesses parenting stress on a variety of domains related to parenthood and family functioning, and the findings from this study thus emphasize the importance of keeping a broader focus on risk indicators not limited to symptoms of psychopathology (Skari et al., 2002). Furthermore, the results add to current literature that has demonstrated a relationship between parenting stress and PRF on the PRFQ; however, only for the PM subscale (Luyten et al., 2017a; Nijssens et al., 2018). One possible explanation for these findings may be that, despite being an overall non-clinical and low-risk sample, fathers in our study were in a relationship with a mother who had been screened above cut-off on the EPDS, and many mothers met diagnostic criteria for PPD ( $n = 111$ , 57.8%). It is possible that parenting stress is more profound in partners of mothers with depressive symptomatology and thus affects PRF on dimensions beyond PM in this sample. Accordingly, a substantial body of research indicates a spillover effect of maternal PPD on paternal psychological wellbeing (Dudley et al., 2001; Paulson & Bazemore, 2010), including parenting stress (Egmoose et al., 2020; Goodman, 2008). Another explanation for our findings might be infant age, as the mean age of the infants in our study was 3.17 months, while it was 10.11 months in the sample used in the studies by both Luyten et al. (2017a) and Nijssens et al. (2018). Research on paternal mental health following childbirth indicates that stress levels decrease within the first 6 months post-partum (Vismara et al., 2016), and it is, therefore, possible that the present study taps into a more acute period of stress.

To date, only a few studies have investigated the role of paternal mental health in the postpartum period in relation to PRF. This is due to fathers' generally being underrepresented in parenting research (Cabrera et al., 2018; Parent et al., 2017) and to the fact that the standard measures of PRF are extensive, limiting their applicability in large scale studies and clinical settings (Katznelson, 2014; Schiborr et al., 2013). In the present study, we found preliminary evidence for the factorial validity of the PRFQ-I in fathers, as we were able to confirm its three-factor structure and to obtain measurement invariance, although partially, between mothers and fathers. We also found that the subscales of the PRFQ-I were sensitive to variability in paternal psychological functioning. These findings add

to the literature of the PRFQ and the modified infant version of it, as an easily administered self-report of parenting reflective skills that advantageously could be implemented in large-scale research and busy real-life practice. As previous studies on PRF have found that certain aspects of parental reflective skills are generally lower in fathers compared to mothers (e.g., Cooke et al., 2017; Pajulo et al., 2018; Pazzagli et al., 2018), it is important to identify factors that contribute to further PRF impairments.

### 4.3 | Limitations and future directions

The characteristics of the sample limits the generalizability of findings to populations with more risk indicators. This was partially due to the sampling procedure for the overall project that the current study was embedded in. The participants were recruited based on screening of depressive symptoms in mothers and not paternal difficulties, and high-risk families were excluded. Also, for the overall project, paternal involvement was not a requirement even if the mother participated, and a self-selection bias is, therefore, likely to have affected results. Despite advances in including fathers in the parent-child research field, mothers still tend to be more available to researchers compared to fathers (e.g., Parent et al., 2017) and fathers with higher educational and occupational levels, better marital quality, and a more optimal parenting environment tend to be over-represented in literature (Costigan & Cox, 2001).

As all of the measures examined were obtained through self-report, another limitation concerning respondent social desirability bias may arise (Morsbach & Prinz, 2006). Fathers' social desirability responding has been found not to differ from mothers and to be related to self-reports of negative parenting behaviors compared to positive ones (Bornstein et al., 2015), which could be contributing to non-authentic responses of both perceived mental health problems as well as parental reflective functioning. Additional research on the PRFQ, might overcome this issue by categorizing responses into groups reflecting the overall level of PRF on each scale (e.g., hypomenthalizing, optimal midrange and hypermentalizing) for analyses. In addition, as some of the findings indicated association between PRF and paternal mental health problems in unexpected directions, it is relevant to take into account the proposed "optimal midrange" of the CMS and IC scale especially, where neither too low nor too high scores are considered appropriate regarding reflective capacity (Luyten et al., 2017a). With this in mind, studies may assess the PRFQ-I, and the original PRFQ, in a non-linear manner. For instance, in a recent study by Anis et al. (2020), averaged PRFQ scale scores were used to compare the PRFQ with the RFS (Fonagy et al., 1998) applied to the PDI

(Slade et al., 2004). In the current study, we were not able to determine optimal scores of the PRFQ-I based on comparison with another scoring system with pre-established and well-validated indicators of reflective capacity, however, this is an interesting point for future research.

In our study, only partial scalar invariance was obtained. The existing literature on partial invariance is ambiguous (Byrne et al., 1989; Putnick & Bornstein, 2016; Shi et al., 2019; Vandenberg & Lance, 2000), and more research on the consequences of measures with partial scalar invariance is needed, which is, however, beyond the scope of the current study. It is also important to consider the findings in light of the low alpha values for the PM subscale. This rather low internal consistency of the PM scale of the PRFQ-I has similarly been found in previous studies applying the PRFQ (Burkhart et al., 2017; Krink & Ramsauer, 2021; Luyten et al., 2017a), which calls for more research on the validity of this scale in particular. Finally, as this study addressed the association between paternal postpartum mental health and PRF within a cross-sectional study design, the causal relationship between impairments in PRF and mental health issues could not be investigated. Longitudinal studies on PRF could also bring new insights into the situational aspects influencing PRF, such as the developmental level of the child.

## 5 | CONCLUSION

This study contributes to our knowledge of parental reflective functioning in fathers of infants, a population that has often been overseen in parenting research. Our findings confirm the factor structure of a modified infant version of the PRFQ, as well as partial measurement invariance across fathers and mothers. Results from this study indicate that even in non-clinical and resourceful fathers, elevated levels of parenting stress is associated with impairments in PRF. Correctly identifying fathers at-risk of PRF impairments in the postpartum period assists the development of early-targeted intervention strategies on the basis of a more nuanced understanding of both paternal postpartum mental health problems and their association with different aspects of paternal PRF.

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## DATA AVAILABILITY STATEMENT

Study participants have not given consent to sharing of data. Data will be available upon request. To get access, the project's data manager should be contacted: [maria.stougaard@psy.ku.dk](mailto:maria.stougaard@psy.ku.dk).

## CONFLICTS OF INTEREST

The authors declare that there is no conflicts of interest.

## ORCID

Katrine Isabella Wendelboe  <https://orcid.org/0000-0002-8079-1775>

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