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Paternal history of depression or anxiety disorder and infant–father attachment

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ABSTRACT

Paternal depression and anxiety are important risk factors for a problematic parent-child relationship quality and subsequent child development. We examined the association between paternal history of depressive and anxiety disorder and infant-father attachment security, taking into account the possible mediating roles of sensitivity and perceived family stress. In a sample of 94 infant-father dyads, a structured diagnostic interview and a questionnaire on family stress were administered during pregnancy. Paternal sensitivity was observed using the Ainsworth coding scales and infant-father attachment was observed in the strange situation procedure during a lab visit at 14 months. Linear regression models were used to examine the association of father's lifetime depression or anxiety with the continuous scales for infant-father attachment security and disorganization. Father's history of depression or anxiety disorder was not significantly related to infant-father attachment security in the total sample. Interestingly, daughters of fathers with a history of depression or anxiety had higher scores on attachment security than daughters of fathers without this diagnosis. Perceived family stress and paternal sensitivity were not significant mediators. We discuss these unexpected findings, suggesting alternative mechanisms for how paternal vulnerability to depression or anxiety may be associated with the infant-father attachment relationship.

INTRODUCTION

The importance of early attachment relationships for the socioemotional development of children has been demonstrated in numerous studies over the past decades (see the meta-analyses by Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; Groh et al., 2014; Groh, Roisman, Van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012). Attachment security represents the child's trust in his or her caregiver, and is evident from the child's preferential desire for contact with the caregiver in times of stress, and the use of the caregiver as a "secure base" to explore the environment (Bowlby, 1969). Parental sensitivity is the best-known predictor of a secure parent-child attachment relationship (De Wolff & van IJzendoorn, 1997; Lucassen et al., 2011). As sensitive parenting requires accurate reading of and empathic responding to the child's signals, there are good reasons to expect that parents' psychological health is related to attachment security (Fearon & Belsky, 2016).

Parental depression is the mental health problem most often studied in relation to attachment security (Fearon & Belsky, 2016). Atkinson and colleagues (2000) showed in their meta-analysis that maternal depression and infant-mother attachment are associated, with clinical samples yielding a stronger effect size than nonclinical samples. Although clinically depressed individuals suffer distinct episodes of depression, they also experience residual dysfunction between episodes. Possibly, the effects of the depression on attachment security are not precluded to the depressive episodes (Atkinson et al., 2000). Similar to studies in mothers, paternal depression has been associated with decreased sensitivity or warmth in parenting, with comparable effects for the association between depression and parenting being found for mothers and fathers (Ramchandani & Psychogiou, 2009; for a meta-analysis, see Wilson & Durbin, 2010).

The effects of parental anxiety are much less studied, which is remarkable as anxiety disorders are among the most prevalent forms of adult mental illnesses and often co-occur with depressive symptoms. The effects of parental anxiety are assumed to have a major impact on parenting and the parent-child relationship (Zahn-Waxler, Duggal, & Gruber, 2002). Manassis, Bradley, Goldberg, Hood, and Swinson (1995) found a high rate ($n = 16$) of insecure attachment in their small sample of 20 children aged 18 to 59 months with mothers with anxiety disorders. Del Carmen, Pedersen, Huffman, and Bryan (1993) examined the association of depression, anxiety, and self-efficacy, measured during the prenatal phase and three months postpartum, with infant-mother attachment security observed at 12 months. Interestingly, prenatal maternal anxiety was a better predictor of the infant's insecure attachment classification than maternal depression.

To our knowledge, there are no studies focused on the link between lifetime prevalence of paternal depression and anxiety disorder and the infant-father attachment relationship. Effects of depression and anxiety on attachment insecurity may be driven by the level of parental sensitivity and by the level of family stress (Fearon & Belsky, 2016). Depression in men is associated with impaired marital interaction and family stress (e.g., Du Rocher Schudlich, Papp, & Cummings, 2004). Subsequently, a number of studies have documented associations between marital relation quality or family stress and infant-parent attachment security, reporting that greater harmony and satisfaction and lower conflict are associated with greater attachment security to mothers (e.g., Howes & Markman, 1989) and fathers (e.g., Owen & Cox, 1997). However, some studies reveal mixed findings, for example the study by Wong, Mangelsdorf, Brown, Neff and Schoppe-Sullivan (2009), reporting a significant correlation between marital quality and infant-mother attachment, but a nonsignificant correlation for infant-father dyads.

The present study explores the relation between lifetime prevalence of depression or anxiety disorder in fathers with infant-father attachment security, taking into account the possible mediating roles of sensitivity and perceived family stress. Based on results from previous studies, we expect that (1) past depression or anxiety disorder in fathers is associated with lower levels of infant-father attachment security; and (2) family stress and paternal sensitivity are (independent) mediating variables. As sons and daughters might be differentially affected by parental depression and anxiety (e.g., Möller, Majdandžić, Vriends, & Bögels, 2014), we will also explore gender differences. Research in fathers indicates that boys are more vulnerable than girls to the effects of their fathers' depression, especially during early development (Ramchandani, Stein, Evans, O'Connor, & ALSPAC Study Team, 2005). In the wider child development literature, a significant body of research suggests that there are differential effects of both parental depression and other parenting variables between boys and girls (Crick & Zahn-Waxler, 2003). Thus, the investigation of possible differences in impact upon boys and girls is warranted.

METHOD

Participants and procedure

This study is embedded within the Generation R Study, a prospective cohort study in Rotterdam, the Netherlands, investigating growth, development, and health from foetal life onwards (Jaddoe et al., 2012). Eight hundred eightytwo children visited the research centre at 14 months. The primary caregiver was invited to participate, which resulted in a lab visit by 767 mothers and 115 fathers. This latter group was the focus of our current study. The study was conducted in accordance with the guidelines proposed in the World Medical Association Declaration of Helsinki and has been approved by the Medical Ethics Committee of the Erasmus University Medical Center, Rotterdam.

Measures

Paternal lifetime depression or anxiety disorder. The Composite International Diagnostic Interview (CIDI; WHO, 1990) Version 2.1 was conducted during the prenatal phase to assess lifetime prevalence of psychiatric disorders. The CIDI is a structured interview based on Diagnostic and Statistical Manual of Mental Disorders -IV criteria, with good reliability and validity being reported (Andrews & Peters, 1998). The CIDI was conducted during a home interview by research assistants trained in an official WHO training center. Fathers were diagnosed with a history of anxiety disorder if they met diagnostic criteria, either currently or in the past, for any of the following anxiety disorders: generalized anxiety disorder, panic disorder, social phobia, agoraphobia, specific phobia, obsessive-compulsive disorder, or post-traumatic stress disorder. Lifetime diagnosis of unipolar depressive disorder was defined as diagnoses of dysthymia, a single episode of major depression, and recurrent major depression.

Family stress during pregnancy. The subscale General Functioning of the McMaster Family Assessment Device (GF; Byles, Byrne, Boyle, & Offord, 1988) was completed by the father during the third trimester of the pregnancy. GF is a reliable and validated self-report measure of family dysfunctioning or family stress (Kabacoff, Miller, Bishop, Epstein, & Keitner, 1990). The GF scale consists of 12 items. Parents rated how well each item described their family by selecting from four different responses: *strongly agree*, *agree*, *disagree*, or *strongly disagree*. The internal consistency of GF was $\alpha = .90$. A higher score (range 1-4) translates into more family stress.

Paternal sensitivity. Paternal sensitivity was observed during free play in the 14-month lab visit using Ainsworth's rating scales for sensitivity (Ainsworth, Bell, & Stayton, 1974). The mean duration of the play session was 5 min ($SD = 2.0$). Sensitivity scores were based on the subscale scores for sensitivity and cooperation ($r = .84$), both scored on 9-point rating scales, with higher scores indicating more sensitivity. The intraclass correlation for sensitivity (single measure, absolute agreement) was .78 ($n = 82$).

Infant-father attachment. Infant-father dyads were observed in the strange situation procedure (SSP; Ainsworth, Blehar, Waters, & Wall, 1978) during the 14-month lab visit. The SSP used in the current study included all important stimuli, but to make it fit into a tight time schedule, the preseparation and separation episodes were shortened by 1 min, keeping the critical reunion episodes intact (see also Luijk et al., 2010). Attachment was coded from DVD recordings according to the coding systems of Ainsworth et al. (1978) and Main and Solomon (1990). The two coders were trained to reliability at the University of Minnesota.

To maximize statistical power, a continuous score for the security of the infant-father attachment relationships was used (Van IJzendoorn & Kroonenberg, 1990). Richter, Waters, and Vaughn (1988) developed a series of classification functions to score infants' attachments in a continuous way on the basis of the interactive scales (proximity seeking, contact maintaining, resistance and avoidance) and crying behaviour in the two Strange Situation reunion episodes. Van IJzendoorn and Kroonenberg (1990) adapted Richter's algorithm by omitting the crying episodes. The resulting Attachment Security Scale has been shown to be strongly associated with secure versus insecure attachment classifications, predicting about 90% of the cases (Van IJzendoorn & Kroonenberg, 1990), and has been used in more than 20 studies (e.g., Kochanska, Aksan, Knaack, & Rhines, 2004). In addition to this continuous organized attachment classification score, infants received a continuous score

for disorganized attachment behavior on a scale from 1 (no signs of disorganization) to 9 (strong signs of disorganization), reflecting the level of organization of the attachment strategy (Main & Solomon, 1990).

Intercoder agreement was calculated on 70 *Strange Situation Procedures* (SSPs), which represents 8.4% of the total sample of available observations of attachment security at the 14-month lab visit ($N = 829$). Of these 70 SSPs, 61 SSPs were double-coded in infant-mother dyads and nine SSPs were double-coded in infant-father dyads, which is proportional to the participation of mothers and fathers in the 14-month lab visit. For ABCD classification, intercoder agreement was 77% ($\kappa = .63$); agreement on disorganization was 87% ($\kappa = .64$). Eight percent of the cases were discussed with one of two expert coders (*, *) and classification was assigned after consensus was reached. The inter-coder reliability, based on the total group of parents who visited the lab at 14 months, was .88 for the attachment security scale score and .88 for the disorganization scale ($n = 70$; intraclass correlation coefficients).

Covariates. Information about paternal age, educational level (as a proxy for socio-economic status), and parity (as a proxy for transition to parenthood) were determined at enrolment during pregnancy by means of questionnaires. Although only a few studies control for socio-economic status (e.g., Ramchandani et al., 2008), studies in the general population have shown that the prevalence of depression (e.g., Mojtabai & Olfson, 2004) as well as attachment security (e.g., Scher & Mayseless, 2000) is linked to socio-economic status. Child gender and gestational age at birth (as a proxy for the child's neurobiological status) were obtained from community midwife and hospital registries at birth. To adjust for symptoms of depression and anxiety in the prenatal phase, at the time the diagnostic interview took place, and also to more precisely examine the role of prenatal family functioning, we used the Brief

Symptom Inventory (De Beurs, 2004; Derogatis, 1993). The BSI scores on depression and anxiety during pregnancy were combined into an average score (z-standardized). Finally, we adjusted for the child's age at the lab visit in which paternal sensitivity and infant-father attachment security were observed.

Statistical analysis

Missing Data. Out of 115 infant-father dyads, seven were not included in the analyses, due to child illness ($n = 1$), participation of a sibling ($n = 5$), or procedural issues during the SSP ($n = 1$). Of the remaining 108 infant-father dyads, data on lifetime prevalence of depression or anxiety disorder were available for 94 fathers. Missing data on covariates (0% for symptoms of depression or anxiety, child gender, gestational age, age child at lab visit, and parity; 1.0% for paternal age; 8.5% for paternal educational level; 9.6% for family stress; 21.3% for paternal sensitivity) were imputed using the multiple imputation procedure with predictive mean matching included in IBM SPSS Statistics, version 23.0 for Windows (2015). Ten imputed data sets were generated.

As depression and anxiety are related and often co-exist (e.g., Nutt, 2004), we focused on a dichotomy of history of depression or anxiety versus no such psychiatric history. First, the bivariate correlations among the study variables were explored. A mediation model was tested with family stress and paternal sensitivity as mediating variables in the association between father's lifetime depression or anxiety disorder and (1) the Richter's scales for infant-father attachment security; (2) the disorganized attachment score, using MPlus 7.4. In both models, we tested interaction effects of child gender. The analyses were adjusted for the child's gestational age at birth and age at the lab visit, paternal age and educational level, parity, and paternal symptoms of depression and anxiety during pregnancy. Interaction terms between paternal history of depression or anxiety and child gender were included. See Figure

1 for the hypothesized model. The 10 imputed datasets were analyzed separately in MPlus. Subsequently, the results of the imputed analyses were pooled and the unstandardized betas (B), standard errors (SE), and p -values were reported.

RESULTS

Descriptive statistics and bivariate correlations

Sample characteristics are displayed in Table 1. Correlations between the study variables can be found in Table 2. Bivariate correlations indicated that paternal history of depression or anxiety disorder was *positively* related to infant-father attachment security ($r = .21, p < .05$), implying that infants of fathers with past depression or anxiety had *higher* attachment security scores.

Paternal history of depression or anxiety disorder and infant-father attachment security

The first model, with Richter's attachment security score as dependent variable, fitted the data well: $\chi^2(17) = 11.15, p = .85$, RMSEA = .00, CFI = 1.00, SRMR = .04. Father's history of depression or anxiety disorder was not significantly related to infant-father attachment security ($B = -0.47, SE = 0.93, p = .61$). However, a significant interaction ($p = .02$) with child gender showed that daughters of fathers with a psychiatric history of depression or anxiety ($n = 13$) had higher scores on attachment security than daughters of fathers with no such history ($n = 38; B = 2.08, SE = 0.84, p = .01$), whereas no difference was found for sons of fathers with ($n = 8$) and without ($n = 35$) past diagnosis of depression or anxiety disorder ($B = -0.82, SE = 0.84, p = .33$).

Paternal sensitivity did not mediate the association between paternal history of depression or anxiety and infant-father attachment security ($B = -0.02, SE = 0.11, p = .87$), nor did paternal perceived family stress ($B = -0.02, SE = 0.16, p = .90$).

Paternal history of depression or anxiety disorder and disorganized attachment

Next, we examined the mediation model with attachment disorganization as dependent variable. This model fitted the data well ($\chi^2(17) = 11.32, p = .84$, RMSEA = .00, CFI = 1.00, SRMR = .04). Paternal history of depression or anxiety disorder was not related to infant-father attachment disorganization ($B = -0.40, SE = 0.66, p = .55$), nor did child gender moderate this association ($p = .83$).

Mediation analyses showed that paternal sensitivity did not mediate the association between paternal history of depression or anxiety and disorganized attachment ($B = 0.01, SE = 0.04, p = .90$), nor did paternal perceived family stress ($B = -0.11, SE = 0.12, p = .36$).

DISCUSSION

The present study explored the relation between paternal history of depression or anxiety disorder and infant-father attachment security, and investigated possible mediating roles of paternal sensitivity and perceived family stress. Father's history of depression or anxiety disorder was not significantly related to the infant-father attachment security score in the total sample. This finding was surprising, as previous (meta-analytic) studies (e.g., Atkinson et al., 2000; Del Carmen et al., 1993) showed a long-term negative effect of depression or anxiety on attachment security, independent of subsequent symptoms of depression or anxiety. Previous effects were, however, rather small and inconsistent.

Interestingly, daughters of fathers with a history of depression or anxiety disorder were *more* secure than daughters of fathers with no such history. We should be careful with the interpretation of these findings as the number of fathers with a psychiatric history was low ($n = 21$) with an unequal division between families with sons ($n = 8$) and daughters ($n = 13$), which limits the power to detect associations and enhances the risk of false positives.

However, it might be valuable to present our exploratory results and discuss the possible mechanisms in the link between depression or anxiety and attachment security to create a starting point for further research. A potential explanation for the unexpected direction of this effect is that fathers with a history of depression or anxiety might have developed better mentalizing capacities and are therefore better able to “read” their child. Mentalizing (or reflective functioning) is the capacity to comprehend mental states of the self and others (Fonagy, Luyten, Allison, & Campbell, 2016). Although it is generally stated that depression is negatively related to reflective functioning (RF; e.g., Ekeblad, Falkenström, Andersson, Vestberg, & Holmqvist, 2016; Fischer-Kern et al., 2013), results seem to be inconsistent. Taubner, Kessler, Buchheim, Kächele, and Staun (2011) did not find a significant difference in RF in the clinical depressed ($n = 20$) versus the nonclinical ($n = 16$) group. Likewise, Cordes et al. (2017) found no differences between RF in the group of mothers with postpartum depression ($n = 13$) and the group with comorbid personality disorder ($n = 14$) compared to the nonclinical group ($n = 52$). There are even studies showing a positive relationship between depression and RF. Stacks et al. (2014) found a positive link between RF and concurrent maternal depressive symptoms. Suchman, DeCoste, Leigh, and Borelli (2010) assessed RF in substance abusing mothers who also showed symptoms of depression and found that self-mentalization was positively correlated with maternal depression.

The preoccupation with interpersonal problems associated with the depression or anxiety disorder requires reflective thinking, possibly strengthened by therapy with a focus on subjective mental experiences (Cordes et al., 2017; Fonagy, Steele, Steele, Higgitt, & Target, 1994). As previous studies have shown that psychotherapy can promote RF abilities (e.g., Levy et al., 2006; Rudden, Milrod, Target, Ackerman, & Graf, 2006), we hypothesize that psychotherapeutic treatment might lead to an increase in RF (Cordes et al., 2017). Because we do not have detailed information about psychotherapeutic history in the current

study, we can only speculate on this explanation. All the described studies on depression in relation to RF and psychotherapeutic treatment were conducted in samples of mothers. It remains to be seen how these results and hypotheses translate to research on fathers with a history of depression or anxiety, but it might be an interesting issue to take into account in future research on paternal depression, RF and attachment security. Fonagy and Target (2005) argue that the parent's mentalizing capacity enables the parent to create a psychological and physical environment facilitating the development of a secure base for the infant. Considering the (clinical) importance of mentalizing in the context of the parent-child attachment relationship, our findings create an interesting hypothesis for future research on the link between psychopathology and the buffering or mediating role of mentalizing abilities.

An alternative, more methodologically based, explanation for our findings may be that parents of infants with a secure attachment relationship are more open to reporting about emotional difficulties. Pianta, Egeland, and Adam (1996) examined the differences in self-reported psychiatric symptomatology according to adult attachment status and found that women with a secure mental representation of attachment reported higher levels of psychiatric symptoms compared to women with an insecure dismissing representation of attachment. As one of the basic components of security is a more developed self-reflective capacity and open, coherent communication about personal issues (Fonagy, Steele, Steele, Moran, & Higgitt, 1991), secure individuals (who have significantly more often a secure attachment relationship with their own child; Hesse, 2016) may be more inclined to report psychological problems and thus have higher chances of being classified with a diagnosis of depression or anxiety disorder.

Our findings indicate that only daughters are positively affected by paternal history of depression or anxiety disorder. It is known from previous studies that boys and girls can be

differently affected by paternal depression or anxiety (e.g., Möller et al., 2014; Ramchandani et al., 2005). Ramchandani et al. (2005) suggested that boys are more vulnerable than girls to the effects of fathers' depression, especially during early development. The researchers describe this finding as “striking” (p. 2204) and hypothesize that boys might be more vulnerable than girls to a range of parental influences in general. A study using the still-face paradigm (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001) illustrated that boys of mothers who engaged in positive play interactions made more social bids when mothers were unavailable. In contrast, girls appear to deal with mismatches in social interaction more easily than boys (e.g., Robinson, Little, & Biringen, 1993). Girls, more than boys, may be prevented from affective disturbances in interaction that typically accompany depressed states.

Perinatal measurements of paternal depression might have provided important insights into the specific effects of lifetime prevalence of depression and anxiety disorder on infant-father attachment security, especially as paternal depression in the early months of a child's life might be a particular risk factor for adverse development (Ramchandani et al., 2005). Another limitation of our study is that only the primary caregiver was invited to participate in the lab visit, implying that our group of fathers consists of perhaps atypical, highly involved fathers, which raises the question as to what extent our findings may generalize to the whole population. Finally, the percentage of data missings on paternal sensitivity was relatively high (21.3%). Although we used appropriate statistics for the imputation of the missing data, it would obviously have been best to have real-life observations of sensitivity of all infant-father dyads.

Our exploratory study suggests that factors other than sensitivity are at play in the development of the infant-father attachment relationship. Although the claim that infants not only become attached to their mother but also to their father lies at the core of attachment

theory, research on precursors of attachment security in infant-father dyads is still a neglected area. We consider our gender-specific finding of lifetime paternal depression or anxiety predicting secure attachment in their daughters but not their sons to be a hypothesis that should be tested in an independent and larger sample.

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Table 1.

Descriptives of the study variables

Paternal and family characteristics		
Age father at intake in years, mean (<i>SD</i>)		35.2 (4.7)
Educational level, % higher		73.6
Parity, % first child		75.5
Father's lifetime prevalence of anxiety disorder, % yes		17.0
Father's lifetime prevalence of depressive disorder, % yes		8.5
Perceived family stress, mean (<i>SD</i>)		1.4 (0.3)
Paternal symptoms of anxiety during pregnancy, mean (<i>SD</i>)		0.2 (0.3)
Paternal symptoms of depression during pregnancy, mean (<i>SD</i>)		0.1 (0.2)
Paternal sensitivity, mean (<i>SD</i>)		5.5 (1.2)
Paternal cooperation, mean (<i>SD</i>)		5.8 (1.3)
Child characteristics		
Child gender, % girls		54.3
Gestational age in weeks, mean (<i>SD</i>)		40.3 (1.5)
Age at lab visit in months, mean (<i>SD</i>)		14.6 (0.8)
Attachment Security Scale, mean (<i>SD</i>)		0.7 (2.4)
Attachment disorganization (score), mean (<i>SD</i>)		2.6 (1.7)
Infant-father attachment security	% Secure (B)	63.8
	% Avoidant (A)	9.6
	% Resistant (C)	17.0
	% Disorganized (D)	9.6

Table 2.

Correlations between the study variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. History depression/anxiety	-											
2. Family stress pregnancy	.26*	-										
3. Depression/anxiety pregnancy	.23*	.15	-									
4. Age father	.11	-.09	-.13	-								
5. Parity	.17	.04	-.03	.15	-							
6. Educational level father	-.05	-.11	-.04	-.10	-.09	-						
7. Child gender	.08	-.07	-.01	.14	.13	.09	-					
8. Gestational age child	.16	-.04	-.10	.04	.10	.15	.08	-				
9. Age child lab visit	-.18	-.03	.04	-.13	-.08	.15	-.02	.07	-			
10. Paternal sensitivity	-.05	.02	.01	.07	.06	.14	-.03	.07	.20	-		
11. Attachment security score	.21*	.05	.06	.13	-.06	-.07	.16	.07	.04	.18	-	
12. Disorganization score	-.08	-.07	.03	-.15	.03	-.27*	-.08	-.07	-.06	-.10	-.22*	-

For two continuous variables or a continuous with a dichotomous variable *Pearson* or *Kendall's Tau* correlation were used; for two dichotomous variables *Phi correlation* was used.

* $p < .05$; ** $p < .01$