



Maternal and paternal depression and anxiety: their relationship with mother-infant interactions at 3 months

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Abstract

While there have been studies on the effects of maternal depression and anxiety on mother-infant styles of interaction in infancy, there have been no studies on the effects of paternal depression and anxiety or on the joint effects of maternal and paternal depression and anxiety on mother-infant styles of interaction. The aims of the study were to examine the associations between maternal depression and anxiety and paternal depression and anxiety and to examine the relationship between maternal and paternal depression and anxiety and mother-infant styles of interaction at infant 3 months. Seventy mother and father couples were administered the EPDS for depression and the STAI-Y for anxiety and mother-infant interactions were video-recorded and coded with the CARE-INDEX. Analyses with Pearson correlation indicated an association between maternal depression and paternal anxiety and between maternal anxiety with paternal depression and anxiety. Moreover maternal and paternal depression and anxiety were found to be associated with the quality of maternal style of interaction. Maternal sensitive style was negatively associated with maternal depression and state anxiety. Maternal unresponsive style was positively associated with both paternal depression and state and trait anxiety. Multiple regression analysis has shown that maternal state anxiety was a greater predictor of a lower level of maternal sensitivity than maternal depression.

Keywords Maternal depression · Maternal anxiety · Paternal depression · Paternal anxiety · Mother-infant styles of interaction

Introduction

Anxiety and depression are among the most significant disorders to affect parents in the perinatal period, frequently in comorbidity in both mother and father (Cameron et al. 2016; Kessler et al. 2005). In this period, maternal depression is often associated with paternal depression and maternal anxiety with paternal anxiety (Matthey et al. 2003). Depression and anxiety are among the principal risk factors with respect to the quality of parenting of mothers and fathers starting from the first year of the child's life, resulting in negative consequences for his/her development in the short and long term relating, inter alia, to the occurrence of internalizing and externalizing disorders (Matijasevich et al. 2015; van der Waerden et al. 2015).

It has also been shown that, during a child's first years, the father plays an important role in supporting the mother (Kaitz and Katzir 2004), safeguarding her relationship with the child (Melrose 2010). The quality of the conjugal relationship is also correlated with maternal sensitivity to the child, influencing his/her psycho-emotional development (Gryc 2002).

Research has shown the effects of maternal depression on the mother-infant relationship, including greater intrusiveness or withdrawal on the part of the mother (Tronick and Reck 2009), difficulty in regulating emotions in the mother-infant couple (Riva Crugnola et al. 2016), and consequently, a child's insecure attachment (Murray et al. 2015). Various studies have shown that paternal perinatal depression can also make his responsiveness and involvement in play with the child less adequate, which impacts negatively on the child's development (Paulson et al. 2006; Sethna et al. 2015).

While the literature on the effects of maternal depression is extensive, studies on the effects of maternal anxiety in the perinatal period are less numerous and have mixed results. According to some, mothers suffering from anxiety express little sensitivity and engagement towards their infants (Warren et al. 2003), and their infants express little engagement

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(Feldman et al. 2009); maternal anxiety is also correlated with both maternal negative states and infant negative states (Riva Crugnola et al. 2016), with fewer positive emotions being expressed by mothers (Nicol-Harper et al. 2007). According to others, there is no difference in the sensitivity of anxious mothers and that of control mothers (Murray et al. 2007). Another study (Field et al. 2005) has shown that depressed mothers with a high level of trait anxiety compared with depressed mothers with a low level of trait anxiety expressed fewer positive emotions and their children were less positive and more negative in dyadic interactions. One study has shown, in this regard, that anxiety is a greater predictor than depression of less adequate styles of mother-infant emotion regulation (Riva Crugnola et al. 2016).

A few studies have examined how maternal and paternal depression and anxiety, respectively, influence mother-infant and father-infant interactions. Aktar et al. (2017) have shown that depressed mothers and fathers were less positively involved in face-to-face interactions with children at 3 and 5 months than mothers and fathers who were not depressed and that their children expressed fewer positive emotions. However, the expression of emotions by mothers and fathers during interactions with their child is not affected by their levels of anxiety.

Approach of our study

In the light of the above, examining the effects of depression and anxiety in mothers and fathers is important since such disorders impact negatively on the development of the child, increasing his/her psychopathological risk (Murray et al. 2011). Depressed and anxious fathers, moreover, are unable to provide sufficient emotional support and this may influence the mother-infant relationship. There have also been numerous studies on the effects of parental depression on the quality of dyadic interactions. Studies which have examined the influence of parental anxiety on interactions with the child are less numerous and their results are contradictory. Furthermore, to our knowledge, no study has examined the effect of paternal depression and anxiety on mother-infant styles of interaction in the first months of a child's life.

The principal aims of this study, therefore, were to examine in a community sample the relationship between maternal and paternal depression and anxiety at infant 3 months and the correlation of these variables with the quality of mother-infant interactions in the same period.

Particularly the first objective was to analyze the associations between depression and anxiety in mothers and fathers and the associations between maternal depression and anxiety and paternal depression and anxiety. In this regard, we hypothesized high correlation between maternal anxiety and depression and between paternal anxiety and depression, an

association between maternal depression and paternal depression and an association between maternal anxiety and paternal anxiety.

The second objective was to examine the associations between maternal and paternal depression and anxiety and mother-infant interactions at 3 months. We hypothesized that maternal depression and anxiety would be associated with a low level of maternal sensitivity and a low level of cooperativeness in the infant. As there are no studies on the association between paternal anxiety and depression and mother-infant styles of interaction, the study was of an exploratory nature.

The third objective was to examine, at an exploratory level, the possible interaction effects between maternal and paternal depression and anxiety on the quality of mother-infant interactions at 3 months.

Method

Participants

The participants were 70 couples of mothers and fathers, with their children (male infants = 32). All mothers and fathers were European Caucasian. The average age of the mothers was 34.59 (SD = 5.21) with a range between 20 and 48. The average age of the fathers was 37.01 (SD = 7.25) with a range between 26 and 48. The mothers had an average 15.22 years of education with a range between 8 and 18 years (2.9% had left school at the age of 16, 25% had a high school diploma, and 72.1% had a degree). All the mothers were married or lived with their partners. Twenty-eight percent were of a low socio-economic level, 57% a medium socio-economic level, and 15% a high socio-economic level. Seventy-five percent of the mothers had jobs. Twenty-four percent of the fathers were of a low socio-economic level, 61% a medium socio-economic level, and 15% a high socio-economic level. All the fathers had jobs. The infants were all born full term, without organic pathologies. They were the first children for 83% of the mothers.

The participants were recruited in the family centers and hospitals of the "Azienda Sanitaria Locale no. 2 Savonese" located in northern Italy and in "Azienda Sanitaria Locale" RM1 and RM4 in central Italy. The study protocol was approved by the institutional review boards of the University of Milano-Bicocca and of "Sapienza" University of Rome. Informed consent was obtained from all individual participants included in the study.

Procedure

At infant 3 months, the mothers and fathers were given self-report questionnaires to evaluate symptoms of depression and

anxiety and a form to gather socio-demographic data. At 3 months, mother-infant couples were video-recorded for around 5 min in a laboratory consisting of a suitably furnished play room. The video camera was positioned inside the room in front of the dyad in order to frame mother and infant, who were sitting on a cushion, sideways. The behavior and the expressions on the faces of both members of the dyad were thus visible and could be coded. The mothers were instructed to interact with the infant as they would normally do at home.

Measures

Postpartum depression

The Edinburgh Postnatal Depression Scale (EPDS) (Benvenuti et al. 1999 for Italian version) is a 10-item self-report questionnaire which evaluates postpartum depression. The cutoff used to evaluate probable depression in mothers was ≥ 13 (Benvenuti et al. 1999). The instrument has also been validated for fathers (Matthey et al. 2001). In this study, the cutoff used to assess probable depression in fathers was ≥ 12 (Loscalzo et al. 2015).

Anxiety

Maternal and paternal anxiety were assessed with the State Trait Anxiety Scale (STAI-Y; Spielberger et al. 2012 for Italian version), a self-report questionnaire grouped into two scales relating to State Anxiety, regarding the current state of anxiety, and Trait Anxiety, regarding the type of anxiety which is characteristic of the personality of the subject. For evaluation of state anxiety (Y1), a cutoff of 39 was used for mothers and of 36 for fathers. For trait anxiety (Y2), a cutoff of 42 was used for mothers and 37 for fathers.

Mother-infant interactions

Interactions were video-recorded and evaluated with the Child-Adult Relationship Experimental Index (CARE-INDEX) (Crittenden 1994–2000), a method which codes interactions on the basis of six behavioral characteristics: facial expressions, vocal expressions, body position and contact, affection, turn-taking, control, and choice of activity. Parental styles of interaction are assessed on three scales: sensitive with responsiveness towards the emotions and actions of the child, controlling with hostility and intrusiveness towards the activities of the child, and unresponsive with physical and emotional detachment. The styles of interaction of the child are assessed on four scales: cooperative with expression of positive emotions and acceptance of actions undertaken by the parent, compliant-compulsive with cautious and inhibited behavior and a compliant approach towards the parent,

difficult with resistance to proposals of the parent, and passive with physical and emotional withdrawal.

Data analysis

The SPSS Statistic 24.0 package was used for all analyses. Preliminary analyses were undertaken to identify missing data. Descriptive statistics were calculated with respect to demographic characteristics: *t* tests and bivariate correlations were applied. We first analyzed the distribution of scores relating to depression and anxiety to identify the percentage of mothers and fathers collocated in the clinical range. Secondly, using the Pearson correlation, we analyzed the associations between maternal and paternal depression and anxiety. Thirdly, we used multiple linear regressions to identify which states of maternal and paternal discomfort were more predictive of the quality of mother-infant interactions.

Results

Preliminary analysis

Less than 5% of all questionnaire items were not filled in, so we managed the missing data with listwise deletion. Preliminary analyses with correlations did not show significant relations between maternal and paternal age, maternal education, socio-economic level, and maternal and paternal depression and anxiety or style of dyadic interactions. Moreover, no significant differences emerged from *t* test with respect to marital status, employment, gender, and infant first born in relation to paternal and maternal depression and anxiety or style of dyadic interactions. We therefore did not consider these variables in the following analyses.

Comparison between mothers and fathers

We analyzed frequency, mean, and standard deviation for anxiety and depression of mothers and fathers and for the categories of the CARE-INDEX. Of the mothers, 14.3% had scores which exceeded the clinical cutoff (≥ 13) for depression; 32.9% of the mothers had high scores with respect to state anxiety (cutoff ≥ 39), and 31.4% of the mothers had high scores with respect to trait anxiety (cutoff ≥ 42). For what concerns fathers, 2.9% of the fathers had scores which exceeded the clinical cutoff (≥ 12) for depression; 21.7% of the fathers had high scores with respect to state anxiety (cutoff ≥ 39), and 11.6% of the fathers had high scores with respect to trait anxiety (cutoff ≥ 42). Moreover, a paired sample *t* test showed differences between EPDS and STAI-Y mean scores for the mothers and fathers in each couple, with mothers showing higher scores than fathers (see Table 1).

Table 1 Mean and standard deviations of EPDS, STAI-Y, and CARE-INDEX categories

	Mother	Father	<i>t</i>	<i>P</i>
EPDS	7.46 (4.68)	3.53 (3.44)	5.70	0.000***
STAI-Y state	35.91 (8.85)	32.20 (7.23)	3.34	0.001**
STAI-Y trait	37.44 (9.43)	31.72 (8.01)	4.92	0.000***
Sensitivity	7.46 (3.07)			
Controlling	4.20 (3.06)			
Unresponsive	2.34 (3.45)			
Cooperative	5.69 (3.62)			
Compulsive	0.15 (0.35)			
Difficult	1.79 (3.42)			
Passive	6.41 (3.53)			

** $p < 0.01$, *** $p < 0.000$

Correlations

Maternal depression was positively correlated with maternal trait and state anxiety and positively correlated with paternal state and trait anxiety. Maternal state anxiety was positively correlated with paternal state and trait anxiety. Moreover, maternal trait anxiety was positively correlated with paternal depression and state and trait anxiety. However, maternal depression was not correlated with paternal depression (see Table 2).

Maternal sensitivity was negatively correlated with maternal depression and state anxiety and paternal trait anxiety. Maternal controlling style was negatively correlated with paternal state anxiety. Maternal unresponsive style was positively correlated with paternal depression, trait, and state anxiety. Infant passive style was positively correlated with paternal trait anxiety.

Table 2 Correlations between maternal and paternal risks, and CARE-INDEX categories

	(1)	(2)	(3)	(4)	(5)	(6)
Maternal depression (1)	–					
Maternal state anxiety (2)	0.59***	–				
Maternal trait anxiety (3)	0.66***	0.71***	–			
Paternal depression (4)	0.01	0.16	0.23*	–		
Paternal state anxiety (5)	0.23*	0.32**	0.40**	0.51***	–	
Paternal trait anxiety (6)	0.24*	0.35**	0.38**	0.57***	0.84***	–
Sensitivity	–0.26*	–0.38**	–0.23	–0.10	–0.17	–0.30*
Controlling	0.24	0.22	0.03	–0.21	–0.31*	–0.21
Unresponsive	0.02	0.14	0.18	0.27*	0.43***	0.47***
Cooperative	–0.24	–0.28	–0.16	–0.18	–0.11	–0.23
Compulsive	0.24	0.08	0.14	0.04	–0.15	0.07
Difficult	0.01	0.18	0.47	0.11	–0.14	–0.09
Passive	0.20	0.10	0.10	0.06	0.23	0.32*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.000$

Multiple regressions

Multiple regression analysis was conducted to analyze the effect of maternal and paternal depression and anxiety on each mother and infant style of interaction; we tested theoretically relevant interactions (see Table 3).

For the maternal sensitivity style, the model explained 29% of the variance which was statistically significant, $F(6, 53) = 2.04$, $p = 0.048$. A high level of maternal state anxiety ($t = -2.38$, $p = 0.021$) was the only significant predictor of a lower score on the sensitivity scale. No interaction effects were significant. For the maternal controlling category, the model explained 32% of the variance which was statistically significant, $F(6, 53) = 2.99$, $p = 0.008$. The interaction effect between maternal state and paternal state anxiety showed that a high level of maternal state anxiety with a low level of paternal state anxiety ($t = -2.82$, $p = 0.007$) was a significant predictor of a higher score on the controlling scale.

For the maternal unresponsive style, the model explained 31% of the variance which was statistically significant, $F(6, 53) = 2.97$, $p = 0.008$. A high level of paternal state anxiety ($t = 2.10$, $p = 0.040$) was a significant predictor of a higher score on the unresponsive scale. The interaction effect between maternal depression and paternal depression showed that a high level of maternal depression with a high level of paternal depression ($t = 2.04$, $p = 0.046$) was a significant predictor of a higher score on the unresponsive scale. There were no significant predictive effects for the styles of the child.

Discussion

The study provided significant results on the relationship between anxiety and depression in mothers and fathers and on

Table 3 Multiple regression models predicting CARE-INDEX categories

	<i>B</i>	SE	<i>p</i>
Mother sensitivity			
Maternal depression	0.05	0.12	0.73
Maternal state anxiety	−0.38	0.05	0.021*
Paternal depression	−0.01	0.13	0.92
Paternal state anxiety	−0.11	0.06	0.45
M depression × M state anxiety	−0.07	0.01	0.60
M depression × F depression	0.19	0.03	0.20
M depression × F state anxiety	−0.06	0.01	0.71
M state anxiety × F state anxiety	0.10	0.00	0.54
Mother controlling			
Maternal depression	0.19	0.11	0.23
Maternal state anxiety	0.14	0.05	0.32
Paternal depression	−0.05	0.11	0.68
Paternal state anxiety	−0.22	0.06	0.12
M depression × M state anxiety	0.10	0.01	0.43
M depression × F depression	0.12	0.03	0.38
M depression × F state anxiety	0.07	0.01	0.62
M state anxiety × F state anxiety	−0.43	0.00	0.007**
Mother unresponsive			
Maternal depression	−0.23	0.13	0.16
Maternal state anxiety	0.21	0.06	0.15
Paternal depression	0.06	0.13	0.65
Paternal state anxiety	0.30	0.07	0.040*
M depression × M state anxiety	−0.02	0.01	0.84
M depression × F depression	0.28	0.03	0.046*
M depression × F state anxiety	−0.01	0.01	0.94
M state anxiety × F state anxiety	0.29	0.00	0.06

* $p < 0.05$, ** $p < 0.01$

the effect of the discomfort of both in mother-infant interactions at 3 months.

Firstly, mothers had higher depression and anxiety scores than fathers, confirming the idea that women are more vulnerable than men in the period of transition to parenthood (Figueiredo and Conde 2011). High correlation between maternal depression and anxiety (Andersson et al. 2006) and between paternal depression and anxiety (Cameron et al. 2016) also emerged. Maternal depression was shown to be associated with paternal anxiety (Paulson et al. 2016) and maternal anxiety with paternal anxiety and depression (Vismara et al. 2016). Contrary to the literature, maternal depression was not associated with paternal depression.

Secondly, maternal anxiety and depression were associated with quality of mother-infant interactions at 3 months. Maternal sensitive style was negatively correlated with maternal depression and state anxiety. There were also significant associations

between paternal depression and anxiety and mother-infant styles of interaction. Maternal sensitive style was negatively correlated with paternal trait anxiety; maternal unresponsive style was positively associated with both paternal depression and state and trait anxiety. The results therefore show that paternal depression and anxiety influence maternal styles of interaction, increasing withdrawal and decreasing sensitivity.

Contrary to what we hypothesized, there were no significant correlations between maternal and paternal depression and anxiety and the styles of interaction of the infant, apart from a correlation between passive style and paternal trait anxiety. This is, to our knowledge, the first study to examine at 3 months in natural conditions the effect of maternal and paternal anxiety and depression on the styles of interaction of the infant as well as on those of the mother. Other studies (Aktar et al. 2017) have examined the effect of parental depression and anxiety on the infant's expression of emotions but not on his styles of interaction. One of these, Aktar et al. (2017) has shown that parental depression, but not parental anxiety, affects the infant's expression of positive emotions at 3 months. Another study has examined the effects of maternal depression and anxiety on the infant's styles of interaction, doing so however in stressful conditions constituted by the FFSFP (Asselmann et al. 2018). The study showed, in particular, that maternal anxiety and depression together (vs absence of maternal anxiety and depression) result in a greater increase of distancing behavior in the infant at 4 months at that stage of the procedure in which the mother has a still face expression. With regard to our results, we may hypothesize that the effects of maternal and paternal depression and anxiety—observed in natural conditions—have an early impact on maternal styles of interaction and a later impact on the styles that the infant develops progressively in interaction with the mother. In order to verify this hypothesis, it may be useful to conduct a longitudinal study, examining the effects of parental depression and anxiety on the infant's interaction styles after 3 months during the first year. In this regard, the study of Feldman et al. (2009), conducted at 9 months, showed that maternal depression (vs absence of maternal depression) affects the infant, causing lower social engagement, less mature regulation, and more negative emotionality.

Furthermore, multiple regression analysis has shown that maternal state anxiety is a greater predictor of lower maternal sensitivity than maternal depression and paternal depression and anxiety. Moreover, maternal controlling style is predicted by high levels of maternal state anxiety associated with low levels of paternal state anxiety. The analysis, therefore, shows that high maternal anxiety plays a more important role than maternal depression in relation to maternal sensitivity, a role which remains also with regard to maternal controlling style, when it is associated with low paternal state anxiety. We may hypothesize that low paternal state anxiety implies that there is little involvement on the part of the father in the context of mother-infant caregiving. This low level of involvement could

be correlated to a high level of maternal state anxiety, explaining the effect of the interaction of low paternal anxiety and high maternal anxiety on maternal controlling style. Lastly, maternal unresponsiveness, involving withdrawal and emotional detachment, is predicted both by paternal state anxiety and by high levels of maternal depression associated with high levels of paternal depression.

To sum up, our study is one of the few to have examined the relationship between maternal and paternal depression and anxiety and quality of mother-infant interactions at 3 months. Compared to previous research, the results show the importance not only of maternal depression but also of maternal anxiety in influencing maternal styles of interaction with the infant. In particular, maternal state anxiety seems to be a greater predictor of maternal sensitivity. Moreover, to our knowledge, this is the first study to show that paternal anxiety and depression influence maternal styles of interaction, with regard to levels of intrusiveness and withdrawal. It is also the first study to show the joint effect of the association between maternal and paternal depression on maternal unresponsive style.

The results, therefore, demonstrate how important it is to identify, with the use of screening programs at an early stage, depression and anxiety, not only in mothers but also in fathers. Indeed, parental anxiety and depression, involving the expression of negative emotions in interactions with the infant, have been shown to be important factors in the parent-infant transmission of depression and anxiety (El-Sayed et al. 2012).

Since parental anxiety and depression seem to have an early influence on the quality of mother-infant interaction, it is important to provide timely preventive and support interventions, such as attachment-based intervention (Steele and Steele 2017), which is not only mother-focused but also father-focused, in order to increase well-being and parenting skills and thus foster the mother-father-infant relationship.

There are some limitations to and possible future directions for our study. The size of our sample should be increased so that the results can be generalized to a greater extent. It must also be taken into consideration that the study examined couples with primiparae women without at risk pregnancies. Therefore, in order to generalize the results, a further study could include pluriparae women and women with at-risk pregnancies. A further analysis could examine the reciprocal impact of women and partners' depression and anxiety and how this reciprocal impact affects the quality of mother-infant interaction, using an analysis model such as the Actor Partner Interdependence Model (APIM; Kashy and Kenny 1999). This model can determine how outcomes are influenced bidirectionally by both members of the dyads (Cook and Kenney 2005). In this regard, another limit of the study is that it focuses on mother-infant interaction, not directly examining father-infant interaction, and the possible interdependence of the father-infant interaction with the mother's level of depression and anxiety with respect to the mother's interaction style.

Furthermore, anxiety and depression were assessed with questionnaires and not diagnostic clinical interviews. Lastly, potentially important variables such as the quality of a couple's relationship, the temperament of the infant and maternal attachment, which could serve as moderators in the relationship between paternal and maternal depression and anxiety and styles of interaction, were not considered.

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