



# Early styles of interaction in mother-twin infant dyads and maternal mental health

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## Abstract

Transition to parenthood is considered a critical process for mothers of twins. There are, however, few studies on the subject. This study aims to evaluate the differences between mother-twin infant dyads and mother-singleton infant dyads with regard to maternal depression, anxiety, parenting stress, and the quality of mother-infant interaction. Mothers of twin infants ( $N = 40$ ) were compared to mothers of singletons ( $N = 72$ ). At infant 3 months, maternal depression, anxiety, and parenting stress were assessed via a questionnaire and styles of interaction with the Care-Index. The results indicated that mothers of twins (vs mothers of singletons) had significantly higher state anxiety and higher scores on the Difficult Child Scale of the Parenting Stress Index at infant 3 months. No significant differences between the two groups were found with regard to maternal depression. Mothers of twins had significantly lower sensitivity and were more unresponsive than mothers of singletons. Twin infants had significantly more difficult and compliant behaviours than singleton infants. Assisted reproductive treatment (ART) and prematurity had no effect on any of the examined variables. State anxiety was shown to partially mediate the relationship between twin parenthood and maternal sensitivity and to completely mediate the relationship between twin parenthood and infant difficult style. Maternal unresponsiveness was shown to be exclusively linked to being the parent of twins. The study shows that twin parenthood has a significant effect on maternal mental health and on the quality of mother-infant interaction and highlights the importance of early prevention programmes for twin parents.

**Keywords** Twins and singletons · Mothers of twins · Mother-infant interaction · Maternal anxiety · Parenting stress · Maternal depression

## Introduction

Despite the progressive increase in twin and multiple births in the last few decades rising from 1 to 3.41% in the US of all births in recent years (Anderson et al. 2017; ASRM 2012), also due to the growth in infertility treatment and the use of assisted reproductive treatment (ART), there are fewer studies

that have analyzed the impact of this phenomenon on the mental health of parents and on their parenting styles in the infant's first year.

## Twin parenthood and maternal mental health

A large body of prior studies documents the risks of twin pregnancy to maternal, fetal and neonatal physical health (Glazebrook et al. 2004; Prino et al. 2016; Wenzel et al. 2015), such as hypertension and diabetes during pregnancy, intrauterine fetal growth retardation and neonatal premature birth. There are, however, fewer studies on the risks to parental mental health and the results of these studies are equivocal. From a psychodynamic perspective, the transition towards parenthood is a period of vulnerability for a woman (Brockington 2004; Rollè et al. 2017). In this period, the mother-to-be has to re-organize her identity with regard to her new role as parent and prepare a mental space for the coming infant (Slade et al. 2009). The mother of the future twins, especially if the twin pregnancy is unexpected, may find it

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difficult to differentiate her emotional investment, having to “double” the mental space dedicated to them (Brustia 2011). Even after the birth, she tends to relate to both rather than to each individually, at the expense of their individuality (Zazzo 1987). The father’s role may, therefore, be important in this condition. He should help the mother, also relieving her of part of her caregiving, in establishing an attuned relationship with each of the twins.

Other qualitative studies (Beck 2002) have also shown that mothers of twins have intense feelings of physical and mental fatigue in the perinatal period and continually oscillate between positive emotions and feelings of helplessness. This condition may be linked to the stress caused by the need felt by mothers of twins to be “egalitarian” towards their infants, giving each equal care and, at the same time, demonstrating their ability to acknowledge the individuality of each (Holditch-Davis et al. 1999).

From an empirical perspective, studies focusing on post-partum depression show an increased risk for mothers of twins compared to mothers of singletons (see the review of Wenze et al. 2015). However, a number of these studies compare singleton births with multiple births, comprising both twins and triplets (Ystrom et al. 2014). One study also compared mothers of twins who used ART, mothers of twins who did not use ART and mothers of singleton, showing that twin parenthood vs singleton parenthood has an impact on maternal depression and anxiety whilst using ART does not (Vilksa et al. 2009). This could—according to the authors—be due to the fact that infertile mothers show a higher degree of preparedness and positivity towards twin births compared to fertile mothers.

Fewer studies have compared levels of anxiety in mothers of twins vs mothers of singletons post-partum, showing for the most part a significant increase in anxiety in the former (Vilksa et al. 2009), except for some studies (Glazebrook et al. 2001; Ystrom et al. 2014). Parenting stress was also shown to be greater in the mothers of twins than in singleton mothers (Glazebrook et al. 2001), except in those of Ellison (2005) and Singer (1999). However, in some cases, the studies group together mothers of twins and mothers of triplets (Feldman et al. 2004) or mothers who used ART and mothers who did not use ART (Glazebrook et al. 2001). In other cases, these sub-groups are compared with mixed results. Cook et al. (1998) found that parenting stress is greater in the perinatal period in ART mothers, while others (Vilksa et al. 2009) found that twin motherhood increased parenting stress but that using ART did not. Another variable, which often fails to be distinguished in those studies with possible confounding effects, is twin prematurity, a condition that could further increase stress for twin mothers.

### Twin parenthood and mother-infant interaction styles

There are few twin studies on mother-infant interaction, and they concern, for the most part, premature twins. Some studies

(Beer et al. 2013; Ostfeld et al. 2000) show that mothers of premature twins (vs mothers of premature singletons) at infant 3 months are less responsive to their children, who are less responsive just as premature singletons are. It is to be noted in this regard that, on the contrary, according to various studies, mothers of premature singletons (vs mothers of full term infants) have a more controlling style towards their infants to offset their low level of responsiveness (Forcada-Guex et al. 2006).

There are even fewer observational studies on full-term twins. Those of Feldman (Feldman et al. 2004; Feldman and Eidelman 2005) have shown that mothers of twins are less sensitive than mothers of singletons. According to the author, the lower level of sensitivity could be linked to the difficulty mothers of twins have in providing individual and exclusive care to their infants. Boivin et al. (2005) highlight that mothers of twins—vs mothers of singletons—report perceiving themselves as less effective and more hostile and reactive towards their infants.

### Approach of our study

In brief, studies on the mental health of mothers of twins are not fully consistent. They are often conducted on small and non-homogeneous samples at different infant ages. Furthermore, there are few observational studies on mother-infant interaction styles and almost all concern premature twins. Since the quality of mother-infant interaction in infancy has a significant impact on the social-emotional development of the infant and on his psychopathological risk (Sroufe et al. 2010; Verhage et al. 2018), it is important to study whether twin motherhood is a condition of risk for a satisfactory relationship between mother and infant and for maternal well-being.

Our study therefore proposes to address the gaps in the existing literature on twin parenthood with respect to maternal mental health and mother-infant interaction styles, examining this interaction using an observational approach. The first aim is to compare the incidence of depression, anxiety and parenting stress in the mothers of twins with that of mothers of singletons at infant 3 months. On the basis of most studies, we expect depression, anxiety and parenting stress to be greater in mothers of twins. The second aim is to assess mother-infant interaction styles at infant 3 months (Crittenden 1998). In this regard, we expect, on the basis of existing studies, mothers of twins to be less sensitive than mothers of singletons. The study is exploratory for the other mother-infant interaction styles, given the absence of results in this regard.

At an exploratory level, we also intend to analyze (a) whether using ART is linked to mother-infant interaction styles; (b) possible differences in the interaction styles of mother-premature twin couples and mother-non premature twin couples; (c) whether depression, anxiety and parenting

stress play a mediating role in mother-infant interaction styles considering mothers of twins and mothers of singletons.

The study was conducted at infant 3 months, a period that is considered crucial for the structuring of interactive patterns between mother and infant and for future attachment models (Beebe et al. 2010).

## Method

### Participants

The participants were recruited between 2013 and 2015 from a community sample. Of the 50 mothers of twins contacted who met the criteria of the study, 10 declined to participate. Of the 110 mothers of singletons contacted, 38 declined to participate. The study group consisted of 40 mothers with twins recruited at the *Twin Clinic of the OIRM Sant'Anna of Turin* and 72 mothers with singletons recruited at the family centres and hospitals of the “*Azienda Sanitaria Locale no. 2 Savonese*”, both located in Northern Italy.

Inclusion criteria for all participants in the study were ability to speak and understand the Italian language, age range between 23 and 48, absence of diagnosed maternal psychotic psychopathology and uneventful pathological complications at delivery. For the socio-demographic characteristics of the two groups, see Table 1.

The study protocol was approved by the institutional review board of the University of Milano-Bicocca and of the University of Turin. All subjects gave their written informed consent.

### Procedure

After the mothers had been invited to participate in the study and had given their informed consent, we gathered medical history data, also on diagnosed psychopathology, and sociodemographic data using ad hoc forms. Questionnaires were then administered to the mothers in order to assess depression, anxiety and parenting stress at infant 3 months. In the same meeting, mother-infant couples were video-recorded for around 5 minutes in a laboratory consisting of a suitably furnished play room. With twin mothers, we recorded interaction with each of the twins. The mothers were instructed to interact with the infant as they would normally do at home.

### Measures

#### Post-partum depression

Edinburgh Postnatal Depression Scale (EPDS; Cox et al. 1987) was used to evaluate risk of depression. It is a self-report questionnaire intended to identify depression in the last week of pregnancy and in the post-partum period. The cut-off

used to evaluate probable depression in mothers was  $\geq 13$ . Internal consistency was  $\alpha = .78$ .

#### Anxiety

State Trait Anxiety Scale (STAI-Y; Spielberger et al. 1983), a self-report questionnaire, was used to assess maternal anxiety. The questionnaire is composed of two scales: 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. Cut-offs of 39 and 42 were used, respectively, for state anxiety and for trait anxiety. Internal consistency was  $\alpha = .78$  for the state anxiety scale and  $\alpha = .86$  for the trait anxiety scale.

#### Parenting stress

Parenting stress was measured with the Parenting Stress Index-Short Form (PSI-SF; Abidin 1995), a self-report questionnaire composed of 3 sub-scales: parental distress, which measures the amount of distress caused by personal factors of the parent (cut-off  $> 35$ ); parent-child dysfunctional interaction, which reflects how the child meets the expectations of the parent (cut-off  $> 26$ ); difficult child, which assesses the behavioural characteristics of the infant that make him/her difficult or easy to manage (cut-off  $> 29$ ). The total stress score is the sum of the three sub-scales (cut-off  $> 85$ ). Internal consistency was  $\alpha = .90$  for the total scale.

#### Mother-infant interaction

Interactions were video-recorded and evaluated with the Child-Adult Relationship Experimental Index (Care-Index) (Crittenden 1998). Parental styles of interaction were assessed on three scales: sensitive with responsiveness towards the emotions and activities 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 activities undertaken by the parent, compulsive compliant with cautious and inhibited behaviour and a compliant approach towards the parent, difficult with resistance to proposals of the parent and passive with physical and emotional withdrawal. For all scales, the scores vary from 0 to 14. With respect to the scores given to maternal sensitivity and infant cooperativeness, the range of scores 0–4 is considered high risk; the range of scores 5–6 indicated that maternal sensitivity is only marginally adequate; 7–10 indicates adequate sensitivity and 11–14 indicates very good sensitivity. Reliability between observers was calculated on 20% of the observations of

**Table 1** Socio-demographic profile

	Twins ( <i>N</i> = 40)	Singletons ( <i>N</i> = 72)	
Maternal age (mean; SD)	34.27; 5.1	33.25; 5.2	n.s.
Marital status			
Single	0%	2.7%	n.s.
Married/living with a partner	100%	97.3%	
Occupation			
Job	97.5%	86%	n.s.
No job	2.5%	14%	
Education			
Less than High School	5.3%	5.5%	n.s.
High School Diploma	26.3%	51.4%	
Bachelor's Degree	15.7%	12.5%	
Master's Degree	42.2%	27.8%	
PhD	10.5%	2.8%	
ART	60%	0%	
Infant born preterm	65%	0%	
Range of gestational weeks	32–40	38–40	
Pre-term weeks delivery (Mean)	4.5		
Infant health complications	0%	0%	

the dyads through the intraclass correlation coefficient and was  $ICC = .75$  for maternal behaviour and  $ICC = .78$  for infant behaviour.

### Statistical analysis

SPSS 24 was used for all analyses. Demographic characteristics, analyzed with *t* tests, Pearson correlation and the Chi-square test, did not have a significant impact on or relationship with maternal depression, anxiety, stress and mother-infant interactions. We used *t* tests or multivariate ANOVA to evaluate differences between mothers of twins and mothers of singletons with regard to maternal depression, anxiety and parenting stress. We used ANOVA to evaluate differences between the dyadic interaction of mothers with one of their twins and that of the same mothers with their other twin and we found no significant differences. Given that no significant differences emerged, we created new variables for maternal and infant interaction style categories to identify mean scores between the interaction of mothers with one of their twins and that of the same mothers with their other twin. We did likewise with the parenting stress scales. We also used ANOVA to evaluate differences between twin mother dyads and singleton mother dyads on mother-infant interaction. We then conducted mediation analysis using the Bootstrapping procedure. In the twin mother dyad group, using multivariate ANOVA, we evaluated differences with respect to using and not using ART and gestational age (pre-maturity/full term birth).

## Results

### Depression, anxiety and parenting stress in mothers of twins vs mothers of singletons

*T* test indicated that mothers of twins had higher scores on state anxiety than mothers of singletons (see Table 2). A post hoc power analysis using G\*Power showed that the model was powered (power = .99; *d* = .88).

No significant differences between the two groups emerged for maternal depression and trait anxiety.

Multivariate tests indicated that being a twin mother or a singleton mother had a significant overall effect on parenting stress (Pillai trace  $F(4, 96) = 3.43$ ,  $p = .001$ ,  $\eta^2 = .12$ ). The univariate test indicated that mothers of twins (vs mothers of singletons) had higher scores on PSI-SF Difficult Child scales scale.

### Differences between interaction styles of mother-twin dyads and mother-singleton dyads

Multivariate tests indicated that being a twin mother or a singleton mother had a significant overall effect (Pillai trace  $F(7, 103) = 24.98$ ,  $p = .000$ ,  $\eta^2 = .63$ ). Univariate tests indicated that twin mothers (vs singleton mothers) had lower scores on the sensitivity scale and higher scores on the unresponsive scale (see Table 3). Their level of sensitivity ( $M = 6.4$ ) comes within the risk range using the Crittenden assessment (1998), unlike that of singleton mothers which is adequate ( $M = 8.5$ ).

Twin infants had higher scores on the compulsive compliant and difficult scales and lower scores on the passive scale than singleton infants. The model was powered (power = .99).

**Table 2** Differences between mothers of twins and mothers of singletons as regards depression, anxiety and parenting stress

	Twins ( <i>M ± DS</i> )	Singletons ( <i>M ± DS</i> )	<i>t</i> or <i>F</i>	<i>p</i>
Depression	7.66 ± 4.36	6.21 ± 4.03	1.53	.11
State anxiety	38.72 ± 5.33	32.88 ± 7.67	3.75	.000***
Trait anxiety	34.54 ± 7.17	34.47 ± 7.89	-.03	.97
PSI-parental distress	23.27 ± 6.96	24.73 ± 7.90	.75	.38
PSI-parent-child dysfunctional interaction	17.91 ± 4.11	18.54 ± 5.86	.27	.60
PSI-difficult child	22.94 ± 6.45	19.31 ± 6.55	6.39	.013*
PSI-total stress	64.10 ± 15.35	62.59 ± 16.09	.18	.66

\**p* < .05, \*\*\* *p* < .000

**Mediation**

We conducted mediation analysis to examine whether maternal state anxiety and the PSI Difficult child scale had a mediation effect on the relationship between twins/singletons and style of interaction.

Twin parenthood is predictive of less maternal sensitivity (*b* = -2.35; *t* = -4.23; *p* = .000) and this relationship is mediated partially by greater state anxiety (*b* = -.08; *t* = -2.34; *p* = .021; 95% CI: -1.04, -.007). Twin parenthood is predictive of maternal unresponsive style (*b* = 2.51; *t* = 5.22; *p* = .000) and this relationship is direct and not mediated by anxiety (95% CI: -.43, .33). Twin parenthood is predictive of more infant difficult behaviour (*b* = 1.41; *t* = 2.23; *p* = .02) and this relationship is mediated completely by greater state anxiety (*b* = .12; *t* = -3.10; *p* = .002; 95% CI: .11, 1.46). Twin parenthood is predictive of greater infant compliant behaviour (*b* = 1.29; *t* = 7.58; *p* = .000) and this relationship is direct and not mediated by anxiety (95% CI: -.04, 1.52). The PSI Difficult Child scale was not a mediator with a significant effect.

**Differences between mother-twin dyads with and without ART**

The twin mother group was divided into two sub-groups: with ART (*N* = 21) and without ART (*N* = 14). There were no

significant differences between the two groups with respect to mother-infant interaction styles (Pillai trace *F*(6, 26) = 1.00, *p* = .44), depression (*t* = 1.38; *p* = .17), state anxiety (*t* = 1.64; *p* = .19), trait anxiety (*t* = 1.76; *p* = .09) and parenting stress (Pillai trace *F*(4, 22) = .41, *p* = .79).

**Differences between mother-twin dyads with preterm and full-term infants**

The mother-twin dyad group was subdivided on the basis of the gestation week (37 weeks) into a group of 14 dyads with full-term infants and another group of 26 dyads with preterm twins (*M* = 35.12; *sd* = 1.15; range 32–36 weeks). No significant differences emerged between mothers of premature twins and mothers of full-term twins for mother and infant style of interaction (Pillai trace *F*(6, 31) = 1.97, *p* = .10), for depression (*t* = 1.12; *p* = .27), state anxiety (*t* = -.92; *p* = .36), trait anxiety (*t* = -.20; *p* = .83) and parenting stress (Pillai trace *F*(4, 24) = .74, *p* = .57).

**Discussion**

Firstly, the study shows, providing new results with respect to previous studies, that mental distress in twin mothers seems to be due notably to being the parent of

**Table 3** Differences between mothers of twins and mothers of singletons on Care-Index

	Twins ( <i>M ± DS</i> )	Singletons ( <i>M ± DS</i> )	<i>F</i>	<i>p</i>	$\eta^2$
Sensitive	6.44 ± 2.76	8.51 ± 2.73	18.01	.000***	.14
Controlling	3.11 ± 1.73	3.58 ± 2.8	.86	.35	
Unresponsive	4.43 ± 1.89	1.91 ± 2.62	27.34	.000***	.20
Cooperative	6.56 ± 1.66	6.40 ± 3.88	.06	.80	
Compulsive compliant	1.28 ± 1.33	.08 ± .40	50.22	.000***	.31
Difficult	2.86 ± 1.37	1.65 ± 3.22	4.9	.029*	.04
Passive	3.35 ± 1.83	5.84 ± 3.44	17.26	.000***	.13

\**p* < .05, \*\*\* *p* < .000

twins, as borne out by the high level of parenting stress and state anxiety, a type of anxiety which relates to the circumstances in which the subject actually finds him/herself. Depressive states, relating to factors which may be linked to a greater extent to a mother's history of vulnerability (Brockington 2004), do not differ from the normative sample of singleton mothers, just like trait anxiety, understood as a stable aspect of the personality which is not linked to context (Spielberger et al. 1983).

The twin parenthood condition also seems to have a greater impact than the other conditions examined in relation to maternal anxiety and stress. Indeed, no difference was found for anxiety, depression, or parenting stress when comparing mothers of premature twins and non-premature twins and mothers of twins born with and without ART.

Secondly, the results concerning interaction between mothers and twins are of particular interest, given the few observational studies in this regard. Twin mothers adopt interaction styles which are more at risk than singleton mothers, being less sensitive and more unresponsive, showing a more withdrawn style physically and emotionally. It is to be noted that, according to regression analysis, maternal unresponsiveness, unlike sensitivity which is partially mediated by anxiety, is not influenced by maternal mental distress, being exclusively linked to twin parenthood. This style could be linked to the fact that the mothers, pressured by the need of caregiving, are unable to adopt adequate emotional involvement with each of their twins. It might be interesting in a future study, involving the fathers of twins, to evaluate whether the quality of the relationship of the mother with the father of the infants and the sensitivity displayed by the father with them can mitigate the non-responsiveness of the mother.

For their part twins, compared to singletons, adopt a more difficult style with their mothers, resisting and crying and/or compliant with inhibited responses and lack of emotional involvement (Crittenden 1992). It is to be noted in this regard that, in the study, while infant difficult style is mediated entirely by maternal anxiety, infant compliant style, usually observed in at-risk parenting conditions such as neglecting (Crittenden 1992), seems connected only to the condition of twinhood, being predicted entirely by this condition.

## Limitations

Our study has some limits. The low number of participants in the mother twin group reduces the possibility of generalizing the results, particularly in relation to the analysis based on subdivision into ART vs non-ART subgroups and premature vs non-premature sub-groups. We also did not take into consideration variables of interest, for instance infant temperament, and the role played by the father, such as the quality

of the conjugal relationship and his mental distress, which were shown to affect maternal sensitivity (Ierardi et al. 2019). Furthermore, maternal distress was assessed only with self-reports.

## Conclusion

The study shows, contributing new findings, that twin parenthood is a double condition of risk at infant 3 months for what concerns maternal mental health, increasing maternal anxiety and distress, and the mother's relationship with the infant, affecting the sensitivity of the mother and increasing her unresponsiveness, and inducing difficult and compliant behaviour in the infant.

The study has key clinical implications. It highlights the importance of monitoring the mental health of twin mothers in the perinatal period and of involving them together with the fathers in early prevention programmes in order to improve the parent-infant relationship (Riva Crugnola et al. 2016, 2019).

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Human participants** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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