The role of negative maternal affective states and infant temperament in early interactions between infants with cleft lip and their mothers

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The Role of Negative Maternal Affective States and Infant Temperament in Early Interactions Between Infants With Cleft Lip and Their Mothers

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Objectives The study examined the early interaction between mothers and their infants with cleft lip, assessing the role of maternal affective state and expressiveness and differences in infant temperament. **Methods** Mother–infant interactions were assessed in 25 2-month-old infants with cleft lip and 25 age-matched healthy infants. Self-report and behavioral observations were used to assess maternal depressive symptoms and expressions. Mothers rated infant temperament. **Results** Infants with cleft lip were less engaged and their mothers showed more difficulty in interaction than control group dyads. Mothers of infants with cleft lip displayed more negative affectivity, but did not report more self-rated depressive symptoms than control group mothers. No group differences were found in infant temperament. **Conclusions** In order to support the mother's experience and facilitate her ongoing parental role, findings highlight the importance of identifying maternal negative affectivity during early interactions, even when they seem have little awareness of their depressive symptoms.

Key words cleft lip and palate; early mother–infant interactions; maternal depression; temperament.

Introduction

Clefts of the lip and palate are congenital malformations affecting the upper lip and the roof of the mouth (Lilius, 1992; Wyszynski, Sarkozi & Czeizel, 2006). They occur in about 1 in 700 live births, and are generally divided into isolated cleft palate and cleft lip with or without cleft palate (Mossey & Castillia, 2003). Effects on speech, hearing and appearance can lead to long-term negative effects on health and social integration. Infants have feeding problems, and the cleft can also lead to physical complications (e.g., ear infections, dental problems); affected children are at increased developmental risk for deficits in language development (Kapp-Simon & Krueckberg, 2000). Not only are the physical and language impairments in children with cleft lip clinically important, but also one area attracting increasing research interest is the role that early infant–mother interactions may play in child cognitive and socio emotional functioning (Hentges et al., 2011; Murray et al., 2008, 2010).

Although the disfigurement makes infants with clefts less appealing (Goodacre, Henteges, Moss, Short & Murray, 2004) and less easy for parents to interpret their

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expressions (Field, 1977; Field & Vega-Lahr, 1984; Goldberg, Brachfeld & DiVitto, 1980), the question about the extent to which difficulties in parent–infant interactions may be explained by the emotional reactions of mothers remains open. Parents may experience an initial emotional reaction of shock, confusion, sadness, anger, and guilt (Bradbury & Hewison, 1994), before they are able to form a bond with their babies (Drotar et al., 1975). Mothers may feel a strong sense of anger for the loss of the perfect child, represented and emotionally invested in their minds, and for the associated sense of inadequacy (Tisza & Gumpertz, 1962). Nevertheless, few studies, focused on the quality of relationship between mothers and infants with cleft lip, have examined maternal depression. Endriga and Speltz (1997) found that low maternal involvement in the cleft group was not predicted by maternal psychological distress. Murray et al. (2008) found that mothers in a cleft lip and palate group were more likely to be depressed than control mothers, but found no evidence that maternal depression affected interactions with the infant. However, these findings are inconsistent with several studies documenting the negative influence of maternal depression on early mother–infant social exchanges (Murray et al., 2010; Tronick & Reck, 2009). It should be noted, however, that in these studies of populations with clefts, self-report, rather than observational measures, was used to assess maternal emotional state; moreover, the numbers of mothers with depression might have been too small to detect effects. Notably, a previous study has documented some discrepancy between behavioral observation and self-rating scales (measuring stress, social support, parenting, and general life satisfaction, although not depressive symptoms) in mothers of infants with craniofacial anomalies (Barden, Ford, Jensen, Rogers-Salyer & Sayler, 1989). Thus, a possible explanation is that mothers of infants with cleft lip may be unaware of, or tend to minimize their negative emotional states. In order to overcome this limitation in the present study, both self-report and behavioral observation measures were used to assess the role played by maternal depressive affectivity in the quality of early mother–infant interactions.

Within a transactional perspective on mother–infant interactions (Fiese & Sameroff, 1989), another issue possibly affecting the interpretation of previous face-to-face studies is the way in which infant temperament influences the early social exchanges. Although there are some differences in the conceptualization, most posit that temperament comprises several dimensions of behavior, conceptualized as individual differences appearing in infancy (Rothbart, Ahadi, & Evans, 2000). These dimensions typically include reactivity, self-regulation, positive and negative emotionality, and approach or withdrawal (Else-Quest, Hyde, Goldsmith & Van Hulle 2006). A major empirical issue in infant temperament research concerns the fact that parent reports of infant temperament include an objective component (i.e., actual infant's characteristics) and a subjective component. However, regardless of the extent to which it is objective, the mother's perception of her infant may impact on the way she acts in early mother–infant interactions (Mantymaa, Puura, Luoma, Salmelin & Tamminen, 2006). Consequently, how mothers (mis-)interpret infant temperament may be relevant to understanding the factors that affect maternal behavior and the quality of mother–infant interaction. Previous studies have documented that infants perceived as more irritable received less responsive mothering (Campbell, 1979; Milliones, 1978); and mother-reported difficult temperament was related to less responsive infant behavior (Zeanah, Keener & Anders, 1986). Analogously, for positive infant characteristics, one study reported that mothers who perceived their infants as becoming less difficult between 4 and 18 months were more relaxed, optimistic, and less irritable (Engfer, 1986).

Few studies have examined temperament in infants with cleft lip in association with maternal behavior; nevertheless, Speltz and colleagues (Endriga & Speltz, 1997; Speltz, Goodell, Endriga, & Clarren, 1994) found maternal reports of less difficult infant temperament were related to maternal sensitivity during observed feeding interactions. Unfortunately, the authors assessed only infant negative reactivity, and no comparison between infants with cleft lip and control group infants was reported, leaving open the question of group differences regarding temperament. Furthermore, considering that a higher quality of maternal interaction is related to increases in infant positive emotionality (Costa & Figueiredo, 2011), this may, in turn, act as a protective factor for the infant socioemotional development. However, the question of the extent to which other temperamental characteristics, and especially those related to positive dimensions (positive emotionality and self-regulation), might contribute to the maternal behavior, remains an important unexplored topic.

The current study investigated the quality of mother–infant emotional exchanges in two- month-old cleft lip infants compared with healthy controls, taking into account the role of self-reported maternal depression and observed maternal affective states, as well as infant temperament. Four principal aims were addressed: (a) to compare mother–infant interactions in the presence versus absence of infant cleft lip; (b) To investigate the effect of cleft lip on mothers, in particular assessing whether the presence of infant cleft lip is associated with a discrepancy in maternal negative affectivity between observational and self-report measures. We expected that observed negative maternal

affectivity (i.e., depressive-like expressions) would be associated with the quality of mother–infant interactions; (c) To assess differences in temperament between cleft lip and healthy infants. We hypothesized that cleft lip infants would be rated as less positive, self-regulated and negative; and (d) To investigate if maternal behavior in interaction with infant was related with mother's perception of her infant's temperament. According with previous findings (Mantymaa et al., 2006), we expected that a negative mother's interactive style would be associated with an increase the infant's risk of being perceived as difficult.

Methods

Participants

25 2-month-old infants with isolated cleft lip, with (64%) or without cleft palate (36%) (clinical group), and 25 age-matched healthy full-term infants (control group) participated in the study with their mothers. The infants of the clinical group were recruited at the Unit of Maxillofacial Surgery of San Paolo Hospital (Milan). Exclusion criteria for the clinical group were: prematurity (<37 weeks of gestational age), low birth weight (<2500 g), presence of other syndromes (i.e., cromosomial trisomies, fetal alcohol syndrome, rare syndromes, Treacher Collins syndrome, Di George/Velo-cardio-facial syndrome, oro-facial-digital-syndrome). Exclusion criteria for mothers were: mental retardation or psychiatric disorders diagnosed earlier, addiction to alcohol or drugs, teenage, single parent, and non-Italian nationality (given the increasingly presence of families immigrated, we included this criterion in order to avoid possible effects due to cultural variations in the perception of infants' temperament). We contacted 33 mothers: 25 (76%) consented, 8 (24%) refused for lack of time, unwillingness to participate or because the infant would undergo surgery in another hospital. The final clinical group comprised 21 (84%) male and 4 (16%) female infants; this gender difference reflects the general male preponderance in cleft lip populations (Mossey, Little, Munger, Dixon & Shaw, 2009). The control group was recruited from a consecutive series of infants born at Fatebenefratelli Sacra Famiglia Hospital of Erba (Como). The exclusion criteria for infants and mothers were the same as those for the clinical group. Sixty potential controls were identified for recruitment: 37 (62%) mothers consented, 23 refused (38%). In both groups, non-participants did not differ significantly from the study sample by gender and socioeconomic status (SES). In order to obtain equivalence between the two groups in terms of infant gender and family SES, controls were selected by a pseudorandomized procedure. The healthy infants were divided on the base of gender and SES and then they were randomly matched to infants of the clinical group. The characteristics of sample are shown in Table I.

Procedure

Mothers were told that the study concerned infant-caregiver interactive and communicative behavior. Participating mothers were scheduled to visit the laboratory when they thought their infant would be awake and alert, usually between 9 a.m. and noon. The protocol included video-recording the mother–infant interaction and maternal completion of questionnaires about sociodemographic information, depressive symptoms, and infant temperament. Clinical data concerning the infants were obtained from medical records. The study was approved by the Ethics Committee of the ''E. Medea'' Scientific Institute (Bosisio Parini, Lecco) and written informed consent was obtained from each mother.

Measures

SES

Family SES was coded according to Hollingshead's (1975) classification for parent occupation. Score ranging from

Table I. *Clinical and Sociodemographic Characteristics of the Sample*

	Control group ($n = 25$; *Male* = 21) *M* (*SD*)	Clinical group ($n = 25$; *Male* = 21) *M* (*SD*)	Mann–Withney test (U)	Effect size	Asymptotic 95% CI	
					Lower	Upper
Gestationale age (weeks)	39.83 (9.59)	39.39 (7.78)	221.5	.35	.20	.51
Infant's age (days)	64.36 (4.85)	64.16 (6.14)	311.5	.50	.34	.66
Apgar 5 min	9.91 (.29)	9.92 (.28)	285.5	.46	.30	.62
Birth weight (g)	3345.60 (456.30)	3394.80 (463.63)	310.0	.50	.33	.66
Birth length (cm)	50.71 (1.89)	50.27 (1.65)	245.0	.39	.23	.55
Birth cranial circumference (cm)	34.50 (1.17)	34.83 (1.30)	263.0	.42	.26	.58
Mother's age (years)	34.18 (4.99)	34.43 (2.96)	309.5	.49	.33	.66
Mother's years of study	14.24 (2.83)	13.40 (3.51)	269.5	.43	.27	.59
SES	58.00 (17.32)	53.20 (16.26)	267.5	.43	.27	.59

Note. CI = Confidential intervals.
*$p \leq .05$.

0 to 90: the higher the value, the better the socioeconomic level.

Infant Temperament

Mothers completed the Italian version of the Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003), for which satisfactory reliability and validity have been reported (Montirosso, Cozzi, Putnam, Gartstein & Borgatti, 2011). The 191-item instrument provides scores on 14 temperament subscales, which can be grouped into three summary factors: Positive Emotionality (approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level and perceptual sensivity), Negative Affectivity (sadness, distress to limitation, fear and falling reactivity) and Orienting/Regulatory Capacity (low intensity pleasure, soothability, duration of orienting and cuddliness).

Self-Rated Maternal Depression

Maternal depressive symptoms were evaluated with the 21-item self-reported Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mack, & Erbaugh, 1961). Items are rated on 4-point scales, indicating the absence/presence and severity of depressed feelings/behaviors/symptoms. This scale is commonly used in research on community depressed samples. The BDI demonstrates good internal consistency, and concurrent and discriminant validity in clinical and non-clinical samples (Beck, Ward, Mendelson, Mock, & Erlbaugh, 1962). A score equal or greater than 12 was used as the cutoff for the clinical range (O'Hara, Rehm, & Campbell, 1983).

Infant–Mother Interaction

The infant was placed in a supportive seat when alert and contented; the mother was asked to sit opposite her infant, and play with him/her for 5 min. Two digital cameras, one focused on the infant and the other on the caregiver, were used to produce a single image with simultaneous frontal view of the face, hands and torso of infant and mother. Off-line, a masking disk was digitally super-imposed on the mouth and nose of all infants, to ensure that ratings were done blind to infant group (Murray et al., 2008). Infant and maternal behavior and their interactions were coded using the coding system Global Rating Scales of Mother–Infant Interaction (GRS; Fiori-Cowley, Murray, & Gunning, 2000; Murray, Fiori-Cowley, Hooper & Cooper, 1996a[1]). This method has shown a predictive validity regarding infant and child cognitive outcome at 18 months and 5 years of age (Murray et al., 1996a; Murray, Hipwell, Hooper, Stein & Cooper, 1996b), and good discriminant validity for a number of clinical groups such as those with maternal depression and schizophrenia, and infants at low-risk/high-risk (Murray, Stanley, Hooper, King & Fiori-Cowley, 1996c; Riordan, Appleby & Faragher, 1999). It has also proved to be valid cross-culturally: it has been used in studies in South Africa, Venezuela, Japan and many European countries (Cooper et al., 1999; Gunning et al., 2004). Moreover, it has been used to investigate associations between infant psychological profiles, temperament and quality of mother–infant interaction (Costa & Figueiredo, 2011; Murray et al., 1996c). The GRS comprises 25 five-point scales, describing 7 infant, 13 maternal, and 5 joint interactive behaviors occurring within a 5-min period. Scale scores were clustered in summary measures (three infant, four maternal, and one dyadic). Maternal dimensions describe mother's overall sensitivity, intrusiveness, remoteness, and signs of depression. Infant dimensions describe level of communication, involvement, and positive emotionality. Finally, interactive dimension regards mutual engagement. Definitions of summary indexes are provided in Table II. Infant–mother interactions were coded by psychologists, trained to reliability by L.M., who were unaware of the study hypothesis and infant health status. Further, to establish reliability for the current study data, a random 54% sample of videotapes from both groups were rated by both coders. Intra-class correlations computed on the summary GRS measures showed good agreement for infant (.88 to .98), and maternal behavior (.73 to .92) and for the interaction scale (.89).

[1]The coding system can be obtained from L.M.

Data Analysis

Since distributional assumptions for parametric statistics were not met (i.e., some variables were skewed) non-parametric Mann–Whitney U-test were applied. Effect sizes were evaluated using the suggestion of Newcombe (2006a, 2006b), which concerns a measure of separation of the data variable distribution. The index ranges from 0 to 1, values close to 0.5 supporting a null hypothesis with the variable ranks identically distributed in the two groups. Categorical variables were analyzed by chi-squared tests. Associations among variables were examined using the Spearman correlations. Alpha was set $\leq .05$ for all analyses.

Results

No differences between the clinical and control groups were found for clinical and demographic variables (Table II). Two mothers from the clinical group and three control group mothers exceeded the cut-off on the BDI;

Table II. *Outline of the Summary Indexes Obtained by Global Ratings Scales (GRS) Encoding System (Fiori-Cowley, Murray, & Gunning, 2000)*

Infant

The *level of communication* captures infant's ability to engage with the mother through the verbal channel (positive vocalizations) and non-verbal (eye contact, pre-speech). High scores indicate that the infant exhibits a higher level of communication.

The *infant involvement* measures the infant's ability to actively participate in the interaction and her capacity to be involved with the caregiver. A high score is a sign that infant is more actively engaged with the mother.

The *positive emotionality* indicates the during the interaction with the mother the infant shows pleasure, smiling and laughter, level of positive affect shown by the infant. A high score denotes higher level of positive emotionality.

Mother

The *maternal sensitivity* dimension captures the extent to which the mother responds to her infant's cues in a way that is appropriately adjusted to the infant's behavior, responding to his/her agenda, and also measures warmth and acceptance. A high score indicates higher competence.

The *maternal intrusiveness* reflects the extent to which the mother is over-stimulating with verbal or physical interventions, so that she disturbs the infant. A high score indicates higher intrusiveness.

The *maternal remoteness* measures the extent of mother's capacity to participate actively in the interaction with the infant through both bodily and verbal channels. A high score indicates higher maternal involvement.

The *signs of depression* dimension captures the outward impression of the mother's affective state and the level of her enjoyment in interacting with her infant. This dimension is related to the depressive person's experience of low energy, psychomotor retardation and indicates the extent to which the mother is really engaged with her infant and is not thinking about her own experience. A high score indicates higher mother's enjoyment and fewer maternal signs of depression in the interaction with the infant.

Interaction

The *mutual engagement* is a dimension which assesses the ability of mother and infant to interact with each other so that their interaction is involving, dynamic, positive and mutually satisfying. A high score indicates higher reciprocal engagement.

Chi-square test showed this to be a non-significant difference. Similarly, continuous BDI scores between the two maternal groups did not significantly differ. Finally, no difference emerged between two groups for the infant temperament factors (Table III).

Infant–Mother Interaction

The mean values, standard deviations, Mann–Whitney tests and effect sizes (with confidence intervals) are shown in Table III. With regard to the infants, significant differences were found for Level of communication and Infant involvement. These findings suggest that the infants with cleft lip showed fewer communicative signals and a lower level of engagement than controls. As for the mothers, significant differences emerged in Maternal sensitivity, Maternal remoteness, and Signs of depression. Mothers in the clinical group showed more negative interactive behavior, that is, fewer communicative signals, a lower level of engagement, and, due their facial expression (e.g., sadness), tone of voice, and demeanor (e.g., self-absorbed), they appeared more depressed. Finally, the two groups showed differences in the dyadic index (Mutual engagement) suggesting that, in the control group, there was a more reciprocal, satisfying engagement between mother and infant than in the clinical group. For all comparisons the effect sizes were moderate to large with a range from .20 to .30, indicating no overlap in the rank distributions between the two groups.

Correlations Between Maternal Behavior and Infant Temperament

To investigate the relationship between maternal behaviors during the interaction and the mother's perception of her infant's temperament, separately for control and clinical groups, Spearman correlations between GRS scores for maternal behavior and IBQ-R scores were computed. No significant associations were found for the control group. In the clinical group, in contrast, a significant association emerged between maternal Signs of depression and IBQ-R Positive Emotionality($r = .51$, $p = .026$). Less evidence of maternal negative affectivity (i.e., depressive-like behavior), as manifest in facial, vocal and general expressiveness, during the interaction with their infants was associated with a more positive infant temperament, as rated by mothers.

Discussion

Consistent with previous research (Murray et al., 2008), our results showed that infants with cleft lip made fewer communicative signals toward their mothers, producing fewer positive vocalizations than control group infants. Moreover, infants with cleft lip spent less time in visual contact with their mothers, were less engaged in active exploring of the environment and exhibited more self-absorbed behavior. Likewise, in line with previous studies

Table III. *Observational Measures Obtained by GRS, Self-rating Mmaternal Depression and Mother Ratings on the IBQ-R for Control and Clinical Group*

	Control group *M* (*SD*)	Clinical group *M* (*SD*)	Mann–Withney test (U)	Effect size	Asymptotic 95% CI	
					Lower	Upper
GRS summary indexes						
Infant						
Level of communication	3.23 (0.74)	2.55 (0.80)	164.0**	.26	.12	.40
Involvement	3.72 (0.70)	3.11 (0.76)	165.0**	.26	.12	.40
Positive emotionality	3.70 (0.63)	3.48 (0.57)	241.0	.39	.23	.54
Mother						
Sensitivity	3.67 (0.59)	3.15 (0.62)	181.5*	.29	.15	.43
Intrusiveness	4.18 (0.63)	3.84 (0.85)	243.0	.39	.23	.55
Remoteness[a]	4.70 (0.38)	4.10 (0.87)	189.0*	.30	.16	.45
Signs of depression[b]	4.23 (0.39)	3.67 (0.66)	135.5**	.22	.09	.34
Interaction						
Mutual engagement	3.38 (0.75)	2.50 (0.70)	127.0**	.20	.08	.33
BDI maternal scores	6.32 (4.79)	5.68 (5.11)	188.0	.30	.15	.45
IBQ-R factors						
Positive emotionality	4.14 (0.80)	3.90 (0.87)	174.0	.28	.14	.42
Negative affectivity	1.22 (0.70)	1.08 (0.89)	158.0	.25	.12	.39
Regulatory capacity	5.24 (0.77)	5.16 (0.67)	183.0	.29	.15	.44

[a]High score indicates, higher mother's involvement in the interaction with the infant.
[b]High score indicates, higher mother's enjoyment and fewer maternal signs of depression in the interaction with the infant.
*$p \leq .05$;**$p \leq .001$.

(Field & Vega-Lahr, 1984; Murray et al., 2008), mothers of infants with cleft lip showed more difficulty in interacting with their infants. Throughout the interaction, these mothers were less responsive and sensitive to their infants' signals than control group mothers. Our findings also showed that the early interactions of mother–infant dyads in the cleft lip group were less mutually satisfying than in the control group. The mutual engagement and co-participation between mother and infant appeared to be less fluid, more serious and had fewer positive episodes of involvement. The present data are consistent with the view that early mother–infant interactions form a dyadic system, in which the partners jointly and actively regulate their interactions through their capacity to interpret and respond to each other's affect and behavior (Fogel, 1977; Gianino & Tronick, 1988; Trevarthen, 1979; Tronick & Reck, 2009). From this perspective, the presence of infant cleft lip, because of the impairment in facial expressiveness and vocal production, may complicate the mother's interpretation of infant signals and, in turn, this behavior might lead to less infant involvement in the interaction and more withdrawal. Moreover, it should be noted that, in this study, mothers of infants with cleft lip displayed more negative affectivity (i.e., depressive-like expressions) with a lower level of positive emotional expressiveness and enjoyment in the interaction with their infants. In a similar way to mothers with clinical depression (Stanley, Murray & Stein, 2004), the mothers of cleft lip infants showed little effort to gain or maintain engagement with their infant, they smiled little, and appeared tense rather than engaged for most of the interaction; furthermore, their facial expressions and/or tone of voice appeared sad and depressed. In line with studies showing that depressed mothers are less responsive and sensitive (Murray et al., 1996a; Righetti-Veltema, Conne-Perréad, Bousquet & Manzano, 2002), similar depressed-like attitudes in mothers of infants with cleft lip might affect the parent's ability to respond sensitively and contingently to the infant's cues.

Notably, however, in the present, study mothers of clinical group infants did not report self-rated depressive symptoms more than control group mothers. This latter finding is at variance with the previous study in which mothers of infants with cleft lip did report higher depression levels than control group mothers (Murray et al., 2008). On the other hand, our results are consistent with research in which self-report and behavioral observation procedures were compared (Barden et al., 1989). In their study, the subjective measure did not capture some negative maternal feelings, leading to some inconsistency with the interpersonal attitudes adopted by the mothers in interactions with their infants. Accordingly, in the current study, the clinical group mothers manifested depression-

like affect and behaviors, but they did not report experiencing depressive symptoms, suggesting a reduction in the perception of their negative affective states.

Contrary to expectation, the clinical group infants did not differ from the control group in any of the three temperament factors. Thus, mothers of cleft lip group infants did not perceive their infants as having a more difficult temperament than mothers of healthy infants. It is possible that this result reflects the fact that individual differences between cleft lip infants do not influence maternal perceptions; nevertheless we did find group-specific associations between maternal behavior and infant temperament ratings. In the cleft lip group, but not in the control group, a consistent concurrent relationship emerged between fewer maternal signs of depressed affect and maternal ratings of infant positive emotionality. This finding might indicate that the high level of maternal enjoyment observed in the control group interactions made it easier to elicit the infant's innate capacity for social engagement. Alternatively, given the correlational nature of the finding, it is quite possible that infants with high sociability might elicit more positive maternal engagement. Possibly, when early interactions occur naturally, as in our control group, mothers are primed to bond with their infant, and maternal behavior is expressed regardless of individual variation in infant temperament. When the early interaction is disrupted, however, and maternal behaviors are not properly primed, as in the cleft group (for example, because natural breastfeeding is prevented and maternal-infant contacts are less fluid), the individual infant's innate capacity for social engagement plays a greater role in affecting the mother's attitudes. Such an explanation is consistent, for example, with the finding that objectively assessed infant irritability raises the risk for subsequent maternal depression, but only in mothers who already live in challenging circumstances (Murray et al., 1996c). Both this latter finding, and the present data highlight the fact that infant characteristics are important in accounting for the transactional nature of mother–infant interactions (Crockenberg & Acredolo 1983), especially in challenging circumstances. Moreover, whatever the explanation, less negative maternal affect and/or more positive infant temperament, is likely to foster a better quality early mother–infant relationship, which itself has a well-documented protective role in long-term child cognitive development (Hentges et al., 2011).

The present study has limitations. One was the relatively small sample size, which precluded more in-depth analysis of pathways and moderators that contribute the quality of mother–infant relationship, and which reduces the generalizability of our findings. Second, our findings about temperament are correlational and we cannot argue for specific causal effects. Thus, it is not clear whether infant temperament affects maternal behavior during the interactions, or vice-versa. Additional research is needed to explore how these factors contribute or determine maternal and infant adaptation and the quality of early dyadic interactions. Finally, it should be noted that the Signs of depression GRS scale does not correspond to a measure of clinical depression, rather, it captures the mother's expressed affective state and the level of her enjoyment in interacting with her infant (i.e., how happy, non-flaccid, absorbed in the infant vs. self-absorbed, and relaxed she is). Consequently, caution is required in drawing parallels between the observational measure used in the current study and a clinical assessment of maternal depressive symptoms. Further research should address this issue.

Despite these limitations, our findings have potential clinical implications. First, mothers of infants with cleft lip may be less conscious of their depressive-like attitudes than other mothers, and this could affect the quality of infant-caregiver interactions. Given that high levels of maternal depressive symptomatology may disrupt infants' regulatory capacities and the quality of parent–infant relationships, leading to maladaptive child outcomes (Murray et al., 1996a), health care professionals may be able to support the parent–infant relationship by helping mothers better understand their affective responses to their infant. Second, clinicians working with at-risk infant-caregiver dyads need to help mothers recognize reduced signs of involvement and communication in their infants. Pediatricians and other health care providers should attend to these infant characteristics to promote optimal child outcomes and prevent developmental problems. Third, it is important to recognize that a positive infant temperament is associated with less negative maternal affective states, and perhaps particularly so in the context of challenges such as infant health difficulties. As mothers' perceptions of infant temperament seem to influence maternal feelings of efficacy through the transition to motherhood (Porter & Hsu, 2003), knowledge of these factors would enable clinicians to identify specific infant temperamental traits to give feedback on the mother's experience and facilitate her ongoing parental role.

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