Original Paper

Psychopathology

Psychopathology 2004;37:272–280
DOI: 10.1159/000081983

Received: May 28, 2003
Accepted after revision: March 30, 2004
Published online: November 9, 2004

Interactive Regulation of Affect in Postpartum Depressed Mothers and Their Infants: An Overview

Corinna Reck[a] Aoife Hunt[a] Thomas Fuchs[a] Robert Weiss[a] Andrea Noon[c] Eva Moehler[b] George Downing[d] Edward Z. Tronick[e] Christoph Mundt[a]

[a]Department of General Psychiatry, and [b]Department of Child and Adolescent Psychiatry, University of Heidelberg, Heidelberg, [c]Family Counseling Center, Korbach, Germany; [d]Salpêtrière Hospital, Paris, France; [e]Child Development Unit, Harvard Medical School, Cambridge, Mass., USA

Key Words

Regulation of affect · Postpartum depression · Mother-child interaction · Interactive repair · Still-face paradigm

Abstract

Specific patterns of interaction emerging in the first months of life are related to processes regulating mutual affects in the mother-child dyad. Particularly important for the dyad are the matching and interactive repair processes. The interaction between postpartum depressed mothers and their children is characterized by a lack of responsiveness, by passivity or intrusiveness, withdrawal and avoidance, as well as a low level of positive expression of affect. Thus, an impaired capability to regulate the child's affect has been demonstrated in depressed mothers. Maternal aggression, neglect toward infants, infanticidal thoughts, as well as infanticidal behavior are mainly linked to severe postpartum depression, especially with psychotic symptoms. The findings on mother-child interaction reported in this paper are based on mothers with mild to moderate depressive disorders without psychotic symptoms. Considering the stability of interaction patterns in the course of depressive illness as well as the long-term consequences of these interactions, it seems surprising that there are still few systematic studies of depressed mothers interacting with their infants. In connection with an overview on these issues, treatment models for parent-infant psychotherapy are discussed.

Introduction

According to epidemiological studies, mainly in the Anglo-American-speaking world, approximately 10% of pregnant women develop postpartum depression [1]. There is evidence that the probability of postpartum depression is higher in the first 3 months after birth as compared to the following 9 months. Ballestrem et al. [2] and Kurstjens and Wolke [3] showed a clearly smaller prevalence rate of 2–4% for postpartum depression in Germany using the DSM-III-R criteria. A likely reason for these discrepancies could be the use of diverse diagnostic criteria and research methods. So far, the fewest research studies have employed the DSM-III-R criteria for diagnosing postpartum depression.

Mothers at risk for developing postpartum depression are those with previous depressive episodes and those

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

0254–4962/04/0376–0272$21.00/0

Accessible online at:
www.karger.com/psp

Dr. Corinna Reck
Psychiatrische Universitätsklinik
Vossstrasse 2, DE–69115 Heidelberg (Germany)
Tel. +49 6221 56 4465, Fax +49 6221 56 1741
E-Mail corinna_reck@med.uni-heidelberg.de

suffering from anxiety disorders [4]. There are a few studies reporting postpartum depression in developing countries. Martinez-Schallmoser et al. [5] revealed, in a sample of Mexican-American mothers, that women expressing prenatal depression were more likely to continue to experience depression after birth. Other predictors included a high need for postpartum support, specific support network characteristics, acculturation, and poor-quality relationships within the family. In a study conducted in Taiwan and mainland China, Wang et al. [6] were able to demonstrate that stress, self-esteem and social support are significant psychosocial risk factors in the development of postpartum depression. The large-scale epidemiological study of Inandi et al. [7] revealed that 27% of women from the less developed eastern part of Turkey attained significant depression scores following childbirth. Excess risk for developing depression was associated with several factors including unemployment, low education, poverty, poor family relations, low marital age, and lack of medical services.

It is necessary to differentiate diagnostically between postpartum depression, maternity blues and postpartum psychosis. In the case of maternity blues, we are dealing with a transitory psychological disorder with mild depressive symptoms, characterized by exhaustion, sorrow/weeping, unstable moods, anxiety and confusion. The prevalence rate of maternity blues is about 50% and usually manifests between the second and the fifth day after birth. The duration varies between a few hours and a few days [2]. In a sample of Hong Kong Chinese women, Hau and Levy [8] found a prevalence rate of 44.3% with a typical peaking on the fifth postnatal day.

Postpartum psychosis is a severe and rare mental disorder. However, chances of suffering from psychosis are 20–30 times greater following childbirth as compared to other periods of life [9]. Because severe postpartum disorders such as psychosis, severe depression, and personality disorders may, in extreme cases, lead to infanticide or suicide of the mother, it is necessary to treat them early on [10, 11].

Of the few who have studied maternal aggression and neglect toward infants during severe mental illness in the postpartum period, Chandra et al. [12] examined 50 Indian women in a prospective study. The data collected were the prevalence, pattern and predictors of maternal aggression, infanticidal thoughts, and infanticidal behavior. They found that close to half (43%) of the mothers revealed infanticidal thoughts. As many as 36% exposed infanticidal behavior, and 34% revealed both infanticidal thoughts as well as infanticidal behavior. The researchers also found infanticidal thoughts to be linked to psychotic thoughts about the infant, to undesirable maternal reaction to separation from the infant, and to having a female infant. Furthermore, mothers suffering from depression and psychotic thoughts were likely to develop infanticidal thoughts, whereas mothers with psychotic thoughts concerning their infant tended to develop infanticidal behavior.

It is known that the mental health of the mother influences early interaction experiences. As the most common mental disorder of young mothers, postpartum depression thus assumes a central role. Different affective states such as annoyance, protest or joy can be distinguished in infants even in the first few months of life. These affective states have a close relationship with maternal behavior which, for its part, is reciprocally influenced by the affective state of the child. Thus, the regulation of affect in mother-infant pairs is a process of mutual regulation. Regulation of the affective exchange occurs through specific patterns in which the matching of affective states and reparation of interactive and affective 'mismatches' described by Tronick and Weinberg [13] have fundamental importance. Cohn et al. [14] have shown that these interactive processes are clearly impaired in mothers with postpartum depression, with unfavorable consequences on the infants' emotional and cognitive development.

The following paragraph gives an overview of the processes regulating affect in normal interactions and describes the factors that influence these processes. Then the effects of depression on the regulation of affect in early mother-infant interactions will be discussed. It is noteworthy that the data of the mother-child interactions described in this review article are based on mothers without psychotic symptoms and with mild to medium depressive disorders.

Patterns of Interaction in Normal Mother-Infant Dyads

Eye contact and smiling are important positive social signals in the mother-child interaction [15]. The child's smile establishes closeness with the interacting partner by stimulating the latter to turn towards the child [16]. Fogel et al. [17] showed that mimetic behavior of the mother holds the child's attention. The mother can express her positive feelings by means of smiling, mirroring, and lively vocalization, which in turn promotes the expression of positive feelings on the part of the child. Tronick and Weinberg [13] reported that mother-child dyads with a

high quality of interaction, i.e. showing well-coordinated cycles of positive and negative interactions and generating overall positive feelings, improve the mother's self-esteem.

Typically, early interactions in normal mothers and their infants are characterized by good attunement or synchronicity of behavioral and physiological rhythms and thus attain reciprocal optimal stimulation and arousal modulation [18]. Field [19] observed a parallel rise in heart rate as well as corresponding hormonal parameters in mother and child during stressful interactions with high-risk children. Ekman [20] and Zajonc [21] showed that during mirroring of affects there are corresponding physiological arousal patterns. Accordingly, Dawson [22] detected a mirroring of the affective expression of the mother by means of EEG excitation patterns in 10-month-old infants.

Interactive Affect Regulation: Mutual Regulation Model

Empirical findings of numerous studies [23–25] highlight the pivotal impact of specific patterns of interaction in the mother-child dyad for infants' regulation of affect during the first 6 months of life. The authors define patterns of interaction as characteristic behavior patterns in which mother and child mutually influence each other. The patterns comprise self-regulatory as well as interactive competences in both partners.

In Tronick's mutual regulation model [26], the interactive regulation of affects is conceived as a continuous moment-to-moment process, in which each partner adjusts to the behavior of the other [26, 27]. In positive as well as in negative affective states, the behavior of one partner in the interaction can be predicted by the behavior of the other. These mutual behavioral regulations occur largely outside of conscious control but are thought to be internalized by mother and infant. The existing forms of mutual regulation establish the basis for an internal working model for ways of being together, which is stored at the procedural level [26, 53].

The maternal ability to physically mimic the child's affective condition and thus to create a 'matching' of the mutual emotional expression has long been thought to play a critical role in development [28]. The synchrony view argued that synchronicity and reciprocity of maternal and child affective states, along with a high proportion of positive expressions of affect, characterize optimal interactions of a mother-infant dyad. Tronick and Weinberg [13] contested the presumed central role of synchronicity in a number of recent microanalytic studies. They showed, instead, that healthy mothers and their children characteristically interact with only moderate levels of synchronicity and with a modest proportion of positive as well as negative expressions of affect. In a regular play situation, infants and mothers matched their affects only 30% of the time. Tronick and Cohn [27] characterize the typical mother-child interaction as a flexible process, in which there are frequent shifts between affective 'matches' and 'mismatches' ('interactive errors'). 'Mismatches' are typically associated with a negative, 'matches' with a positive expression of affect. The interactional transition from an uncoordinated to a coordinated state is called 'interactive repair'. In face-to-face interactions with a 6-month-old infant, there is normally a quick repair of interaction mistakes. When a pair experiences an interactive error, they are able to repair it and get back to a matched state within an average of 3–5 s. Beebe and Lachmann [29] replicated the findings of Tronick [26] and Tronick and Weinberg [13] confirmed the hypothesis that normal interactions can be described as a process of matching, mismatching and repair.

According to Tronick and Weinberg [13], the process of interactive repair holds a position of central importance in developmental psychology. The experience to be able to transform negative into positive affective states successfully and reliably leads the child to experience self-efficacy and learn effective coping strategies. In Tronick's [26] opinion, even the young infant develops internal representations in which social interactions are regarded as positive and repairable, and the reactions of adults as predictable and reliable. The infant learns to trust the caregiver and to trust itself.

Regulation of Affect and Coordination of Interaction

Beebe et al. [30] examined the formation of the infant's implicit expectations by studying the 'vocal rhythm' of mother-child interchanges. Eighty-two mother-child dyads (the children were 4 months old) took part in the study. The authors addressed the question of interpersonal timing of vocalization and showed that there is an optimal middle range of interpersonal impact. On the basis of microanalytic studies, Beebe et al. [30] formulated the so-called 'middle-range model'. This model assumes that the child's development is facilitated by a contingent interactive coupling of eye contact, physical expression, body movement, and vocalization at a level of mid-velocity, which is neither under- nor overstimulating. Each partner in the interaction who moves outside of this 'middle area' may thus be trying to cope with problems of interaction or self-regulation. In the interaction

with the infant, the mother acts as pacemaker and ensures adequate stimulation for the child. Essentially, this hypothesis is a restatement of Tronick's [26] interactive model of reparation in which interactions typically have errors that are repaired, whereas atypical interactions have few, if any, errors or have large numbers of unrepaired errors. Tobias [31] has shown that an extremely high level of interactive coordination is significantly associated with insecure attachment. Correspondingly, Jaffe et al. [32] found that a moderate amount of 'vocal matching' is a good predictor for subsequent secure bonding at 18 months.

The Still-Face Situation

To evaluate the hypothesis that patterns of affect and behavior are learned, and expectations of the behavior of the partner emerge from experiences in the first months of life, Tronick et al. [33] developed the so-called face-to-face still-face paradigm. This experiment is organized in three phases each of a 2-min duration. The first phase contains a free-play situation in a face-to-face setting (for example, the child sits in a child's safety seat with the mother opposite); in the second phase, the mother is requested not to carry out any mimic movements; the third phase is the so-called reinstatement phase in which the mother treats the child in her usual manner. To date, still-face examinations have been conducted with children ranging in age from 2 to 9 months.

The key episode in the paradigm is a 2-min-long interruption of the accustomed contact between mother and child achieved by asking the mother not to respond to her infant. This still-face episode can be seen as a prolonged 'mismatch state'. According to Tronick et al. [33], the still face represents an experimental model of maternal emotional rejection. This paradigm is meaningful in postpartum depression insofar as it seems to simulate for the child the typical maternal abrupt cessation of contact and lack of emotional consistency often seen in postpartum depression. In current microanalytic studies of early mother-child interactions, the still-face situation is used in various contexts. It is suitable for examining the expectations the infant has of its attachment figure, the self-regulatory capacity of the infant, the occurrence and usage of intuitive parental expertise, the child's temperament and the security of attachment [34, 35].

Research has shown that infants in the still-face phase typically try to recreate the accustomed alternation of matches and mismatches. After repeated failure of the reparation attempts initiated by the infant, negative affective states emerge (protest, crying). A typical reaction of infants to the still face of their mother is their conspicuous effort to provoke a reaction in the mother. The children's behavior ranges between positive attempts to approach, retreat, and protest. They make repeated attempts to greet the mother: they smile, nuzzle and appear surprised when they do not succeed in activating the mother. Cohn and Ross [36] maintain that the affective interaction stress experienced in the still-face experiment reveals information about the history of the mother-child relationship and thus about the presymbolic interaction representation of the infant. Children who are used to a positive exchange with the mother mainly try positive ways to reestablish the dialogue. If their efforts show no success, stress reactions such as protest, crying, increased arousal, avoidance, and self-calming behavior become evident [34].

Effects of Maternal Self-Efficacy on Mother-Infant Interaction and Depression

The significance of maternal cognitions as central mediating factors between depressive symptoms and maternal interaction patterns with infants is discussed in the literature [37]. The significance of cognitive processes for the development and maintenance of depressive disorders as well as their connection to affective experience has been shown many times [38, 39]. Dysfunctional self-schemas are assigned a major role in the etiology of depression. They have a considerable impact on the processing of information by creating a negative bias which can lead to distortions of reality. Field [40] points out that depressive mothers tend to interpret the self-regulatory avoidance of eye contact in their infants negatively (e.g. 'my baby doesn't love me'), which may lead to disappointment and withdrawal of the mother or to intrusive behavior on her part.

Also discussed in the literature is the connection between the infant's temperament, maternal cognitions and interactive behavior [37]. In investigating the relationship between childhood temperament and early interactions of depressed mothers and their infants, the concept of self-efficacy has proven to be especially important. Depressed mothers judge their parental self-efficacy much more negatively than nondepressed mothers [41].

Teti and Gelfand [37] demonstrated that depressed mothers with negative evaluations of their maternal self-efficacy were particularly prone to perceiving a child with a difficult temperament negatively and to show the cor-

responding deficits in the interaction behavior. Accordingly, the mother's negative interaction experiences presumably affect her evaluation of her self-efficacy unfavorably when dealing with her child. Noteworthy are the findings of Field et al. [42] that depressed mothers perceive the behavior of their child more negatively than impartial observers which, in the sense of a self-fulfilling prophecy, can influence the quality of the mother-child interaction as well as the maternal self-efficacy negatively.

Patterns in the Mother-Child Interaction Specific to Depression

A multitude of research projects on adults have documented relations between depressive disorders and interactive behavior. From this research, we know that depression effects quantity of speech [43], quality of the voice [44], frequency of eye contact [45], emotional expression and reaction [46].

Based on studies of nonclinical populations, several researchers have hypothesized that infants would be effected by the interactive and affective behavior of depressed mothers [47–49]. The behavior of depressed mothers is characterized by a lack of responsiveness, passivity or intrusiveness, less positive affect, more negative affect, and a less expressive mimetic behavior [47, 50–52]. Overall, the literature concerning the behavior of depressed mothers reports lack of empathy and emotional availability [43], a reduced ability to perceive the child's signals and interpret them correctly, and to react appropriately and promptly. Depressed mothers, in contrast to a control group, showed a lesser degree of playful body contact as well as less loving interactions (kissing and stroking) with their infant [54]. Furthermore, at 18 months, the children of postpartum mentally ill mothers are significantly less securely attached to their mothers than the children of psychologically healthy mothers [55].

A typical child's behavior in the interaction with its depressed mother is increased withdrawal and avoidance, avoidance of eye contact, and, in particular, a low level of expression of positive affect [56]. Tronick and Gianino [57] argued that the interaction patterns of children of depressed mothers have an inherent self-regulatory function. Frequent turning away of the head and the active avoidance of eye contact can be understood as the infant's attempt to protect itself from the negative affect of the nonresponsive mother. Another hypothesis might be that the infant is imitating the interaction style of its depressed mother and has not yet acquired any other means of interacting with people.

The depressive mother's lack of nonverbal expressive behavior and joy during play restricts her intuitive, naturally given competency to adapt to the infant. The infant usually does not get the support it needs for the development of its self-regulatory competencies when communicating with its depressed mother [34]. According to Field [18], because of the potentially deficient emotional availability of depressed mothers, disorders of affective and physiological regulation as well as of interaction rhythms can occur. Eye contact is central for the child's self-regulation (see above). Field [18] showed that depressed mothers break off gaze more frequently than healthy mothers and that the children then follow suit. In contrast, the children of healthy mothers more often take the lead in regulating eye contact [58].

Field et al. [51] addressed the question of the generalization of early childhood depressive behavior (less positive emotional expression and a decreased activity level). They examined whether 3- to 6-month-old infants show similar behavior to nondepressed women as to their postpartum depressed mothers. In fact, these infants also show a depressive pattern of behavior in interaction with the nondepressed person. Interestingly, the behavior of the infants seemed to have repercussions on the behavior of the nondepressed women. In their interactions with the infants of postpartum depressed mothers, these nondepressed women behaved more like the depressed mothers. Accompanying physiological measures were differentiated. The infants showed clear signs of stress in interaction with their postpartum depressed mothers (raised cortisol levels, decreased vagal tone and elevated pulse).

Depressive Behavior Patterns in the Still-Face Situation

The infants of depressed mothers make noticeably fewer efforts in the still-face situation to activate their mother than do children of healthy mothers [34, 59]. They appear to lack initiative, become withdrawn and querulous [34]. Beebe et al. [23] pointed to an inhibition of vocal utterances in children of depressed mothers, indicating affective stress. Furthermore, infants of depressed mothers show heightened self-comforting behavior (e.g. touching themselves, or putting their finger in their mouth). Presumably, the infants of the depressed mothers are attempting to regulate themselves without the interactive support of the mother.

Subgroups of Interaction Behavior Patterns of Depressed Mothers

Weinberg and Tronick [25] criticize the treatment of depressed mothers' affective states and interaction behavior as a homogenous group in the literature. The situation seems more complex. In a review of the studies, three types of interaction behavior in depressed mothers can be differentiated: (a) withdrawn, reserved and less engaged, (b) intrusive behavior (express annoyance and interrupt the child's activities, less consistent reactions, loud voice), and (c) positive and dedicated behavior. The two interactive patterns of depressed mothers, intrusiveness and withdrawal [13, 60], effect an interruption of the regulatory processes of interaction between mother and child. Accordingly, in interaction studies with depressed mothers and infants, there is a clear disruption of the pairs' capacity for interactive repair, a process that is central to normal interactions and development [14, 27, 52]. The hypothesis is that the failure of interactive repair throws the child back to its own self-regulatory capacity and that lack of maternal interactive scaffolding triggers greater stress for the infant. The only coping pathway open to the infant is withdrawal in an attempt to ward off the stress and to control its own negative affect.

Inconsistent Findings and Risk Factors

A series of studies have demonstrated disturbance in early interaction behavior of depressed mothers and their children. Furthermore, an adverse influence of postpartum depression on childhood cognitive, emotional and social development has been documented. The research findings are not unequivocal, however.

Murray et al. [49] were not able to replicate the literature findings of severe disturbances of mother-child interactions among 2-month-old infants. The authors discuss their findings with respect to sample composition. The depressed mothers who participated in this study were predominantly middle-class. In contrast to this, Field [61], who studied a group of women mainly from lower socioeconomic status, demonstrated clear impairment in the interaction behavior of the depressed mothers and their children. In another study of socially well-to-do middle-class women, Campbell et al. [62], in agreement with Murray et al. [49], did not describe severe mother-child interaction disturbances in postpartum depression. Wrate et al. [63] ascribed the divergent research findings in the relationship between postpartum depression and childhood developmental disorders to the deficient use of standardized psychiatric-diagnostic criteria and methods.

Father-Infant Interaction

It is important to consider the father's influence on the emotional and cognitive development of infants. Fathers spend more time with their infants than ever before. Their accessibility to the child has increased by half in the past few generations. According to recent research, fathers spend between 2.8 and 4.9 h a day with their younger children, with a focus on the weekends – not only 12 min a day, as cited by the media [64]. In parent-infant interactions, specific maternal and paternal styles may be distinguished. Clarke-Steward [65] found that fathers of 6-month-old infants were more inclined than mothers to be physically stimulating and unpredictable in their play with their infants. The findings also indicate that fathers may be more intrusive than mothers [66]. Additionally, fathers report deriving more pleasure from animated activities with their young children than mothers.

In a study of parent-infant interactions, Hossain et al. [67] observed 26 3- to 6-month-old infants with their depressed mothers and their nondepressed fathers. Interestingly, the dysfunctional interaction patterns infants revealed with their depressed mothers were not generalized to their nondepressed fathers. This may imply that nondepressed fathers might mitigate the effect of maternal depression on infants. It would be desirable for future research to determine whether the dysfunctional interaction patterns infants reveal with their depressed mothers also manifest in interactions with their depressed fathers. Also, it would be of interest to ascertain the possibly diverse impact of parental depression on infants depending on whether one or both parents suffer from depression. In the future, systematic employment of 'natural buffers' such as fathers and caregivers should be part of mother-child treatments in order to compensate for the effect of maternal depression on the baby.

Course of Depression

In summarizing the state of the research, there is a striking lack of systematic longitudinal studies investigating change in, or stability of, the maternal ability to regulate the child's affective condition. The question is still open to what extent treatment of depression or simply spontaneous remission of symptoms result in a better quality of interaction and improved dyadic ability of self-repair. One exception is the controlled treatment study of Cooper and Murray [68], who examined 194 postpartum depressed mothers and their infants. This study showed that improvement of the maternal depression led to no observable change in the dysfunctional interaction pattern. It must be taken into account that Cooper and Mur-

ray [68] detected only minor degrees of interactional disturbances in their study sample prior to treatment, so that a relevant improvement was unreasonable to expect.

A further point of interest is the progression and severity of postpartum depressive symptoms. In a review, Campbell and Cohn [69] emphasized the necessity to take into account the heterogeneity of postpartum depressive symptoms that influence the mother-child interaction. For example, brief depressive episodes impact less on the quality of the mother-child interaction. Interaction disorders were significantly connected with chronic depression and with unplanned pregnancies. If the mother worked outside the home, the quality of mother-child interaction in postpartum depression seemed to be better.

Treatment Issues

Both traditional psychodynamic mother-infant brief therapy and interaction-focused methods have successfully modified mother-child interactions and dysregulations of the child [70]. Recently, video-supported parent-infant psychotherapy models have been increasingly implemented. Some examples of these methods are the psychoanalytically informed video work of Beebe [71], video microanalysis therapy as developed by Downing [72] and the video-supported therapy by Papoušek [73]. These methods are closely based upon research findings about mother-infant interaction and affect regulation. Such therapies include sessions in which brief sequences of a previously filmed videotape of parent-infant interactions are shown to the parent, discussed and explored. Showing the mother the positive reactions her baby has to her and emphasizing its interest in her could be an effective therapeutic intervention within these types of therapies, especially when the mother is depressive. It could also be of importance to inform the mother during such an intervention of certain developmental aspects such as self-regulatory behavior of infants. This could help modify the mother's cognitive distortions such as 'my baby doesn't love me' when the infant turns its head away (actually a self-regulatory behavior). Additionally, Beebe [71] has pointed out the importance of helping the mother acquire a sensitivity to the infants' nonverbal cues by translating observable behavior on the video into words. For example, during a sequence in which the infant is squirming, the therapist could comment that the infant seems to be uncomfortable, perhaps because it is no longer sitting upright in the safety seat. This could help the mother learn to 'read' her infant better. Beebe also pointed out the necessity of identifying specific, distorted maternal representations of the baby that may interfere with the maternal ability to observe and process the nonverbal interaction.

It should be mentioned that not only specific mother-infant therapies, but also other kinds of treatment methods such as baby massages have been shown to improve mother-child interactions [74, 75]. Baby massages have not only contributed to positive interaction behaviors, but also to more organized sleep patterns and to greater weight gain of babies.

Conclusion

Specific interaction patterns in the mother-child dyad are related to processes of emotional regulation in the first months of life. In particular, matching and interactive repair processes described by Tronick and Weinberg [13] have a central role in the interactive regulation of childhood affective conditions. In the interaction between postpartum depressed mothers and their infants, an impairment of specific interaction patterns has been repeatedly shown [14].

In summary, it can be said that there are currently few systematic studies concerning stability of interactive patterns that regulate affect in the course of postpartum depression. Also, there is a lack of studies examining the relationship of dyadic difficulties in interactions to specific types of depression. Future studies need to focus on the long-term course of postpartum depression in order to direct specific mother-child-centered interventions. It is unclear whether interactions in the mother-child dyad can be changed through treatment of the maternal depression or whether dysfunctional behavior is a result of early learned procedures and thus persists independently of the depression. Moreover, the effect of the nondepressive father-infant interaction on the infant's interactional behavior with its depressive mother should be studied more thoroughly.

References

1 Cooper PJ, Murray L: Postnatal depression. Clinical review. BMJ 1998;316:1884–1886.
2 von Ballestrem CL, Strauss M, Häfner S, Kächele H: Ein Modell für das Screening von Müttern mit postpartaler Depression. Nervenheilkunde 2001;6:352–355.
3 Kurstjens S, Wolke D: Postnatale und später auftretende Depressionen bei Müttern: Prävalenz und Zusammenhänge mit obstetrischen, soziodemographischen sowie psychosozialen Faktoren. Z Klin Psychol Psychother 2001;30:33–41.
4 Matthey S, Barnett B, Howie P, Kavanagh DJ: Diagnosing postpartum depression in mothers and fathers: Whatever happened to anxiety? J Affect Disord 2003;74:139–147.
5 Martinez-Schallmoser L, Telleen S, MacMullen NJ: The effect of social support and acculturation on postpartum depression in Mexican American women. J Transcult Nurs 2003;4:329–338.
6 Wang SY, Jiang XY, Jan WC, Chen CH: A comparative study of postnatal depression and its predictor Taiwan and mainland China. Am J Obstet Gynecol 2003;189:1407–1412.
7 Inandi T, Elci OC, Ozturk A, Egri M, Polat A, Sahin TK: Risk factors for depression in postnatal first year in eastern Turkey. Int J Epidemiol 2002;6:1201–1207.
8 Hau FW, Levy VA: The maternity blues in Hong Kong Chinese women: An exploratory study. J Affect Disord 2003;2:197–203.
9 Hipwell AE, Kumar RC: The impact of postpartum affective psychosis; in Murray L, Cooper PJ (eds): Postpartum Depression and Child Development. New York, Guilford, 1997, pp 265–293.
10 Brockington I: Motherhood and Mental Health. New York, Oxford University Press, 1996, pp 430–450.
11 Marks MN: Characteristics and causes of infanticide in Britain. Int Rev Psychiatry 1996;8:99–106.
12 Chandra PS, Venkatasubramanian G, Thomas T: Infanticidal ideas and infanticidal behavior in Indian women with severe postpartum psychiatric disorders. J Nerv Ment Dis 2002;190:457–461.
13 Tronick EZ, Weinberg MK: Depressed mothers and infants: Failure to form dyadic states of consciousness; in Murray L, Cooper PJ (eds): Postpartum Depression and Child Development. New York, Guilford, 1997, pp 54–84.
14 Cohn JF, Campell SB, Matias R, Hopkins J: Face-to-face interactions of postpartum depressed and nondepressed mother-infant pairs at 2 months. Dev Psychol 1990;26:15–23.
15 Blehar MC, Lieberman AF, Salter Ainsworth MD: Early face-to-face interaction and its relation to later infant-mother attachment. Child Dev 1977;48:182–194.
16 Bowlby J: Bindung; Eine Analyse der Mutter-Kind-Beziehung. München, Kindler, 1975.
17 Fogel A, Toda S, Kavai M: Mother-infant face-to-face interaction in Japan and the United States: A laboratory comparison using 3-month-old Infants. Dev Psychol 1988;24–33:398–406.
18 Field T: Affective and Interactive Disturbances in Infants. Handbook of Infant Development, ed 2. New York, Wiley, 1987, pp 972–1005.
19 Field T: Affective displays of high-risk infants during early interaction; in Field T, Fogel A (eds): Emotion and Early Interaction. Hillsdale, Erlbaum, 1982.
20 Ekman P: Autonomic nervous system activity distinguishes among emotions. Science 1983;221:1208–1210.
21 Zajonc R: Emotion and facial efference: A theory reclaimed. Science 1985;228:15–22.
22 Dawson G: Frontal lobe activity and affective behavior of infants of mothers with depressive symptoms. Child Dev 1992;63:725–737.
23 Beebe B, Lachmann F, Jaffe J: Mother-infant interaction structures and presymbolic self- and object representations. J Relat Perspect 1997;7:133–182.
24 Stern DN, Sander LW, Nahum JP, Harrison AM, Lyons-Ruth K, Morgan AC, Bruschweiler-Stern N, Tronick EZ: The process of change study group Non-interpretative mechanism in psychoanalytic therapy. The 'something more' than interpretation. Int J Psychoanal 1998;79:903–921.
25 Weinberg MK, Tronick EZ: The impact of maternal psychiatric illness on infant development. J Clin Psychol 1998;59:53–61.
26 Tronick EZ: Dyadically expanded states of consciousness and the process of therapeutic change. Infant Ment J Health 1998;19:290–299.
27 Tronick EZ, Cohn JF: Infant-mother face-to face interactions: Age and gender differences in coordination and the occurrence of miscoordination. Child Dev 1989;60:85–92.
28 Condon WS, Sander LW: Neonate movement is synchronized with adult speech: Interactional participation and language acquisition. Science 1974;18:99–110.
29 Beebe B, Lachmann F: Representation and internalization in infancy: Three principles of salience. Psychoanal Psychol 1994;11:127–165.
30 Beebe B, Jaffe J, Lachmann F: A dyadic systems view of communication; in Skolnick N, Warshaw S (eds): Relational Perspectives of Psychoanalysis. Hillsdale, The Analytic Press, 1992, pp 61–81.
31 Tobias KE: The relation between maternal attachment and patterns of mother-infant interaction at four months; thesis, The City University of New York, New York, 1995.
32 Jaffe J, Beebe B, Feldstein S, Crown C, Jasnow MD: Rhythms of dialogue in infancy: Coordinated timing in development. Monogr Soc Res Child Dev 2001;66:1–132.
33 Tronick EZ, Brazelton TB, Als H: The structure of face-to-face interactions and its developmental functions. Sign Lang Studies 1978;18:1–16.
34 Papoušek M: Wochenbettdepressionen und ihre Auswirkungen auf die kindliche Entwicklung; in Braun-Scharm H (ed): Depressionen und komorbide Störungen bei Kindern und Jugendlichen. Stuttgart, Wissenschaftliche Verlagsgesellschaft, 2001, pp 201–229.
35 Reck C, Backenstrass M, Moehler E, Hunt A, Resch F, Mundt C: Mutter-Kind Interaktion und postpartale Depression. Psychotherapie 2001;6:171–185.
36 Cohn J, Ross S: Infant response in the still-face paradigm at 6 months predicts avoidant and secure attachment at 12 months. Dev Psychopathol 1992;3:367–376.
37 Teti DM, Gelfand DM: Maternal cognitions as mediators of child outcomes in the context of postpartum depression; in Murray L, Cooper PJ (eds): Postpartum Depression and Child Development. New York, Guilford, 1997, pp 136–164.
38 Beck AT: Cognitive models of depression. J Cogn Psychother Int Q 1987;1:5–27.
39 Teasdale CD, Fogarty SJ: Differential effects of induced mood on retrieval of pleasant and unpleasant events from episodic memory. J Abnorm Psychol 1979;88:248–257.
40 Field T: Infant gaze aversion and heart rate during face-to-face interactions. Infant Behav Dev 1981;4:307–315.
41 Fox CR, Gelfand DM: Maternal depressed mood and stress as related to vigilance, self-efficacy, and mother-child interactions. Early Dev Parent 1994;3:233–243.
42 Field T, Morrow C, Adelstein D: Depressed mothers' perceptions of infant behavior. Infant Behav Dev 1993;16:99–108.
43 Teasdale CD, Fogarty SJ, Williams JMG: Speech rate as a measure of short-term variation in depression. Br J Soc Psychol 1980;19:271–278.
44 Scherer KR: Vocal affect expression: A review and a model for future research. Psychol Bull 1986;99:143–165.
45 Bellack A, Hersen M, Himmelhoch JM: A comparison of social skills training, pharmacotherapy, and psychotherapy for depression. Behav Res Ther 1983;21:101–107.
46 Libert J, Lewinsohn PM: The concept of social skill with special reference to the behavior of depressed persons. J Consult Clin Psychol 1973;40:304–312.
47 Field T, Sandberg D, Garcia R, Vega-Lahr N, Goldstein S, Guy L: Pregnancy problems, postpartum depression, and early mother-infant interactions. Dev Psychol 1985;21:1152–1156.
48 Murray L, Trevarthen C: Emotional regulation of interactions between 2 months olds and their mothers; in Field TM, Fox NA (eds): Social Perception in Infants. Norwood, Ablex, 1985.

49 Murray L, Fiori-Cowley A, Hooper R: The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome. Child Dev 1996;67: 2512–2526.
50 Cohn JF, Tronick EZ: Specificity of infants' response to mothers' affective behavior. J Am Acad Child Adolesc Psychiatry 1989;28:242–248.
51 Field T, Healy B, Goldstein S, Perry S, Bendell D, Schanberg S, Zimmermann EA, Kuhn C: Infants of depressed mothers show 'depressed' behavior even with nondepressed adults. Child Dev 1988;59:1569–1579.
52 Field T, Healy B, Goldstein S, Guthertz M: Behavior-state matching and synchrony in mother-infant interactions in non-depressed versus depressed dyads. Dev Psychol 1990;26: 7–14.
53 Emde R: Development terminable and interminable. 1. Innate and motivation factors. Int J Psychoanal 1980;69:283–296.
54 Stepakoff S: Infant gender, maternal touch, and ethnicity; thesis, St Johns University, New York, 1999.
55 Murray L: The impact of postnatal depression on infant development. J Child Psychol Psychiatry 1992;33:543–561.
56 Cohn JF, Matias R, Tronick EZ, Connell D, Lyons-Ruth D: Face-to-face interactions of depressed mothers and their infants; in Tronick EZ, Field T(eds): Maternal Depression and Infant Disturbance. New Directions in Child Development, No 34. San Francisco, Jossey-Bass, 1986.
57 Tronick EZ, Gianino A: Interactive mismatch and repair: Challenges to the coping infant. Zero to three. Bull Natl Cent Clin Infant Programs 1986;5:1–6.
58 Stern DN, Hofer L, Haft W, Dore J: Affect attunement: The sharing of feeling states between mother and infant by means of intermodal fluency; in Field T, Fox N (eds): Social Perception in Infants. Norwood, Ablex, 1985, pp 249–268.
59 Field T: Early interactions between infants and their postpatum depressed mothers. Infant Behav Dev 1984;18:1–3.
60 Diego MA, Field T, Hart S, Hernandez-Reif M, Jones N, Cullen C, Schanberg S, Kuhn C: Facial expression and EEG in infants of intrusive and withdrawn mothers with depressive symptoms. Depress Anxiety 2002;15:10–15.
61 Field T: The treatment of depressed mothers and their infants; in Murray L, Cooper PJ (eds): Postpartum Depression and Child Development. New York, Guilford, 1997, pp 212–236.
62 Campell SB, Cohn JF, Myers T: Depression in first-time mothers: Mother-infant-interaction and depression chronicity. Dev Psychol 1995; 31:349–357.
63 Wrate RM, Rooney AC, Thomas PF, Cox JL: Postnatal depression and child development – A three-year follow-up study. Br J Psychiatry 1985;146:622–627.
64 Pleck J: Paternal Involvement, Levels, Sources and Consequences. New York, Wiley, 1997.
65 Clarke-Steward KA: And daddy makes three: The father's impact on mother and young child. Child Dev 1978;49:466–478.
66 Frascarolo-Moutinot F: Daily paternal involvement and parent-child relationships (in French); thesis, Geneva, 1994.
67 Hossain Z, Field T, Gonzalez J, Malphurs J, Del Valle C, Pickens J: Infants of 'depressed' mothers interact better with their nondepressed fathers. Infant Ment Health J 1994;15: 348–356. 2.
68 Cooper PJ, Murray L: The impact of psychological treatments of postpartum depression on maternal mood and infant development; in Murray L, Cooper PJ (eds): Postpartum Depression and Child Development. New York, Guilford, 1997, pp 201–220.
69 Campell SB, Cohn JF: The timing and chronicity of postpartum depression: Implication for infant development; in Murray L, Cooper PJ (eds): Postpartum Depression and Child Development. New York, Guilford, 1997, pp 165–200.
70 Stern DN: The Motherhood Constellation: A Unified View of Parent-Infant Psychotherapy. New York, Basic Books, 1995.
71 Beebe B: Brief mother-infant treatment: Psychoanalytically informed video feedback. Infant Ment Health J 2003:24:24–52.
72 Downing G: Video Microanalyse Therapie: Einige Grundlagen und Prinzipien; in Scheuerer-English H, Suess H GJ, Pfeifer W-K (eds): Wege zur Sicherheit: Bindungswissen. In Diagnostik und Intervention. Geissen, Psychosocial Verlag, 2003.
73 Papoušek M: Einsatz von Video in der Eltern-Säuglings-Beratung und -Psychotherapie. Prax Kinderpsychol Kinderpsychiatr 2000;49:611–627.
74 Glover V, Onozawa K, Hodgkinson A: Benefits of infant massage for mothers with postnatal depression. Semin Neonatol 2002;7:495–500.
75 Onozawa K, Glover V, Adams D, Modi N, Kumar RC: Infant massage improves mother-infant interaction for mothers with postnatal depression. J Affect Disord 2001;63:201–207.