The Impact of Maternal Psychiatric Illness on Infant Development

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Maternal depression and anxiety are associated with compromises in infant and maternal social and emotional functioning. In this paper, we briefly review the literature on this topic and present some preliminary findings on a group of mothers in treatment for major depressive disorder, panic disorder, or obsessive-compulsive disorder. The findings suggest that the symptom reports of treated mothers with established DSM diagnoses were similar overall to those of control mothers. However, the mothers' psychiatric illness had a compromising effect on their interactions with their infants and on their infants' social and emotional functioning. The implications of these results are discussed.

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Maternal depression and anxiety are related to compromises in maternal emotional responsivity and infant socioemotional functioning. In this paper, we briefly review the research on this topic. The studies have been carried out primarily in the tradition of developmental psychology and focus largely on maternal depression, since this is the maternal psychiatric illness that has received most attention in this literature. We also discuss some of the methodological shortcomings and unanswered questions of this research. These questions include (1) How do mothers in treatment describe their affective and psychological functioning on self-report measures? (2) Do these self-descriptions fit the emotional quality of their interactions with their infants? This is a critical question, because mothers' self-reports are often used as key indicators of their functioning, including their ability to parent. To address this and other issues, we present preliminary findings on the socioemotional functioning of a group of infants and their mothers who are in treatment for major depressive disorder, panic disorder, or obsessive-compulsive disorder. The results suggest that, although mothers report feeling well, their affective responsiveness as well as their infants' socioemotional development are compromised in significant ways.

The paper is guided by the thesis that maternal depression and anxiety interfere with infants' active engagement with people and objects and that exposure to compromised parenting may predispose children to develop socioemotional, cognitive, and psychiatric difficulties. This interpretation is not complete or exclusive of other perspectives. For instance, there is evidence that mood and anxiety disorders have a genetic basis,[1] that prenatal physiological mechanisms associated with maternal psychiatric illness may alter neonatal outcome,[2] and that a lower threshold of limbic arousal in response to novelty may underlie the development of psychopathology in some individuals.[3,4] The interaction of these processes is complex, and it is likely that there are multiple pathways to psychopathology. Understanding these pathways requires consideration of a broad range of physiologic, genetic, and environmental factors.

EFFECTS OF MATERNAL PSYCHIATRIC ILLNESS ON INFANT FUNCTIONING

Infant Sensitivity to Maternal Affect

It is now well established that infants are exquisitely sensitive to the emotional states of their mother and other caregivers.[5] This sensitivity, in the earliest months of life, is fundamental to understanding the impact of maternal psychiatric illness, such as depression and anxiety, on in-

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fant development.[6] For example, Cohn and Tronick[7] asked nondepressed mothers of 3-month-old infants to simulate depression for 3 minutes. The mothers were asked to speak in a monotone, to keep their faces flat and expressionless, to slouch back in their chair, to minimize touch, and to imagine that they felt tired and blue. The infants exposed to this brief simulation of depression reacted strongly. Compared with their normal interactions with their mother, the infants expressed little positive affect, looked away from the mother, and became wary and distressed during the simulation. Their affective behavior was restricted, cycling among states of wariness, disengagement, and distress with brief bids to their mother to resume her normal affective state. Importantly, the infants continued to be distressed and disengaged from the mother even after the mother resumed normal interactive behavior. This research suggested that infants as young as 3 months can detect even short-lived changes in their mothers' affective behavior and that they react with affective states of their own that are specifically related to the affect expressed by their mother. The research also raised questions as to what happens when infants are exposed to more prolonged periods of maternal social and emotional unavailability. On the basis of these findings and others like them,[8] it was hypothesized that exposure to maternal depression and anxiety might be associated with affective and interactive disturbances in the infant.

Depression and Maternal and Infant Functioning

Weinberg and Tronick[5,9] have recently reviewed the literature on the effects of maternal depression on maternal and infant functioning (see references 10–12). The research indicates that in each communicative domain—face, voice, and touch—the quantity, quality, and timing of depressed mothers' social and affective behavior are distorted in ways that contrast sharply with the behavior of nondepressed mothers. In turn, distortions of maternal affect and behavior are related to compromises in infant social, emotional, and cognitive functioning.[13,14]

Much of the research that evaluates the behavior and affect of depressed mothers has treated these mothers as if they form a homogeneous group. The picture, however, is more complicated. Research suggests that the behavior of depressed mothers is heterogeneous and that maternal depression does not have a singular compromising effect on the infant. Several researchers have found that some depressed mothers' behavior and affect appear quite normal, whereas the behavior and affect of other mothers with similar levels of depressive symptomatology are compromised.[14–18] Cohn and Tronick,[17] for example, describe depressed mothers who are disengaged and withdrawn when interacting with their infants. These withdrawn mothers engage in little play, talk only rarely to their infants using motherese, and show flat and sad affect. Other mothers are more intrusive. They express anger directed at their infants and interfere with their infants' activities. Still other mothers are able to mobilize sufficiently to interact positively with their infants. This research indicates that not all depressed women function poorly as parents. The research, however, does not indicate whether the "positive" depressed mothers represent a subgroup of mothers with less severe and chronic depression. These women may not experience an impairment in interactional skills, whereas women with more severe and chronic depression may be unable to compensate for a worsening in their mood. It is also unclear whether the "positive" depressed mothers have infants who are temperamentally more easygoing and better able to elicit a positive interaction from the mother. Further research is necessary to determine the role of the infant and to establish whether the inability to mobilize and to derive pleasure from interchanges with the infant is a predictor of risk for chronic depression.

Maternal depression is associated with adverse effects on infant functioning.[5,9] Infants of depressed mothers have difficulties engaging in social and object interactions as early as 2 months of age.[19] These infants look less at the mother, engage less with objects, show less positive and more negative affect, lower activity levels, and greater physiologic reactivity as indexed by higher heart rate and cortisol levels than the infants of nondepressed control mothers.[11] They show compromised ability to regulate their affective and behavioral states. These regulatory dysfunctions are present as early as the newborn period (often in the form of irritability and inconsolable crying[20]), which suggests that prenatal factors (e.g., neuroendocrine changes associated with the mothers' depression) may have had an impact on the infants' behavior.

The infants' affective states are specifically related to their mothers' style of interaction. Cohn and Tronick[17] found that the infants of withdrawn depressed mothers spend most of their time fussing and crying, whereas the infants of the intrusive depressed mothers rarely cry but avoid looking at and interacting with their mother. The infants of the positive depressed mothers behave similarly to control infants. These findings emphasize how sensitive infants are to maternal affect and suggest that mothers' affective style is a critical factor that needs to be considered in clinical and research work in addition to the mothers' diagnostic status. The data also suggest that there is a need to tailor interventions, since the interactional difficulties of mothers within the same diagnostic category vary and are associated with different maternal and infant outcomes.

Male infants may be more vulnerable to maternal depression than female infants. Weinberg et al. (Weinberg MK, Tronick EZ, Cohn JF, et al. 1997. Unpublished data) found that 6-month-old male infants of nondepressed mothers have greater difficulty regulating affective states on their own and need to rely more on maternal support than girls to help them maintain affective regulation. Mother-son, as compared to mother-daughter pairs, also

take longer to repair interactive errors (e.g., misreading of cues) that typically occur during mother-infant interactions. To facilitate well-modulated interactions, mothers' and sons' affective behaviors are tightly synchronized. This careful tracking of each other's behavior may function to help boys maintain affective regulation. In other research, Weinberg[21] describes similar gender differences in mother-infant dyads when the mother is depressed. Preliminary data suggest that male infants are more demanding social partners than female infants and that depressed mothers have difficulties providing their sons with the regulatory help that they need. A cycle of mutual interactive problems between mothers and sons becomes established, with the mothers showing more anger to their sons than their daughters and the sons showing less positive affect and greater difficulty maintaining affective regulation.

At 1 year of age, many infants of depressed mothers show poorer performance on developmental tests, such as the Bayley Scales of Infant Development and Piagetian object tasks.[22,23] These findings suggest that the children of depressed mothers are at risk for cognitive compromises at an early age.[22–24] Furthermore, there is some indication that these infants have an insecure attachment to the mother, especially if the mothers' illness is severe and chronic.[25] Insecure attachment has been related to a number of difficulties, including conduct disorders and behavior problems during the preschool and later school periods, and has been suggested as an environmental mechanism for the occurrence of familial psychopathology.[26–29]

Anxiety and Maternal and Infant Functioning

Little is known about the effects of anxiety on infant functioning. Most of the literature has focused on older children and on panic disorder to the exclusion of other anxiety disorders. Despite the paucity of findings, the available research suggests that maternal anxiety, like depression, may have a powerful developmental effect on children.

Increased rates of psychiatric difficulties have been reported in the children of mothers with anxiety disorders. Weissman et al.,[30] for example, found that 6- to 7-year-old children with a parent who has panic disorder were three times more likely than control children to experience anxiety disorders. Several studies also report higher rates of behavioral inhibition in the children of mothers with panic disorder.[4,31–34] Behavioral inhibition is defined by Kagan, Mullen, Reznick, and colleagues[3,35,36] as a temperamental tendency to withdraw from novelty and unfamiliar situations. Research by Mullen et al.[3] indicates that 10% to 15% of American children are inhibited and predisposed to be irritable as infants and shy, fearful, quiet, and introverted at older ages. Rosenbaum et al.[4,31] found that 85% of the children (ages 2–7) of parents with panic disorder, with or without agoraphobia, were rated as behaviorally inhibited, compared with 50% of the children of parents with depression and 15% of the children whose parents had neither panic disorder nor depression. Biederman et al.[34] further found higher rates of multiple anxiety disorders (two or more anxiety disorders per child) in children described as behaviorally inhibited. These rates increased markedly over a period of 3 years when the children were reassessed.[32] However, as Biederman et al.[32] caution, the majority (approximately 70%) of inhibited children do not develop an anxiety disorder. Thus, behavioral inhibition may be one of several risk factors contributing to the ontogeny of later psychopathology.

Children of mothers with panic disorder may also have a higher rate of insecure attachment to the mother.[33,37] Eighty percent of the preschool children in a study by Manassis et al.[37] were classified as insecurely attached to the mother. This study, however, was based on a small sample and the findings must be considered with some caution until they are replicated.

Thus, the research indicates that the children of mothers with panic disorder are at risk for developing anxiety disorders themselves and that inhibited temperamental characteristics or attachment difficulties may be early risk factors. More extended longitudinal observational studies are needed to confirm initial findings and evaluate the importance of these risk factors in the development of psychopathology.

Methodologic Issues and Unanswered Questions

Several of the studies that examine the impact of maternal psychiatric illness on infant functioning have suffered from methodological problems, including small sample sizes, lack of appropriate comparison groups, and absence of blindness in respect to maternal psychiatric status. Many studies have not been replicated, making it difficult to ascertain the robustness of findings. Several of the studies have also relied on maternal reports of child psychopathology, either parental interviews or parental ratings on measures such as the Child Behavior Checklist (CBCL). The extent to which these reports are biased by the parental disorder is unknown, but there is some evidence that depressed mothers may perceive their infants' more negatively than asymptomatic mothers.[38]

Most of the studies that evaluate the impact of depression or anxiety on maternal and infant functioning have not explored the potential effect of treatment on maternal behavior. Many studies have used community-based samples of women who have symptoms but who have not typically sought treatment. Although self-reported symptoms are common during the postpartum period, treatment utilization is low.[39,40] Women who seek treatment may represent a more ill group than women who do not seek treatment. These women may also possess characteristics (e.g., higher IQ, more education, higher income) that make it more likely that they will receive treatment. Exclusive evaluation of untreated women from community-based

samples, however, fails to delineate the extent to which treatment affects maternal and infant functioning. Thus, there is a need for observational studies to evaluate the functioning of women with a psychiatric illness who are in treatment as well as the functioning of their infants.

Few studies have evaluated the relation between mothers' self-report of their own functioning, the mothers' interactive behavior with their infants, and the infants' functioning. Research on this topic has yielded contradictory findings. Teti et al.[41,42] found that the quality of depressed mothers' caretaking behavior was related to the mothers' perceptions of their maternal competence. The poorer the mothers' feelings of self-efficacy in the mothering role, the poorer their interactions with their infants. Frankel and Harmon,[43] however, found discontinuity between maternal self-report and maternal interactive behavior. Although depressed mothers' self-evaluations of their affective state and ability to parent were primarily negative, their interactions and attachment relationships with their children were no more impaired than those of controls. Discontinuity between parent report and behavior has also been reported by Weissman and Paykel[44] but in the opposite direction. Weissman and Paykel found that, even after an acute psychiatric episode is over, mothers continue to show parenting difficulties with their children. This research indicates that there is a need to ask mothers how they are feeling, assess their psychiatric status with objective measures based on structured clinical interviews, and observe their interactions with their infants if we are to understand the relation between maternal psychiatric illness, maternal behavior, and infant development.

PRELIMINARY RESULTS

As part of an ongoing collaboration between the Child Development Unit at Boston's Children's Hospital and the Perinatal Psychiatry Clinical Research Program at the Massachusetts General Hospital, we are currently studying a group of mothers with a pregravid history of psychiatric illness. One of the primary goals of the study is to evaluate the relations between maternal self-reported psychiatric functioning and direct observations of mother-infant interactions and socioemotional functioning.

Characteristics of the Mothers and Infants

The study included two groups of mothers and infants. The proband group consisted of 30 mothers with a pregravid clinical diagnosis of panic disorder (37% of sample), major depressive disorder (43% of sample), or obsessive-compulsive disorder (20% of sample). Mothers were diagnosed using the Structured Clinical Interview for DSM-III-R Axis I Disorders (SCID)[45] and were recruited from and treated at the Perinatal Psychiatry Clinical Research Program. The majority of the mothers were treated with psychotropic medication, the most common of which were clonazepam, tricyclic antidepressants (i.e., nortriptyline, desipramine, and imipramine), and fluoxetine. Sixty-eight percent of the mothers were maintained on medication during some part of their pregnancy. During the postpartum period, 48% of the mothers were treated with psychotropic medication and an additional 40% with psychotropic medication and therapy. Furthermore, 40% of the sample breastfed while taking medication. Thus a majority of the infants were exposed to psychotropic medication during pregnancy and/or the postpartum period.

The second group of mothers was a control group drawn from the community. These mothers were recruited from the maternity wards of Boston area hospitals. The group consisted of 30 mothers with no documented depressive symptomatology on the Center for Epidemiologic Studies Depression Scale (CES-D)[46] or clinical diagnosis on the Diagnostic Interview Schedule-Version-III-R (DIS-III-R).[47]

Mothers and infants in both groups met a set of low-risk social and medical criteria (e.g., age over 21 years, living with the infant's father, at least a high school education, healthy mother and infant). Many developmental studies have included high-risk samples of mothers and infants. Risk factors (e.g., teen parenthood, poverty, illness), however, are known to affect maternal and infant functioning and to obscure the effects of psychiatric status. The use of medical and social selection criteria makes it easier to disentangle the effects of psychiatric illness per se from other factors.

The study is ongoing, and it is important to note that the current proband group is comprised of a heterogeneous cohort of mothers with different diagnoses. Following the completion of the study, the major depressive disorder, panic disorder, and obsessive-compulsive disorder groups will be disaggregated in order to determine if there is a differential effect of diagnosis on maternal and infant functioning. Although specificity is one of the most important issues in the field of high-risk research,[48] few studies have evaluated what outcomes are unique to a specific diagnostic group. Furthermore, when the sample is complete, the effects of different kinds of treatment on maternal and infant functioning, as well as issues of chronicity, remission, and severity of maternal disorder, will be assessed.

Observations of the Mothers and Infants

Mothers completed self-report measures designed to assess their level of depressive symptomatology—using the CES-D—and psychiatric symptoms—using the Symptom Checklist-90 (Revised), (SCL-90R).[49] Mothers and infants were also videotaped in the laboratory of the Child Development Unit at Boston's Children's Hospital at 3 months postpartum. The infants were videotaped with their mother in the Face-to-Face Still-Face paradigm developed by Tronick et al.[50] This paradigm includes a 2-minute face-to-face play interaction with the mother, a 2-minute still-face episode during which the mother is unresponsive to the in-

fant, and a second 2-minute face-to-face play interaction with the mother. In addition, the infants were videotaped during a 2-minute face-to-face play interaction with an unfamiliar female research assistant.

Contrasted to face-to-face play (during which mothers are instructed to play with the baby as they would at home), the still-face perturbs the mothers' behavior. During this episode, mothers are asked to look at their infants but not to touch, smile, or talk to them. The mothers' en face position and eye contact signal the infants that social interaction is forthcoming, while their expressionless face and lack of response communicate the opposite. The mothers are saying "hello" and "good-bye" at the same time and remain expressionless even after attempts by the infants to reinstate the interaction.

The still-face has been used extensively to evaluate young infants' communicative abilities, sensitivity to changes in maternal behavior, ability to cope with interpersonal disturbances, and capacity to regulate affective states.[51,52] For example, Gianino and Tronick[53] found that infants who experienced frequent repairs of minor interactive errors (e.g., misreading of cues) during mother-infant face-to-face play were likely to elicit their mothers' attention using smiles and vocalizations during the still-face. Infants who experienced fewer repairs were more likely to become distressed. Gianino and Tronick concluded that infants who routinely experience repairs have a representation of themselves as effective and of their mother as responsive and sensitive. These data on the still-face, like the data on the simulation of depression reported above, have implications for the infants of psychiatrically ill mothers who may be exposed to periods of maternal unavailability. Infants of mothers with a psychiatric illness would be expected to react with more negative affect to the still-face than the infants of well mothers.

The infants were also videotaped interacting with an unfamiliar female research assistant (or stranger). This episode was included because of work by Field et al.[54] suggesting that negative interactive patterns of infants of depressed mothers generalize to the infants' interactions with an unfamiliar adult. Specifically, Field et al. found that infants of depressed mothers showed similar compromises whether they were interacting with their mother or a stranger and that the stranger performed less optimally with these infants than with the infants of control mothers. These findings suggest that infant affect and behavior are not simply immediate by-products of the adult partner's interactive style but reflect the infants' representations of their interactions with the mother and other social partners.

The infants' and mothers' behaviors and facial expressions were coded microanalytically second-by-second from videotapes using Tronick and Weinberg's Infant and Maternal Regulatory Scoring Systems (IRSS and MRSS) and Izard's AFFEX system.[55] (The IRSS and MRSS are available from the authors on request. The systems are described in reference 56.) These systems have been very effective at documenting subtle changes in infant and maternal behavior. Coders were masked to maternal group membership.

Maternal Self-Reported Functioning and Mother/Stranger-Infant Interactions

The findings from the study are counterintuitive. On the one hand, proband mothers reported feeling as well as control mothers on the questionnaires assessing depressive symptomatology and other psychiatric symptoms. An exception was a slightly higher level of anxiety reported by the proband mothers. However, even though the proband mothers perceived themselves as functioning and feeling well overall, they evidenced a number of difficulties when interacting with their infants.

During the mother-infant play interactions, mothers in the proband group were more disengaged than control mothers. Proband mothers talked less to their infants, showed fewer facial expressions of interest, were less likely to share the infants' attention to objects, and touched their infants less than control mothers. In addition, in the reunion play, during which mothers and infants must renegotiate the interaction after it has been stressed by the still-face, proband mothers were more likely to perceive the interaction negatively (as reflected in comments such as "You don't like me," "I bore you," or "You don't want to play with me") and had a tendency to show more anger to their infants than control mothers. These findings suggest that the proband mothers found it difficult to repair the interaction after it had been disrupted by the still-face.

The proband infants also showed compromises in their interactive behavior. Although there were few notable differences in the infants' affect and behavior during the first play interaction, the proband infants had more negative interactions with their mothers than controls after having experienced the stress of the still-face. The proband infants showed less interest, more anger and sadness, and a greater tendency to fuss and cry than controls during the reunion face-to-face play. These findings indicate that they, as their mothers, had difficulties regulating their emotional states and repairing the interaction after it had been disrupted. This is consistent with previous work by Weinberg and Tronick,[52] who found that the reunion episode is often the most challenging episode of the face-to-face still-face paradigm to mothers and infants.

The proband infants also showed more negative affect in response to the still-face and the interaction with the stranger. During both situations, the proband infants showed less interest, more anger and sadness, and had a tendency to fuss and cry more than control infants. In addition, the proband infants were less likely than control infants to engage the stranger in an interaction by vocalizing. These results indicate that the proband infants reacted with a decrease in interest and an increase in anger, sad-

ness, fussiness, and crying to the episodes of the face-to-face still-face paradigm that presented them with a challenge or stress.

The strangers' reactions to the infants in the proband and control groups were also evaluated. The stranger interaction is interesting because the strangers were unbiased. The strangers had never seen the baby before, had not watched the preceding mother-infant interactions, and were masked to the infants' and mothers' background. Thus the strangers were influenced by the infants' ongoing behavior during the interaction and not by prior knowledge of the mother and infant.

The strangers were more disengaged with the infants of the proband mothers than with the infants of control mothers. Of particular interest was the minimal amount of time the strangers touched these infants. They especially avoided using touches such as tickles that are arousing and intrusive. The strangers also maintained a greater physical distance from these infants than from control infants and used behaviors (e.g., hand waves, calling the infant's name) to try to elicit the proband infants' attention. The strangers may have behaved in a disengaged manner because they were picking up cues from the infants that the infants did not want to play with them (e.g., these infants were less likely to invite interaction by vocalizing). The strangers may also have perceived these infants as more emotionally vulnerable than controls (e.g., these infants expressed higher levels of negative affect) and more likely than controls to become overwhelmed or overstimulated if they played with them in a more animated manner. Both alternative explanations suggest that the infants in the proband group exhibited an affective-behavioral organization that affected their interactions with the strangers in significant ways.

COMMENTS

Mothers in treatment with a pregravid history of panic disorder, major depressive disorder, or obsessive-compulsive disorder consistently perceived themselves as doing well when asked to complete self-report measures assessing psychiatric symptoms. They reported levels of depression and other psychiatric symptoms that were comparable to those of control mothers. An exception was a slightly higher level of self-reported anxiety. Surprisingly, how well the proband mothers said they were doing did not accurately reflect their interactions with their infants. The proband mothers were significantly more disengaged than control mothers when interacting with their infants. This disengagement extended to the communicative domains of face, voice, and touch. They also had a more difficult time regulating their affect and coping with the disruption generated by the still-face than control mothers. These interactional difficulties are similar to those reported in prior research with depressed untreated mothers.

These results indicate that psychiatrically ill mothers' self-evaluations are not always concordant with the emotional quality of their interactions with their infants. A similar discordance has been reported by Weissman and Paykel.[44] They found that, even after an acute psychiatric episode is over, mothers continue to show interactive and emotional difficulties with their children.

The findings suggest that some areas of maternal functioning may change more easily than others. Self-perceptions may be the first area to improve as a result of treatment and/or remission of the disorder. Changes in interactive behavior and intimate relationships, on the other hand, may be less easily amenable to treatment and/or remission. Mother-infant relationships develop stable characteristics based on the mothers' and infants' interactive history. As a result, both mothers and infants interact with each other following predictable patterns. For a change to occur in the mother-infant relationship, the mother's perceptions of her infant and of herself as a parent as well as her interactive behavior with the infant must change. The infant's interactive representations and behavior must also change, given the reciprocal nature of interactions and the infant's active role in shaping relationships.[6] Thus change takes place at different levels and is often a slow and difficult process.

The infants of the proband mothers showed compromises in their socioemotional functioning. Compared with controls, the proband infants reacted with more anger, sadness, fussiness, and crying and less interest to the episodes of the face-to-face still-face paradigm that presented them with a challenge or stress. Thus they reacted with negative affect to the still-face, the stranger, and the reunion episode during which the mothers and infants had to repair the interaction following the disruption of the still-face. Furthermore, the infants' behavior affected the unfamiliar adults' interactions. The strangers were more disengaged with the proband infants than with the control infants. The disengagement apparent in both the mothers' and strangers' interactions is worrisome and raises the question of whether these infants receive adequate levels of social and emotional stimulation necessary for optimal development.

The findings in this study are consistent with the Mutual Regulation Model (MRM) developed by Tronick et al.[5,6] The MRM focuses on the interactive nature of development and argues that mothers and infants jointly regulate interactions by responding to each other's affective displays. Parental unresponsiveness dysregulates infants' affective states, which prevents the infants from achieving their goals of social connectedness and object exploration. This inability leads to sadness and anger and compels the infants to devote much of their coping resources to control negative affect. With chronic failure to change their mothers' behavior, the infants' sense of mastery and agency may become compromised. They develop a representation of the parent as unreliable and unavailable and of them-

selves as ineffective and helpless. In addition, they may develop a self-directed style of coping that is deployed defensively and automatically in an effort to preclude anticipated negative emotions even in situations in which negative affect may not occur. This interpretation may explain the findings of Field et al.[54] and this study that the infants of psychiatrically ill mothers were affectively negative even with people who were not depressed or anxious.

The process of mutual regulation is not a complete or exclusive explanation. A large body of literature supports a genetic basis for mood and anxiety disorders. Family studies have demonstrated that relatives of depressed probands are at greater risk of mood disorders than the general population (see reference 1 for a review). Higher concordance rates of anxiety disorders have been found in monozygotic as compared with dizygotic twins.[57] This genetic diathesis is likely to influence infants' behavior independently of their interactive experiences. There is also some evidence that prenatal maternal habits influence infants' later behavior. Depressed women are more likely than nondepressed women to use alcohol, cigarettes, and drugs during pregnancy, and each of these factors has been associated with compromises in infant outcome.[58] Physiologic mechanisms associated with depression may also alter neonatal outcome. These factors include hypercortisolemia and increased serum catecholamines that alter uterine blood flow and induce uterine irritability.[59] Animal studies also indicate that significant changes in offsprings' neurotransmitter systems and regulation of the hypothalamic-pituitary axis can be induced by prenatal maternal stress.[2,60–63] These studies suggest that physiologic changes induced by prenatal stress may undermine the ability of offspring to cope with anxiety-provoking situations.[2]

The finding of greater irritability (i.e., anger, sadness, fussiness, and crying) in the proband infants in this study is also reminiscent of the descriptions of inhibited infants in Mullen et al.[3] who found that 4-month-old infants who later become inhibited are motorically active and irritable when confronted with novelty. In this study, the still-face and the stranger were novel to the infants, and both situations elicited anger, sadness, fussiness, and crying in the proband infants. Rosenbaum et al.[4,31] and Biederman et al.[4,31,32,34] have argued in a series of papers that inhibition may reflect a temperamental predisposition to the development of anxiety disorders. They hypothesize that a lower threshold of limbic arousal in response to novelty and challenge is a basic process underlying the development of psychopathology in some individuals.

The present study does not allow us to discern genetic from environmental effects. It is clear, however, that the developmental process leading to psychopathology is complex. It is likely that there are multiple pathways to both similar and dissimilar developmental outcomes. Thus an inhibited child with an asymptomatic mother and a normal child with a mother with panic disorder may develop similar forms of disturbances. Or, the child of a depressed intrusive mother may experience a different outcome from the child with a withdrawn depressed mother. Understanding these pathways requires consideration of a broad range of biological, genetic, and environmental factors.

The findings from this study highlight several difficult therapeutic issues. The disjunction of maternal self-report and observed interactive behavior indicates that descriptions of how good mothers are feeling do not fully capture the quality of their functioning. This is a significant issue, because maternal self-report is often a primary method of evaluating the effects of therapy and medication. Are mothers unaware of interactional problems with their infants? Are they denying these difficulties? Has the therapeutic process transformed only some aspects of the mothers' functioning and not others? Do the mothers need more therapy or a different kind of therapeutic intervention? These are difficult questions to which there are no easy answers.

A related issue is how clinicians should handle the effects of the mothers' disorder on the infants' development. The primary question here is whether it is enough to treat the mother alone or whether the dyad should also be a focus of the therapeutic intervention. In many cases, the infant is the "forgotten patient." By excluding the infant from the therapeutic process, clinicians may miss the opportunity to address developmental difficulties that may lead to later psychiatric problems in a child who may already be genetically vulnerable to psychiatric illness. Furthermore, clinicians may not fully address the potential exacerbating effect of the birth of a child on the mother's psychiatric status.

Clinicians need to be aware of mother-infant interactional difficulties and to be alert to the fact that these difficulties emerge early in the child's life. The research suggests that it is important to evaluate how well mothers are doing with their infants. One technique may be to ask mothers direct questions about their relationship with their infant (e.g., "How connected do you feel to your baby?", "Do you enjoy holding and playing with the baby?", "What do you and the baby do together?"). Another technique may be to observe mothers' interactions with their infant.

The inclusion of a mother-infant interaction component in the therapeutic process may have several benefits. It may help alleviate mothers' concerns about their infant's development and feelings of guilt and worry that they are not doing everything they should to foster the child's development. It allows clinicians to directly address mother-infant interactional difficulties with the mother, which in turn may improve the mother-child relationship and enhance the infant's development. Finally, the infant who functions well can be used as a therapeutic ally to increase a mother's sense of competence as a parent. Discussion of mothers' and infants' strengths may be an invaluable and self-affirming experience for these mothers.

The current study has a number of limitations. The findings are preliminary and not based on the final sample of mothers and infants. The current proband group is comprised of a heterogeneous cohort of infants and mothers with different diagnoses. It is possible that the effects observed in this study are primarily accounted for by a particular diagnostic group. Following the completion of the study, the major depressive disorder, panic disorder, and obsessive-compulsive disorder groups will be disaggregated in order to determine if there is a differential effect of diagnosis on maternal and infant functioning. Furthermore, issues of chronicity and severity of maternal illness were not taken into account in this preliminary data set. It will be important to determine whether mothers in remission or in episode show dissimilar responses on self-report measures and patterns of interaction with their infants and whether their infants' socioemotional functioning differs. Finally, it is unclear what role exposure to prenatal psychotropics plays in the outcome of the proband infants. When the sample is complete, the effects of different kinds of treatment on maternal and infant functioning, as well as issues of chronicity, remission, and severity of maternal disorder, will be addressed.

Despite these limitations, the findings of this study add to the literature indicating that the infants of mothers with mood and anxiety disorders are at risk for socioemotional difficulties early in life. The recognition of the importance of mother-infant interactional problems as a risk factor in the development of later psychopathology may facilitate the early identification of infants at greatest risk. Early intervention with both the mothers and infants may limit or prevent the development of psychopathology in these children. More extended longitudinal follow-up studies are needed to observe the evolution of early difficulties into manifest disorder and to determine the importance of protective and risk factors in the ontogeny of psychopathology.

Drug names: clonazepam (Klonopin), desipramine (Norpramin and others), fluoxetine (Prozac), imipramine (Tofranil and others), nortriptyline (Pamelor and others).

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