Published in final edited form as:
Infant Ment Health J. 2008 ; 29(5): 399–419. doi:10.1002/imhj.20190.

Dyadic Intervention during Pregnancy? Treating Pregnant Women and Possibly Reaching the Future Baby

Sharone Bergner, Ph.D.,
Institute for Psychoanalytic Training and Research

Catherine Monk, Ph.D., and
Dept of Psychiatry, Columbia University

Elizabeth A. Werner, M.A.
Department of Psychology, Long Island University

INTRODUCTION

Development begins before birth. Yet, pregnancy is under-theorized and infrequently the focus of clinical attention. The pregnant woman, her fetus, nor their relationship, have been fully explored from a biopsychological or a psychodynamic perspective. It is well established that post–natally, parental psychopathology greatly increases a child's risk for emotional disorders (Fonagy, Steele, Steele, Moran, & Higgit, 1991) (Fraiberg, 1995) (Murray, 1997) (Nomura, Wickramaratne, Warner, Mufson, & Weissman, 2002) (Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997). The impact can be identified across a wide range of ages and indices. For example, maternal depression is associated with behavioral problems in school–age boys (Shaw & Vondra, 1995) as well as with atypical frontal electrical brain activity in toddlers (Dawson & et. al., 2001). This paper addresses the formative phase that precedes the mother-infant mutually regulating dyad, the study of which continues to enrich our clinical understanding of the roots of psychopathology. New research indicates that even before birth, women's moods may affect child development (Groome, Swiber, Bentz, Holland, & Atterbury, 1995) (Lundy et al., 1999) (Mohler, Parzer, Brunner, Wiebel, & Resch, 2006) (Monk et al., 2000; Monk, Myers, Sloan, Ellman, & Fifer, 2003; Monk, Sloan et al., 2004) (Gutteling et al., 2005; Van den Bergh & Marcoen, 2004; Van den Bergh et al., 2005; Van den Bergh, Van Calster, Smits, Van Huffel, & Lagae, 2007) (Zuckerman, Bauchner, Parker, & Cabral, 1990). Biopsychological data presented here suggest that women's affective states during pregnancy—specifically depression, anxiety, and elevated life–stress— are associated with subtle differences in the neurobiological substrate of the fetus' emerging affect regulation system.

The psychotherapeutic literature on the treatment of pregnant women was for some time rather scant. This is likely reflective in part of Freud's purported view that pregnant women are in a state of calm bliss, and are not in need of nor motivated for intervention. Those who went on to write about pregnancy did not agree with this view, and their writings addressed in greater depth the meaning and experience of pregnancy for the pregnant woman, as well as her potential need of and emotional availability for clinical intervention. The literature now recognizes pregnancy as a critical transitional-developmental phase that often stirs

Corresponding author: Catherine Monk, Ph.D., Behavioral Medicine & Developmental Neuroscience, Columbia-Presbyterian Medical Center, 1150 St Nicholas Ave., Suite 1-121, New York NY 10032, cem31@columbia.edu.

unresolved conflicts, arouses related anxieties, and thus is coincident with affect disturbance.

In this paper, we review the psychobiological research examining women's moods during pregnancy in relation to newborn and fetal behavior. To date, there are only a few published studies on fetal behavior in women with depressive symptoms; the majority of the fetal studies focus on stress and subsyndromal anxiety. We describe some of the fetal research from our laboratory, which begins to address the effects of both anxiety and depression.[1] We then turn to a brief discussion of psychoanalytic writings on the emotional experience of pregnancy and on psychotherapeutic intervention. Next we focus on psychodynamic psychotherapy with pregnant women as it relates, in particular, to problematic aspects of women's representational world that are imbued with negative or dysregulated affect; such affect may, in turn, influence fetal development. This kind of therapeutic intervention aims to achieve mood improvement and affect regulation, and to address the evolving relationship between the woman and the fetus. Finally, two case vignettes are presented, one described in brief and the other in greater detail.

We have chosen to present dynamically oriented clinical interventions. We think the psychoanalytic framework is especially suited for addressing affective disturbance that may be triggered by the representational world that is "activated" (Stern, 1991, 2004) during pregnancy. Psychodynamically oriented therapy is a modality that targets conflictual representations and the affective difficulties with which they are intertwined within a uniquely mutative relational context. Stern (1995) discusses psychoanalytically-oriented parent-infant psychotherapies as approaches that aim to change the parent's representations – which underlie behavior, comparing these to approaches that focus on the actual interactive behaviors of the parent with the infant. The therapeutic intervention with pregnant women discussed in the current paper is similar to those described by Stern in that it targets the representational-affective world of the woman in the absence of observable dyadic interactions with an infant but with the idea of thereby also affecting the developing child.

We suggest that combining such qualitatively different perspectives as biopsychological research with psychodynamic theorizing and clinical discussion is a worthwhile pursuit, as it enriches our understanding of the experience of pregnancy, a phase marked by inseparably intertwined psychological and physiological processes. However, such a combination entails switching languages and ways of thinking as well. We hope the disjunctive quality such switches can generate will ultimately produce active cross-fertilization between the two enterprises.

Considering fetal development in relation to pregnant women's moods has several implications for clinical and developmental psychology: it (1) pushes back the time frame for examining women's emotional functioning as it relates to child outcomes; (2) promotes a biopsychosocial approach to the study of pregnancy and development; (3) indicates that the treatment of perinatal mood disorders must be better understood as the choices for intervention will likely affect not only the mother, but the baby as well. Winnicott (1960) said there is no such thing as a baby alone; all the more so during pregnancy.

[1]This research was conducted by Monk and colleagues at Columbia University.

A BIOPSYCHOLOGICAL PERSPECTIVE

WOMEN'S MOOD DISTURBANCES AND NEWBORN OUTCOMES

Behavioral Outcomes—Babies born to mothers who have depressive symptoms at the time of delivery have lower motor tone and endurance, are less active, and more irritable on a neurobehavioral exam (Abrams, Field, Scafidi, & Prodromidis, 1995). Fewer facial expressions in response to models of happy and surprised faces also have been reported in these infants (Lundy & Field, 1996), as well as disrupted sleep patterns (Field, 1995). Women's depressive symptoms measured during pregnancy predict newborn fussiness and non–soothability, even after controlling for adverse health behaviors and low socioeconomic status (Zuckerman et al., 1990) while depression and anxiety are associated with negative reactivity in 2 and 4 month olds (Davis et al., 2007) (Davis et al., 2004). In a prospective, longitudinal study of over 7,000 pregnant women and their offspring, findings indicated that maternal anxiety during pregnancy doubled the risk for hyperactivity in 4–year-old boys, independent of obstetric and sociodemographic risks as well as mothers' postnatal anxiety levels (O'Connor, Heron, Golding, Beveridge, & Glover, 2002). Data from this same sample also suggests that antenatal anxiety contributes to emotional and behavioral problems at 47 months old, independent of sociodemographic risks as well as mothers' postnatal depression (O'Connor et al., 2002). Finally, a more recent study showed that antenatal anxiety predicts impulsivity on a performance task at ages 14–15 (Van den Bergh et al., 2005) as well as depression in teenage girls (Van den Bergh et al., 2007). On the other hand, a more recent publication found that a combination of high levels of prenatal anxiety, non–specific stress, and depressive symptoms were associated with more advanced Bayley scales of motor and cognitive development in two–year olds while pregnancy specific stress was associated with slower development (DiPietro, Novak, Costigan, Atella, & Reusing, 2006). The authors speculate that given their healthy sample, this level of mild to moderate maternal mood dysregulation may not be of a significant magnitude or chronicity to adversely affect the child. Instead, it may serve to entrain the child to a postnatal environment of stimulation, one in which advanced motor and cognitive development is an advantage.

Physiological Outcomes—Women's prenatal depressive symptoms were associated with higher newborn basal cortisol levels assayed from urine samples (Lundy et al., 1999) and, in combination with levels of elevated maternal norepinephrine (also from urine samples), inferior orienting scores in the newborn (Lundy et al., 1999). (Cortisol and norepinephrine are stress hormones.) When both subsyndromal trait anxiety and depression were assessed during pregnancy, women with higher composite scores on both mood measures gave birth to newborns who showed reduced high frequency heart rate variability (HRV) (Ponirakis, Susman, & Stifter, 1998) — measures of high frequency HRV are used as non–invasive indices of parasympathetic control of the heart linked in children and adults to affect regulation; reductions are associated with poorer regulation (Bazhenova & Porges, 1997) (Huffman, Bryan, del Carmen, Pedersen, & Doussard-Rousevelt, 1998) (Porges, Doussard–Roosevelt, & Maiti, 1994) (Sloan et al., 1994). Recent reports indicate that antenatal anxiety also is associated with alterations in HPA axis functioning in 10 year olds (O'Connor et al., 2005) and in adolescents (Van den Bergh et al., 2007).

MOOD DISTURBANCE AND FETAL BEHAVOR

Detecting neurobehavioral differences in offspring that are associated with pregnant women's affective states suggests the likelihood that these alterations arose during pregnancy and can be identified in the fetus. Indeed, it has long been suspected that physiological characteristics of the *in utero* environment associated with maternal mood may affect the fetus.

Women who describe their lives as more stressful have fetuses that exhibit reduced parasympathetic and/or increased sympathetic activation as measured by reduced HRV (DiPietro, Hodgson, Costigan, & Hilton, 1996). Moreover, when highly stressed pregnant women also have faster resting baseline heart rate (HR), their fetuses show a delay in the maturation of the coupling of fetal HR and movement, which is hypothesized to reflect less mature central nervous system development (DiPietro, Hodgson, Costigan, & Johnson, 1996). Low socioeconomic status—often a cause of and associated with heightened levels of life stress[2]—has been linked to higher and less variable fetal HR throughout the second and third trimesters (Pressman, DiPietro, Costigan, Shupe, & Johnson, 1998). Finally, elevated stress during pregnancy, and, in particular, stress specific to being pregnant, as well as having an intense emotional style are associated with greater fetal reactivity assessed at three time points during gestation (DiPietro, 2002).

Heightened levels of anxiety during pregnancy are associated with reduced fetal movement during active sleep and, overall, more time spent in a quiet sleep state (Groome et al., 1995). One other report found that elevated anxiety among pregnant women was associated with increased fetal movement (Field, Sandberg, Quetel, Garcia, & Rosario, 1985). However, this latter study was based on maternal report of fetal movement, which is less reliable than ultrasound (the method used in the first study). During an ultrasound examination of a subset of fetuses who entered a state with an unstable heart rate with large, prolonged accelerations, the more anxious the mother, the longer the time fetuses spent in that state (Sjostrom, Valentin, Thelin, & Marsal, 2002). In another study, depression was associated with a slower return to baseline HR following a vibroacoustic stimulation (Allister, Lester, Carr, & Liu, 2001).

IN UTERO CONSTRUCTION OF CHILD REGULATION? FETAL TO INFANT CONTINUITIES

Differences in infant temperament—the early indices of variation in emotion regulation—are linked to distinct physiological profiles and varied risks for future psychopathology. The initiation of these physiological phenotypes may begin *in utero*. The data from the studies described above include aspects of newborn and fetal arousal patterns (irritability, movement) and stress physiology (cardiac autonomic control, cortisol activation). They indicate that characteristics of a child's reactivity and regulation patterns likely are formed and may be identified at the earliest developmental stages. Although differences in fetal and newborn neurobehavior associated with maternal prenatal mood could primarily reflect acute responses to immediate changes in the intrauterine environment and/or be transient, other data indicate that they likely have long–term developmental implications. For example, fetuses that are more active tend to go on to be more difficult, unpredictable, and active infants (DiPietro, Hodgson,. Costigan, & Johnson, 1996)[3]. In a replication study, fetal activity levels accounted for 26% of the variance in observation–based ratings of infant activity (DiPietro, 2000). Fetuses who show greater concordance between movement and HR changes go on to have better state regulation as infants (DiPietro, Costigan, & Pressman, 2002). Using sonographic visualization, Groome found that individual differences in fetuses' rate of movement during active sleep is maintained at 2 and 4 weeks postpartum (Groome et al., 1999). Other research indicates that the number of small body movements is positively associated with the amount of crying during the first three months of life (St.

[2]However, see DiPietro et al., 1999 and Hawkins et al., 1999, for differences in stress appraisal during pregnancy as related to socio-economic status.

[3]Given that pregnant women's anxiety has been associated with both increases and decreases in fetal movement, and that heightened fetal activity has been linked to difficult temperament, it is clear that there are contradictions in the emerging data. More research is needed to clarify these issues.

James–Roberts & Menon–Johansson, 1999). The researchers speculate that an inability to inhibit responsiveness is the common underlying characteristic linking increased fetal body movements and greater infant crying. In studies with older children, specific temperament characteristics indicative of behavioral and physiological hyper– and hypo–responsiveness are related to emotional and behavioral problems (Mezzacappa et al., 1997) (Rosenbaum et al., 1993). Taken together, these findings point to the possibility that alterations in biobehavioral regulation seen in the fetuses and newborns of depressed, anxious, and highly stressed women may be markers for future risk for psychopathology.

THE TRANSMISSION OF WOMEN'S MOOD TO THE FETUS

Research examining the "heritability" of emotional disturbances -- in this case providing evidence for the familial effects of psychopathology *prior to birth* -- assumes that genetic and environmental influences together account for the transmission. However, the pathways by which women's dysregulated mood may affect fetal behavior and development have not been fully characterized. Two of the primary systems that may mediate the possible influence of maternal mood dysregulation on the fetus are the autonomic nervous system and the endocrine system, in particular, the HPA–axis (Glover, Teixeira, Gitau, & Fisk, 1999) (Wadhwa, 2005) (Wadhwa et al., 2002).

Elevated and/or chronic sympathetic activation is associated with the release of catecholamines and vasoconstriction. Increased catecholamine levels may affect the fetus directly by contributing to maternal vasoconstriction and increased blood pressure (BP) (McCubbin et al., 1996) (Shnider, Wright, & Levinson, 1979). Vasoconstriction is believed to alter uteroplacental blood flow, causing subsequent oxygen and calorie reduction to the fetus and thereby affecting fetal outcomes (Austin, 2000) (Copper et al., 1996) (Lobel, 1994) (Lobel, De Vincent, Kaminer, & Meyer, 2000) (Lobel, Dunkel-Schetter, & Scrimshaw, 1992) (McCubbin et al., 1996) and possibly influencing fetal CNS development (Teixeira, Fisk, & Glover, 1999). In animal studies, injecting pregnant animals with synthetic corticosterone (dexamethesone) or ACTH leads to changes in offspring behavior and physiology similar to what is observed when the pregnant animals are exposed to stressors (Dodic, Peers, Coghlan, & Wintour, 1999) (Schneider, 1992; Schneider, Coe, & Lubach, 1992) (Weinstock, 2001, 2005). Recent data suggest that pregnant women's cortisol crosses the placenta (Gitau, Cameron, Fisk, & Glover, 1998; Glover et al., 1999) and that fetal exposure to high levels of CRH may influence fetal brain development as well as overall HPA–axis regulation and autonomic and endocrine functioning (Sandman, Wadhwa, Chicz-DeMet, Porto, & Garite, 1999). The hypothesis regarding the effects of women's emotion–based HPA axis and cardiovascular activity on fetal behavior is supported by recent studies showing correlations between: pregnant women's anxiety and uterine artery resistance (Teixeira et al., 1999); women's social support and their levels of adrenocorticotropin releasing factor (ACTH) (Wadhwa, Dunkel–Schetter, Chicz–DeMet, Porto, & Sandman, 1996); women's stress and cortisol (Wadhwa, 2005); women's acute cardiovascular activity and fetal heart rate changes (DiPietro, Costigan, Pressman, & Doussard-Roosevelt, 2000) (Monk et al., 2003); as well as pregnant women's and newborns' levels of stress hormones and dopamine (Lundy et al., 1999).

OUR OWN FETAL AND INFANT STUDIES

In our research, similar to the studies described, we hypothesize that emotion–based changes in pregnant women's physiological activity affect the fetus, and that over the course of gestation, cumulative exposure to particular patterns of women's emotion–induced physiological activity may influence fetal and infant development. We aim to identify fetal characteristics associated with women's affective states and the physiological processes by

which women's affects may be transduced to the fetus. In short, our goal is to understand the connection between women's affective life and the neurobiological substrate of the fetus' emerging emotion regulation system.

Our studies use the following paradigm. Women in the third trimester of pregnancy undergo a stressful, cognitive challenge in our laboratory while we collect maternal heart rate, blood pressure, and respiration, and fetal heart rate data (Monk et al., 2000) (Monk et al., 2003) (Monk, Myers et al., 2004). Specifically, subjects undergo a 5–minute baseline period followed by a 5-minute task (we have used a Stroop color word matching task and an arithmetic task) followed by a 5–minute recovery period.[4] Prior to the laboratory session, we use the Spielberger State–Trait Anxiety Inventory (Spielberger, 1983) and, in the most recent study, the Structured Clinical Interview for DSM–IV, to characterize women's level of anxiety and to diagnose any Axis I pathology.

In one report (Monk et al., 2000), we found that during women's exposure to the challenge task, fetuses of more highly anxious women had a significant HR increase and that fetuses of low anxious women exhibited a non–significant HR decrease. There were no differences in fetal HR during the baseline period. These data are consistent with the hypothesis that, over the course of pregnancy, women's mood–based physiological changes result in an altered *in utero* environment that shape the fetus and have an impact on fetal neurobehavioral development.

In another study (Monk et al., 2003) we replicated the association between women's elevated anxiety and higher fetal HR change during women's exposure to the cognitive challenge and extended that finding to the recovery period. In addition, we found that two–thirds of the variance of fetal HR changes during the recovery period could be accounted for by a combination of measures of women's cardiovascular activity during the recovery period and anxiety scores. These results were some of the first to track a 'real time' correlation between changes in women's physiology and synchronous alterations in fetal HR. In essence, we were able to take a 'snap shot' of women's mood affecting the fetus. This finding supports our overall hypothesis that throughout pregnancy, significant disturbances in women's mood, such as in the case of extreme life stress and/or depression, might influence fetal development. In this study, we see the acute transmission of women's mood to the fetus -- the correlation between mood–based alterations in maternal cardiovascular activity during recovery and fetal HR from the same period. We also may see, as in the first study, the cumulative effects of the fetus' chronic exposure to similar mood–based physiological alterations -- the association between anxiety levels and fetal HR responses.

Recently, (Monk, Myers et al., 2004), we examined HR responses in fetuses of women who were depressed, had anxiety disorders, as well as healthy controls with high and low subsyndromal anxiety. Fetuses of depressed women had greater HR increases during women's exposure to laboratory stress compared to fetuses of women with anxiety disorders and those of healthy, low anxious women while their mothers underwent a cognitive challenge. Although we did not make predictions as to differences in fetal HR related to specific diagnostic categories, it was surprising that fetuses of women with anxiety disorders had smaller HR increases than fetuses of depressed women. However, since the anxiety disorders group is heterogeneous, we hypothesized that putting into one group women with distinct anxiety disorders obscured patterns of fetal HR associated with different subtypes.

[4]In Monk et al., 2000, the recovery period was for 3 minutes.

For a follow up study, we examined fetal heart rate activity and women's antenatal psychiatric illness as predictors of infant temperament at 4 months (specifically, response to novelty on Kagan's infant reactivity paradigm(Kagan & Snidman, 1991). High reactivity in infancy is associated with inhibited temperament in preschoolers, which itself is a risk for future anxiety disorders (Biederman et al., 2001) (Biederman et al., 1993) (Fox, 2004) (Fox & Henderson, 1999). In this work we showed that fetal heart rate change during maternal challenge was positively associated with observed infant motor reactivity to novelty. The odds of being classified as high versus low motor among fetuses who had an increase in fetal heart rate during maternal stress was 11 times those who had a decrease in fetal heart rate. In contrast, antenatal psychiatric diagnosis was associated with an almost four–fold greater odds of having a high cry reactivity classification. All of the infant results were found independent of the influence of women's postnatal anxiety. These data indicate that physiological markers of individual differences in infant temperament are identifiable in the fetal period, and possibly shaped by the prenatal environment (Werner et al., 2007).

In related work, we studied antenatal psychiatric status and maternal parenting sensitivity in relation to 4–month–olds' autonomic regulation, HPA–axis functioning, and behavior (Kaplan, Evans, & Monk, 2007). Animal research suggests that antenatal stress exposure and postnatal rearing style act in concert to shape offspring biobehavioral outcomes. However, the combination of these maternally–mediated influences had not been studied in human infants. After completing our standard psychiatric and psychophysiology protocols, women returned to the laboratory at 4 months postpartum and again completed mood questionnaires and the mother–infant dyads participated in a 10-minute free–play session evaluated for maternal sensitivity. We found that maternal sensitivity, but not antenatal psychiatric diagnosis, predicted greater levels of infant high frequency heart rate variability, after controlling for birth weight and age. Maternal sensitivity, but not psychiatric status, also predicted infant responsiveness. Maternal sensitivity modulated the effects of psychiatric illness on infant cortisol such that cortisol was low regardless of sensitivity for children of healthy women yet higher if the infant had insensitive versus sensitive caregiving when the mother had had an antenatal diagnosis. Taken together, these two follow up studies suggest that biobehavioral adaptation, even that initiated *in utero*, is influenced by interactions with the social world. These findings support the compatibility of fetal programming and social–context models of infant biobehavioral development and have promising implications for pre and postnatal clinical intervention.

Overall, our studies, in combination with those from other laboratories, support the hypothesis that women's moods may influence fetal and child development. The corollary proposition that a return to a euthymic state also might affect the fetus has gone untested. However, ample research indicates that psychological intervention can influence physiological/biochemical processes in the recipient (e.g., Pennebaker, 2000; (Cruess et al., 2000) (Antoni, 2003) (Antoni et al., 2000). It is reasonable to hypothesize that such psychologically–induced changes in pregnant women would affect the fetal milieu, and likely the fetus as well.

In the next section, we review ideas on the psychological terrain of pregnancy and, from a psychoanalytic perspective, discuss challenges that can lead to affect disturbance. We chose to focus on psychodynamic theory and to describe two clinical cases from this perspective because we believe its emphasis on affective disturbance associated with the activation of the pregnant woman's representational world (Stern, 1991) may prove to be particularly useful in perinatal psychiatry, just as it has been in mother–infant psychotherapy (Stern, 1995). Thus, the following discussion serves heuristic purposes as well as illustrates how specific conflicts can impact women's moods.

MOOD REGULATION & DYSREGULATION DURING PREGNANCY: A PSYCHODYNAMIC PERSPECTIVE

In conceptualizing the psychological aspects of pregnancy, Pines (1994) and others, such as Lester and Notman (1986), divide pregnancy into 3 stages. The first stage of pregnancy lasts from inception until the woman can feel the baby's movements, approximately 4.5–5 months. When a woman can feel these kicks, it is called 'quickening.' During this first phase, progesterone level is high, leading to physical malaise, growth of the breasts, nausea, vomiting or special food cravings, symptoms that are experienced and interpreted by pregnant women in accordance with various body- and sexuality-related self–representations and fantasies. For many women, the increase in progesterone also leads to mild depression, irritability and moodiness. These, too, are thought about and interpreted by each woman in line with her self-concept and understanding of pregnancy, and of the link between body and mind.

The changes of the first phase of pregnancy, especially the growth of the breasts, revive feelings of adolescence, and more archaic ones related to the body (Pines, 1994). According to Lester and Notman (1986), diffuse anxiety about the body and the fetus are conscious at this time. The second stage of pregnancy, ushered in by the quickening and lasting 3–4 months, leads, in health, to a recognition on the part of the woman that the baby has a life of its own which she cannot control. This recognition typically mobilizes separation anxieties and vivid fantasies regarding the nature of the fetus and its relation to the woman's body, which can be associated with symptoms of anxiety and depression. Based on their findings that adolescent mothers' representation of their infants at one month were related to prenatal representations and not to infant behavior, and that non-risk upper middle class mothers' prenatal representation of the fetus also remains stable postnatally, Zeanah and his colleagues (Zeanah, Keener and Anders, 1986) view "fetal movements…as a projective stimulus from which mothers elaborate…fantasies…[that are] constructed systematically from rules derived from mother's own experiences in relationships." (p. 201)

Quickening triggers intrapsychic shifts in the pregnant woman, enhancing the formation of firmer boundaries between self and object (Lester & Notman. 1986). The pregnant woman differentiates more from her original maternal object, with whom she herself was the fetus within, as well as from the fetus now within her, whose movements indicate separation. In a longitudinal study of maternal representations, Ammaniti and his colleagues (Ammaniti, Baumgartner, Candelori, Perucchini, Pola, Tambelli & Zampino, 1992) found that during pregnancy, a complex representational framework emerges; maternal identity and the mother's representation of the baby evolve, and the mother gradually differentiates herself from her own mother. Stern (1991) cites other research by Ammantini and by Fava-Vizziello and colleagues indicating that a woman's representation of her fetus increases in richness and specificity from the fourth to the seventh month of pregnancy. The third phase, the last 4–6 weeks (Lester & Notman, 1986), is characterized by stress regarding the physical condition, which also challenges a woman's body image, and anticipation of labor, often expressed in dreams involving fantasies of childbirth and death.

The process of pregnancy has been described as a crisis-transitional stage (Benedek,1970; Bibring 1959; Pines 1994,). Helene Deutsch (1945) wrote that the woman's relationship with her mother is at the center of the psychological problems of pregnancy and the reproductive function as a whole. At issue, she thought, is the degree of the woman's psychological freedom from her mother. Both Pines (1994) and Deutsch (1945) hold that a complicated history of identification with the internalized maternal object leads to psychologically complicated pregnancy, often expressed in feelings of depression and anxiety. Deutsch (1945) states "the ego of the pregnant woman must find a harmonious

compromise between her deeply unconscious identification with the child, which is directed towards the future, and her identification with her mother, which is directed towards the past. Whenever one of these identifications is rejected, difficulties and mood disturbance arise. In the first case the fetus becomes a hostile parasite, in the second the woman's capacity for motherhood is weakened by her unwillingness to accept her identification with her own mother" (p.145.) Pines explicitly states that if a woman has been told her mother had ambivalent feelings about her own conception, her final identification with her mother becomes difficult, and she may become ambivalent about the pregnancy.

In support of these clinical conceptualizations, Fava-Vizziello and colleagues (Fava Vizziello, Antonioli, Cocci and Invernizzi, 1993), using a method for classifying themes identified in mothers' representations of the baby and of the self-as-mother during pregnancy and at 2 times postpartum, found that a pregnant woman's representation of her self as a mother becomes progressively differentiated from her representation of her own mother, and this differentiation is coupled with a process of integrating the representations of the self as mother and the self as a woman. They suggest that a woman's inability to elaborate an organized representation of parental function during pregnancy indicates, prognostically, a situation of risk for postnatal mother-infant dysfunction in that it reveals the absence of a positive maternal model with which a woman can identify.

As the fetus becomes more real and gradually, if conflictually differentiated in the woman's mind, it may possess a more or less conscious negative identity in her internal world. Pines cites the centrality of a woman's relationship with her internal maternal object in this regard, as well as a woman's negative feelings about her sexual partner and her self. The evolving relationship with the fetus may represent an attempt to establish a relationship that will compensate for the unsatisfactory internalized one with the mother of early childhood. A history of multiple abortions, such as characterized by one of the patients to be discussed below, Ms. R, could be understood partly as a series of enactments of a conflictual wish to create a maternal object with whom a woman could be connected in a benign, nurturing way; that is, in such a situation of motivated abortions, the creation of a pregnancy expresses the wish for maternal identification and closeness, and then its eradication expresses aggressive undoing or destruction of the fantasized mother-child bond, and, of course, of the child. Psychoanalytically-informed research has found that during pregnancy, a woman's representation of her self, her fetus and her mother evolve in ways reflective of a woman's relational history and associated conflicts and fantasies (Ammaniti, Baumgartner, Candelori, Perucchini, Pola et. Al, 1992) (Stern, 1991) (Zeanah, Keener and Anders, 1986). When such intrapsychic, relationally-related conflicts predominate, mood disturbance can result.

PSYCHODYNAMIC PSYCHOTHERAPY WITH PREGNANT WOMEN

We now turn to a discussion of psychodynamic psychotherapy with pregnant women referred to treatment by members of OB/GYN teams at two major New York City hospitals. Raphael-Leff (1995) has written about targeted psychotherapy during pregnancy. She recommends differentiating between women who would benefit from a psychoanalytic approach, which in part addresses anxiety-provoking material, and those for whom such an approach would be too anxiety-producing or otherwise inappropriate for diagnostic reasons, and therefore is contraindicated. For example, women with highly obsessional personality structures during pregnancy may resort to a rigidification of defenses in the face of the uncertainty and turmoil of this time, and they would likely find the unstructured nature of psychoanalytic sessions too threatening. Raphael-Leff favors offering other forms of clinical intervention – such as supportive counseling or cognitive therapy in the case of incapacitating phobias – to those women for whom psychoanalytic psychotherapy would be contraindicated.

According to Goldberger (1991), in the psychoanalytic treatment of pregnant women, the fetus becomes a transference object present in and integral to the analysis, while the transference to the analyst often expresses conflicts related to the pregnant woman's mother. Beren (2001) discusses rapid shifts in the transference relationships of such women. These and other authors (Ablon, 1994) (Lester & Notman, 1986) view the analytic process during pregnancy as often exceptionally productive because of the urgency of time and increased access to highly emotional material.

In light of the earlier review of research data, we view mood improvement as a centrally important psychotherapeutic aim in the work with pregnant women. We understand such mood improvement to reflect a shift in the affect-regulatory process, which is linked to containment and some resolution of newly aroused conflict involving a woman's access to identification with a mothering self. The internal representations of women's relationships with their own mothers and the related sensitivities, affective fault-lines, self concepts and attachment styles are actively explored and considered as they are projected onto and expressed through the transference and the evolving relationship with the fetus. Of course, for these clinical cases, we do not have information on the fetus. However, based on the data previously summarized, we hypothesize that the fetus, in particular, the neurobiological construction of its regulatory style, may be influenced by its mother's emotional states.

BRIEF VIGNETTE

A 32–year old woman in the first trimester of pregnancy came to treatment to avoid the significant post-partum depression she had experienced with her now 14–month–old daughter and to cope with her emerging low mood[5]. Originally from a Western European country and a household run by an extremely narcissistic and withholding mother (from whom she "never knew when there might be a smile"), she had met her husband in Europe and then made elaborate career plans that would enable her to follow him to the states. He ended their relationship due to religious differences just as she embarked on her move, but she followed through on her plans and the couple subsequently reunited. However, this break up precipitated her first serious depression, which was followed by another bout seven years later after her daughter was born. Now pregnant for the second time, Ms. C became sleepless, anxious, and sad when her husband left the bedroom to do work at night or after they had spent a special weekend together and she then faced the regular work-week, with its schedule entailing her spending more time alone. In response to the suggestion that she is acutely sensitive to rejection, a sensitivity that goes very far back and has often been repeated in her life, she cried and said "I worry that I shouldn't be so attentive to my daughter; what will she feel when I can't be there?" Here, the patient's identification with her child's neediness, and that of her developing fetus, can be thought of as re–invoking her own unfulfilled longings and times of rejection. These longings lead to depressive feelings, which in this woman are aroused in the face of experiences that trigger a sense of losing the other and their love. Previously, the birth of her daughter had brought on a heightened sense of urgency as she was confronted with her newborn's immense neediness and her own complicated maternal identification, particularly in terms of finding a self to satisfy her baby. The identification of these relationship templates as well as the give and take in the transference, in which Ms. C experienced herself as the one whose needs are attended to by the supportive therapist, significantly altered her mood, helping her to sleep and feel less overwhelmed by sadness as she moved into her second trimester.

[5]This treatment was carried out by Monk.

CASE DESCRIPTION

Ms. R., a 33-year-old pregnant woman from Madagascar, was referred for treatment by her obstetrician, who was concerned about her apparent detachment, passivity, and dysthymic mood [6]. An attractive woman with coffee-colored skin and thick wavy hair, Ms. R. came to the consultation wearing a bright red shirt, which she kept smoothing over her very small belly. She was 2 months pregnant then. In a thick French accent, she said she was "very independent and fine, it will be OK." At the same time, she said she had been waking up panicked in the middle of the night from nightmares in which she is "covered in blood, there is blood absolutely everywhere." In a detached tone, she reported that she is the 2nd of 2 children born to an affluent and socially visible family--she described her parents, disdainfully, saying: "they thought they were the John and Jackie of Madagascar." Her brother is 6 years older. At age 8, she was sent to boarding school in France, and she stayed there until she was college-age. She returned to her country briefly, then came to study in NY, but before completing her studies she once again returned home to Madagascar because her father, whom she considered her ally, was ill. He died 4 years ago. She then came to NY, intending to settle down. During the few short years that she lived in Madagascar as a young woman, she had 3 abortions. "After the first one I cried all night and felt so guilty I hated myself. After the 2nd and the 3rd I didn't really think about it at all." She found out she was pregnant again one month ago -- in all the times she conceived she did not use birth-control, believing – despite gathering evidence to the contrary - that she would not become pregnant. The present pregnancy, she said, was the product of a relationship with a man she adores; she thinks he is beautiful, sophisticated and very bright. He is married and lives in Europe. He wanted her to abort, but promised financial support when she said she would not. She decided not to abort because "now I am 33 and what if this is my last chance to have a baby?" adding, "I don't care about having a baby alone, as I told you, I take care of myself, I am very independent. I have taken care of myself since I was 8 at least, and I am sure long before."

Asked about her physical sensations and experience thus far in the pregnancy, Ms. R. said "I am getting too fat, it is really upsetting me. I feel a little nausea, but that's good because it makes me not eat too much, and maybe that will help so I don't get too fat." She also revealed that she was smoking half a pack of cigarettes a day to avoid overeating. She had difficulty sleeping, and she linked this to her nightmares. She felt fatigued.

Somewhat surprisingly, Ms. R. agreed to a twice-per-week psychodynamic psychotherapy. This approach was suggested once she began hinting at her gradually increasing if still vague sense of concern that "I never got taken care of so I hope I do not do the same, whatever it was, to my baby, whoever it is." Over the next few sessions, the following history emerged. Ms. R believed that her mother was disappointed to be pregnant a second time, and that she only got pregnant again to prove to the surrounding social scene that her marriage was intact, when, in fact, Ms. R's father had a long-standing mistress who was a family friend. Ms. R eventually grew close with her father's mistress, and would spend time with her on vacations home from boarding school; it was this woman who accompanied her to her first abortion, about which she did not tell her mother at all. Ms. R. believes her mother "did not want me and she especially did not want a girl." She says there were never any baby pictures of her because of this. She recalls her mother saying that being saddled with the caretaking took too much time and ruined her life. She remembers her father as loving and supportive and a good friend to her, in part "because he wanted to make up for my mother." After he died, 4 years ago, she lost 30 lbs., "because I was not able to eat." She is happy about the weight loss: "finally I can have the thin body I always wanted." Asked

[6]This treatment was carried out by Bergner.

about her earliest memory of her mother, Ms. R. said: " I remember all of us standing by her bed where she was lying down because she was not eating. She wanted to lose weight thinking she was fat, so she was starving herself and we thought she was going to die. I think I was 3."

The first phase: blood all over and keeping the thin body

Ms. R was quite passive in her first few sessions. She would provide vague answers to questions, speaking in an apparently uninterested monotone. Treatment focused on her body. She was preoccupied with not gaining weight, wanting to hold on to the more androgynous father-identified body she developed after her father's death. Her focus on staying thin also expressed an identification with mother, and especially with mother's aggression towards the unwanted pregnancy and baby girl that Ms. R had been. Cigarette smoking was addressed directly as harmful to the fetus and we explored Ms. R's apparent ambivalence about shifting from the more androgynous body she prized to a more maternal body with insides that must be accounted for and protected. We discussed her past abortions, and her (conscious) conviction that she wouldn't conceive each time.

At the next session she reported that she cut down to 2 cigarettes a day. She reported a dream from which she had awakened crying. She thought she also cried within the dream, in which a black woman she did not recognize was angry at her for having a child outside the race, and her own mother was consoling and comforting to her. This dream seemed very foreign and unintelligible to her because she could not imagine her own mother as loving and kind. The therapist understood the dream in relation to splitting the mother and to an emerging positive maternal transference. In the session, the dream was analyzed as splitting mother into a bad rejecting part and a loving part. It reflected Ms. R's thus far unconscious and unacknowledged need to access a positive internal nurturing mother by whom she could be mothered and from whom she could receive, through identification, the mothering function. Ms. R was powerfully affected by this understanding. The panicked dreams of blood stopped, and she began to report eating more conscientiously. She became more interested in the sessions, and in the therapist's reflections and questions.

At 15 weeks, she had the first ultrasound. This ushered in a gradual shift from a focus on her visible body and actions to a focus on her insides and on the mysterious connection with the fetus. Smiling, she reported that the doctor said the baby was beautiful and had a well-formed head. It was a girl! She said: "there's really something in there, I'm not just getting fat for nothing. This baby, she has room in there to move around." She speculated about what the food she ate was like by the time it reached "that space in there where she can get some of it." The therapist wondered aloud to Ms. R about her fetus' experience, and asked her to imagine the kind of baby she may turn out to be. "Beautiful, and that's it, how should I know?" she responded. She told a relative about the pregnancy but did not call to tell her mother directly, and she changed her phone number to be unlisted so that her mother couldn't contact "and bother" her. She believed the relative passed the news on to her mother, but insisted "I know my mother doesn't believe I am really pregnant and I don't want to hear it from her." This was analyzed in relation to Ms. R's identification with the fetus, and linked explicitly to her belief that her mother did not want her. She wanted to distance her mother so as to defend against her own frightening ambivalence as well, which was linked to an unconscious, warded off identification with mother. This ambivalence had thus far been expressed through the cigarette smoking and poor eating, but was now making its way into dreams and associations within the safety of sessions.

The second phase: the quickening

When she began to feel her baby's kicks, Ms. R dreamt that the baby was born with white skin, blue eyes and a straight narrow nose "looking," she said, "like a combination of the baby's father and you." This was the first indication of a sense of the baby's difference from her. Analysis of the dream and her associations to it revealed anxiety about identifying with her internal mother, and the wish to lean on and be mothered by the therapist, who represented a good mother, instead. We began to discuss Ms. R's thus far repudiated need for being taken care of, and, more generally, her neediness, and her baby's neediness. Ms. R revealed fantasies that the baby listens to her, and kicks in response to questions and needs she expresses. For example, Ms. R said, "she kicks when she's hungry because I haven't eaten, or if we haven't gone to the bathroom in a while then we go because she listens to me tell her I need to go and she helps me." She also stated that the baby will help her after she's born and during the birth by "being nice and not crying too much." Ms. R was unable to conceive of her baby's neediness and total dependence upon her. This worrisome mindset was in direct consequence of her denial of her own neediness *now and in infancy*, and conflict regarding identification with the rejecting mother of pregnancy and infancy, who continued to be present in Ms. R's internal world. The therapist said: "I wonder what kind of baby you imagine yourself to have been?" Initially, she said only "how should I know, there were no pictures of me until I was 6," thus rejecting her own fantasizing and identification with the fetus. Gradually, she began to speculate that she may have been a calm baby, on the basis of comments she recalled hearing from household help, and that she may not have been such a burden to care for. After a series of interpretations regarding the sources of her difficulty conceiving of her baby as utterly needy and dependent on *her*, Ms. R began to wonder what it would be like to take care of a newborn. She would caress her belly as she spoke, and was generally more reflective, engaged, and her depressive mood had improved considerably.

She arrived to the session preceding a holiday, and thus a separation from the therapist, stating that she had called her mother directly to tell her about the pregnancy and ask for help. "I felt the first panic since the bloody dreams were over," she said, "about needing someone to teach me how to change a diaper and especially how to feed a baby." To her enormous surprise, her mother said that she will arrange visa papers so that she could come for the birth. She intended to stay for 2 months following delivery. Ms. R reported this development in a matter of fact tone. She would not let herself believe that this would actually happen, and at the same time she began thinking more actively about the birth, and whether she would want her mother present or not.

The third phase: the unexpected naming

Two weeks before Ms. R's due date, her mother arrived carrying 3 suitcases full of baby clothes. In sessions, Ms. R initially denied fears about the birth, but her extreme reaction to news of the death of a very distant acquaintance led to fantasies about death in childbirth and a greater ability to realize the presence of *and reflect upon* the sources for her own anxiety. One week before she was due, Ms. R, large and uncomfortable, reported that her mother asked her what name she had chosen for the baby. Ms. R had been planning to name her baby Kirsten, and our ongoing analysis of this choice had revealed that in her fantasy, by picking a name entirely foreign to her culture of origin, she would protect her baby from ambivalence and aggression associated with her own internal world.

With evident pleasure she now reported that her mother had said: "Kirsten? I don't know from no Kirsten. Why don't you name her.." and she suggested a name. Ms. R explained that, in her language, this name means she who is most wanted or desired. She thought it

was a beautiful name, and accepted her mother's suggestion. Five days later she gave birth to an 8-pound healthy baby girl.

SUMMARY

In view of emerging biopsychological data regarding the effects of pregnant women's mood on the fetus, we consider psychotherapy during pregnancy to be a preventive intervention. For psychotherapy during pregnancy to function as prevention -- where the work is conceptualized as intervening with respect to the women's mood and possibly the developing child's affect regulation system -- it must first allow for an intimately close involvement with the woman herself. In the beginning there is only the woman, her body, and what she can report about her experience and her history. When a woman is engaged in her own unconscious fantasizing about the insides of her body, she comes into greater contact with the fetus, who is a part of her body initially experienced as both me and not me, body and other matter. Over time, she comes to experience the fetus as separate, and she begins to differentiate self from mother from fetus. Treatment allows for recognition, reclaiming and re-integration of split off images and fantasies of self and other, particularly maternal representations, with which the woman–becoming–mother and the fetus are for a time imbued. Such a process enlarges the psychic space within which the imagined baby can grow and become differentiated from problematic internal representations that are born of the mother's painful or unsatisfying early primary relational experiences. Conflictual relationship constellations are magnified during pregnancy -- a transitional life phase -- yet they are also ripe for working through. This therapeutic work can lead to marked mood improvement, which both brings immediate relief and provides for the future. Psychotherapy thus can engage a woman in an active psychological-gestational process, which not only produces a woman affectively ready for mothering but perhaps also culminates in the birth of a more optimally–regulated baby.

References

Ablon S. The usefulness of dreams during pregnancy. International Journal of Psychoanalysis. 1994; 75:291–299. [PubMed: 8063485]

Abrams S, Field T, Scafidi F, Prodromidis M. Newborns of depressed mothers. Infant Mental Health Journal. 1995; 16(3):233–239.

Allister L, Lester B, Carr S, Liu E. The effects of maternal depression on fetal heart rate responce to vibroacoustic stimulation. Developmental Neuropsychology. 2001; 20(3):639–651. [PubMed: 12002098]

Ammaniti M, Baumgartner E, Candelori C, Perucchini P, Pola M, Tambelli R, Zampino F. Representations and narratives during pregnancy. Infant Mental Health Journal. 1992; 13(2):167–182.

Antoni MH. Stress management effects on psychological, endocrinological, and immune functioning in men with HIV infection: empirical support for a psychoneuroimmunological model. Stress. 2003; 6(3):173–188. [PubMed: 13129811]

Antoni MH, Cruess S, Cruess DG, Kumar M, Lutgendorf S, Ironson G, Dettmer E, Williams J, Klimas N, Fletcher MA, Schneiderman N. Cognitive-behavioral stress management reduces distress and 24-hour urinary free cortisol output among symptomatic HIV-infected gay men. Annals of Behavioral Medicine. 2000; 22(1):29–37. [PubMed: 10892526]

Austin MP, Leader L. Maternal stress and obstetric and infant outcomes: epidemiological findings and neuroendocrine mechanisms. The Australian and New Zealand Journal of Obstetrics and Gynaecology. 2000; 40(3):331–337. [PubMed: 11065043]

Bazhenova O, Porges S. Vagal reactivity and affective adjustments in infants-convergent response systems. Annals New York Academy of Sciences. 1997; 807:469–471.

Benedek, T. The psychology of pregnancy. In: Anthony, EJ.; Benedek, T., editors. Parenthood, Its Psychobiology and Psychopathology. Boston: Little Brown; 1970. p. 137-155.

Beren, P. And baby makes three: Using parenthood as entry into early issues of self and other. Paper presented at conference of the International Psychoanalytic Association; Nice, France. 2001.

Bibring G. Some considerations of the psychological processes in pregnancy. Psychoanalytic Study of the Child. 1959; 14:113–121.

Biederman J, Hirshfeld-Becker DR, Rosenbaum JF, Herot C, Friedman D, Snidman N, et al. Further evidence of association between behavioral inhibition and social anxiety in children. American Journal of Psychiatry. 2001; 158(10):1673–1679. [PubMed: 11579001]

Biederman J, Rosenbaum JF, Bolduc-Murphy EA, Faraone SV, Chaloff J, Hirshfeld DR, et al. A 3-year follow-up of children with and without behavioral inhibition. Journal of the American Academy of Child and Adolescent Psychiatry. 1993; 32(4):814–821. [PubMed: 8340303]

Copper RL, Goldenberg RL, Das A, Elder N, Swain M, Norman G, Ramsey R, Cotroneo P, Collins BA, Johnson F, Jones P, Meier A. The preterm prediction study: Maternal stress is associated with spontaneous preterm birth at less than thirty-five weeks' gestation. American Journal of Obstetrics & Gynecology. 1996; 175:1286–1292. [PubMed: 8942502]

Cruess DG, Antoni MH, McGregor BA, Kilbourn KM, Boyers AE, Alferi SM, Carver CS, Kumar M. Cognitive-behavioral stress management reduces serum cortisol by enhancing benefit finding among women being treated for early stage breast cancer. Psychosomatic Medicine. 2000; 62(3): 304–308. [PubMed: 10845343]

Davis EP, Glynn LM, Schetter CD, Hobel C, Chicz-Demet A, Sandman CA. Prenatal exposure to maternal depression and cortisol influences infant temperament. Journal of the American Academy of Child and Adolescent Psychiatry. 2007; 46(6):737–746. [PubMed: 17513986]

Davis PE, Snidman N, Wadhwa P, Glynn LM, Schetter CD, Sandman CA. Prenatal maternal anxiety and depression predict negative behavioral reactivity in infancy. Infancy. 2004; 6(3):319–331.

Dawson G, et al. Autonomic and brain electrical activity in securely- and insecurely-attached infants of depressed mothers. Infant Behavior and Development. 2001; 24(2):135–150.

Deutsch, H. The Psychology of Women. Vol. 2. New York: Grune & Stratton; 1945.

DiPietro, JA. Continuities in behavior and heart rate from fetus to infant. Paper presented at the International Conference on Infant Studies; Brighton, England. 2000.

DiPietro JA, Costigan KA, Pressman EK. Fetal state concordance predicts infant state regulation. Early Human Development. 2002; 68(1):1–13. [PubMed: 12191524]

DiPietro JA, Costigan KA, Pressman EK, Doussard-Roosevelt JA. Antenatal origins of individual differences in heart rate. Developmental Psychobiology. 2000; 37(4):221–228. [PubMed: 11084603]

DiPietro JA, Hodgson DM, Costigan KA, Hilton SC. Fetal neurobehavioral development. Child Development. 1996; 67:2553–2567. [PubMed: 9022256]

DiPietro JA, Hodgson DM, Costigan KA, Johnson TRB. Fetal antecedents of infant temperament. Child Development. 1996; 67:2568–2583. [PubMed: 9022257]

DiPietro JA, Hodgson KA, Costigan SC, Johnson TRB. Developmental of fetal movement – fetal heart rate coupling from 20 weeks through term. Early Human Development. 1996; 44:139–151. [PubMed: 8745426]

DiPietro JA, Novak MF, Costigan KA, Atella LD, Reusing SP. Maternal psychological distress during pregnancy in relation to child development at age two. Child Development. 2006; 77(3):573–587. [PubMed: 16686789]

Dodic M, Peers A, Coghlan JP, Wintour M. Can excess glucocorticoid, in utero, predispose to cardiovascular and metabolic disease in middle age? Trends in Endocrinology and Metabolism. 1999; 10(3):86–91. [PubMed: 10322400]

Fava Vizziello GM, Antonioli M, Cocci V, Invernizzi R. From pregnancy to motherhood: The structure of representative and narrative change. Infant Mental Health Journal. 1993; 14(1):4–16.

Field T. Infants of depressed mothers. Infant Behavior and Development. 1995; 18:1–13.

Field T, Sandberg D, Quetel T, Garcia R, Rosario M. Effects of ultrasound feedback on pregnancy anxiety, fetal activity, and neonatal outcome. Obstetrics & Gynecology. 1985; 66(4):525–528. [PubMed: 3900839]

Fonagy P, Steele M, Steele H, Moran G, Higgit A. The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. Infant Mental Health Journal. 1991; 12:201–218.

Fox NA. Temperament and early experience form social behavior. Annals of the New York Academy of Science. 2004; 1038:171–178.

Fox NA, Henderson H. Does infancy matter?: Predicting social behavior from infant temperament. Infant Behavior and Development. 1999; 22(4):445–456.

Fraiberg, S. Assessment and Therapy of Disturbances in Infancy. Northvale, New Jersey: Aronson; 1995.

Gitau R, Cameron A, Fisk NM, Glover V. Fetal exposure to maternal cortisol. The Lancet. 1998; 352:707–708.

Glover V, Teixeira J, Gitau R, Fisk NM. Mechanisms by which maternal mood in pregnancy may affect the fetus. Contemporary Reviews in Obstetrics & Gynecology. 1999:155–160.

Goldberger M. Pregnancy during analysis--help or hindrance? Psychoanalytic Quarterly. 1991; 60:207–226. [PubMed: 2062974]

Groome L, Swiber M, Holland S, Bentz L, Atterbury J, Trimm R. Spontaneous motor activity in the perinatal infant before and after birth: Stability in individual differences. Developmental Psychobiology. 1999; 35:15–24. [PubMed: 10397892]

Groome LJ, Swiber MJ, Bentz LS, Holland SB, Atterbury JL. Maternal anxiety during pregnancy: Effect on fetal behavior at 38 to 40 weeks of gestation. Developmental and Behavioral Pediatrics. 1995; 16(6):391–396.

Gutteling BM, de Weerth C, Willemsen-Swinkels SH, Huizink AC, Mulder EJ, Visser GH, et al. The effects of prenatal stress on temperament and problem behavior of 27-month-old toddlers. European Child and Adolescent Psychiatry. 2005; 14(1):41–51. [PubMed: 15756515]

Huffman L, Bryan Y, del Carmen R, Pedersen F, Doussard-Rousevelt J. Infant temperament and cardiac vagal tone: Assessments at twelve weeks of age. Child Development. 1998; 69:624–635. [PubMed: 9680676]

Kagan J, Snidman N. Infant predictors of inhibited and uninhibited profiles. Psychological Science. 1991; 2:40–44.

Kaplan LA, Evans L, Monk C. Effects of mothers' prenatal psychiatric status and postnatal caregiving on infant biobehavioral regulation: Can prenatal programming be modified? Early Human Development. 2007

Lester EP, Notman M. Pregnancy, developmental crisis and object relations: psychoanalytic considerations. International Journal of Psychoanalysis. 1986; 67:357–366. [PubMed: 3744691]

Lobel M. Conceptualizations, measurement, and effects of prenatal maternal stress on birth outcomes. Journal of Behavioral Medicine. 1994; 17(3):225–272. [PubMed: 7932680]

Lobel M, De Vincent C, Kaminer A, Meyer B. The impact of prenatal maternal stress and optimistic disposition on birth outcomes in medically high-risk women. Health psychology. 2000; 19(6):544–553. [PubMed: 11129357]

Lobel M, Dunkel-Schetter C, Scrimshaw S. Prenatal maternal stress and prematurity: A prospective study of socioeconomically disadvantaged women. Health Psychology. 1992; 11(1):32–40. [PubMed: 1559532]

Lundy B, Field T. Newborns of mothers with depressive symptoms are less expressive. Infant Behavior and Development. 1996; 19:419–424.

Lundy B, Jones N, Field T, Nearing G, Davalos M, Pietro P, Schanberg S, Kuhn C. Prenatal depression affects neonates. Infant Behavior & Development. 1999; 22:119–129.

McCubbin J, Lawson E, Cox S, Sherman J, Norton J, Read J. Prenatal maternal blood pressure responsee to stress predicts birth weight and gestational age: A preliminary study. American Journal of Obstetrics and Gynecology. 1996; 175:706–712. [PubMed: 8828438]

Mezzacappa E, Tremblay R, Kindlon D, Saul J, Arseneault L, Pihl R, Sequin J, Earls J. Anxiety, antisocial behavior, and heart rate regulation in adolescent males. Journal of Child Psychology and Psychiatry. 1997; 38(4):457–469. [PubMed: 9232491]

Mohler E, Parzer P, Brunner R, Wiebel A, Resch F. Emotional stress in pregnancy predicts human infant reactivity. Early Human Development. 2006; 82(11):731–737. [PubMed: 16678983]

Monk C, Fifer WP, Sloan RP, Myers MM, Trien L, Hurtado A. Maternal stress responses and anxiety during pregnancy: Effects on fetal heart rate. Developmental Psychobiology. 2000; 36:67–77. [PubMed: 10607362]

Monk C, Myers MM, Sloan RP, Ellman LM, Fifer WP. The effects of women's stress–elicited physiological activity and chronic anxiety on fetal heart rate. Developmental and Behavioral Pediatrics. 2003; 24(1):32–38.

Monk C, Sloan RP, Myers MM, Ellman L, Werner E, Jeon J, Tager F, Fifer WP. Fetal heart rate reactivity differs by women's psychiatric status: an early marker for developmental risk? Journal of the American Academy of Child and Adolescent Psychiatry. 2004; 43(3):283–290. [PubMed: 15076261]

Murray L, Cooper P. Effects of postnatal depression on infant development. Archives of Disease in Childhood. 1997; 77(2):99–101. [PubMed: 9301345]

Nomura Y, Wickramaratne PJ, Warner V, Mufson L, Weissman MM. Family discord, parental depression, and psychopathology in offspring: Ten–Year Follow–up. Journal of the American Academy of Adolescent and Child Psychiatry. 2002; 41(4):402–409.

O'Connor TG, Ben-Shlomo Y, Heron J, Golding J, Adams D, Glover V. Prenatal anxiety predicts individual differences in cortisol in pre-adolescent children. Biological Psychiatry. 2005; 58(3): 211–217. [PubMed: 16084841]

O'Connor TG, Heron J, Golding J, Beveridge M, Glover V. Maternal antenatal anxiety and children's behavioral/emotional problems at 4 years: Report from the Avon Longitudinal Study of Parents and Children. British Journal of Psychiatry. 2002; 180:502–508. [PubMed: 12042228]

Pines, D. A woman's unconscious use of her body. New Haven: Yale University Press; 1994.

Ponirakis A, Susman E, Stifter C. Negative emotionality and cortisol during adolescent pregnancy and its effects on infant health and autonomic nervous system reactivity. Developmental Psychobiology. 1998; 33(2):163–174. [PubMed: 9742411]

Porges, S.; Doussard–Roosevelt, J.; Maiti, A. Vagal tone and the physiological regulation of emotion. In: Fox, N., editor. The Development of Emotion Regulation. Chicago: University of Chicago Press; 1994.

Pressman E, DiPietro J, Costigan K, Shupe A, Johnson T. Fetal neurobehavioral development: Associations with socioeconomic class and fetal sex. Developmental Psychobiology. 1998; 33:79–91. [PubMed: 9664173]

Raphael-Leff, J. Pregnancy: The Inside Story. New York: Aronson; 1995.

Rosenbaum J, Biederman J, Bolduc-Murphy E, Faraone S, Chaloff J, Hirshfeld D, Kagan J. Behavioral inhibition in childhood: A risk factor for anxiety disorders. Harvard Review of Psychiatry. 1993; 1:2–16. [PubMed: 9384823]

Sandman C, Wadhwa P, Chicz-DeMet A, Porto M, Garite T. Maternal corticotropin-releasing hormone and habituation in the human fetus. Developmental Psychobiology. 1999; 34:163–173. [PubMed: 10204092]

Schneider M. The effect of mild stress during pregnancy on birthweight and neuromotor maturation in rhesus monkey infants (Macaca mulatta). Infant Behavior and Development. 1992; 15:389–403.

Schneider ML, Coe CL, Lubach GL. Endocrine activation mimics the adverse effects of prenatal stress on neuromotor development of the infant primate. Developmental Psychobiology. 1992; 25:427–439. [PubMed: 1336466]

Shaw D, Vondra J. Infant attachment security and maternal predictors of early behavior problems: a longitudinal study of low–income families. Journal of Abnormal Child Psychiatry. 1995; 26:407–414.

Shnider S, Wright R, Levinson G. Uterine blood flow and plasma norepinephrine changes during maternal stress in the pregnant ewe. Anesthesiology. 1979; 50:524–527. [PubMed: 453577]

Sjostrom K, Valentin L, Thelin T, Marsal K. Maternal anxiety in late pregnancy: Effect on fetal movements and fetal heart rate. Early Human Development. 2002; 67:87–100. [PubMed: 11893440]

Sloan R, Shapiro P, Bigger J, Bagiella E, Steinman R, Gorman J. Cardiac autonomic control and hostility in healthy subjects. American Journal of Cardiology. 1994; 74:298–300. [PubMed: 8037145]

Spielberger, CD. Manual for the State–Trait Anxiety Inventory. Consulting Psychologists Press, Inc; Palo Alto: 1983.

Stern D. Maternal representations: A clinical and subjective phenomenological view. Infant Mental Health Journal. 1991; 12(3):174–186.

Stern, D. The motherhood constellation. New York: Basic Books; 1995.

St James–Roberts I, Menon–Johansson P. Predicting infant crying from fetal movement data: An exploratory study. Early Human Development. 1999; 54(1):55–62. [PubMed: 10195715]

Teixeira JMA, Fisk NM, Glover V. Association between maternal anxiety in pregnancy and increased uterine artery resistance index: Cohort based study. British Medical Journal. 1999; 318:153–157. [PubMed: 9888905]

Wadhwa P, Dunkel–Schetter C, Chicz–DeMet A, Porto M, Sandman C. Prenatal psychosocial factors and the neuroendocrine axis in human pregnancy. Psychosomatic Medicine. 1996; 58:432–446. [PubMed: 8902895]

Van den Bergh BR, Marcoen A. High antenatal maternal anxiety is related to ADHD symptoms, externalizing problems and anxiety in 8–9 year olds. Child Devopment. 2004; 75(4):1085–1097.

Van den Bergh BR, Mennes M, Oosterlaan J, Stevens V, Stiers P, Marcoen A, et al. High antenatal maternal anxiety is related to impulsivity during performance on cognitive tasks in 14- and 15-year-olds. Neuroscience and Biobehavioral Reviews. 2005; 29(2):259–269. [PubMed: 15811497]

Van den Bergh BR, Van Calster B, Smits T, Van Huffel S, Lagae L. Antenatal Maternal Anxiety is Related to HPA-Axis Dysregulation and Self-Reported Depressive Symptoms in Adolescence: A Prospective Study on the Fetal Origins of Depressed Mood. Neuropsychopharmacology. 2007

Wadhwa PD. Psychoneuroendocrine processes in human pregnancy influence fetal development and health. Psychoneuroendocrinology. 2005; 30(8):724–743. [PubMed: 15919579]

Wadhwa PD, Dunkel–Schetter C, Chicz–DeMet A, Porto M, Sandman CA. Prenatal psychosocial factors and the neuroendocrine axis in human pregnancy. Psychosomatic Medicine. 1996; 58:432–446. [PubMed: 8902895]

Wadhwa PD, Glynn L, Hobel CJ, Garite TJ, Porto M, Chicz-DeMet A, et al. Behavioral perinatology: biobehavioral processes in human fetal development. Regulatory Peptides. 2002; 108(2–3):149–157. [PubMed: 12220739]

Weinstock M. Alterations induced by gestational stress in brain morphology and behaviour of the offspring. Progress in Neurobiology. 2001; 65(5):427–451. [PubMed: 11689280]

Weinstock M. The potential influence of maternal stress hormones on development and mental health of the offspring. Brain, Behavior, and Immunity. 2005; 19(4):296–308.

Weissman M, Warner V, Wickramaratne P, Moreau D, Olfson M. Offspring of depressed parents. Archives of General Psychiatry. 1997; 54:932–940. [PubMed: 9337774]

Werner A, Myers MM, Fifer WP, Cheng B, Fang Y, Allen R, et al. Prenatal predictors of infant temperament. Developmental Psychobiology. 2007; 49:474–484. [PubMed: 17577231]

Winnicott, DW. The Maturational processes and the facilitating environment. New York: International Universities Press; 1960/1965. The theory of the parent-infant relationship.

Zeanah CH, Keener MA, Stewart L, Anders TF. Adolescent mothers' prenatal fantasies and working models of their infants. Psychiatry. 1986; 49:193–203. [PubMed: 3749375]

Zuckerman B, Bauchner H, Parker S, Cabral H. Maternal depressive symptoms during pregnancy and newborn irritability. Journal of Developmental and Behavioral Pediatrics. 1990; 11(4):190–194. [PubMed: 2212032]