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A HISTORY OF THE THEORY OF PRENATAL ATTACHMENT

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Abstract

John Bowlby's theory of human attachment has become widely applied across disciplines and across the stages of human development. This discussion explores the evolution of an application of Bowlby's theory to the experience of pregnancy, from both maternal and paternal perspectives. Although the theoretical construct of maternal fetal attachment (MFA) requires continued theoretically-driven research, existing studies have associated this proposed construct with health behaviors, marital relationship, depressive symptoms, and the postpartum mother-infant relationship, pointing toward its relevance for academicians and clinicians devoted to the service of women and infants.

It would be a gross understatement to write that the subject of attachment has simply enjoyed resurgence in academic interest, for the attention it has drawn more accurately has exploded exponentially since its introduction in the 1950's. PsychInfo, the primary database for psychiatric and psychological research, contained less than 10,000 citations between 1950 and 2000 for the search word "attachment," while the same search for only the last 7 years yielded over than 8,000 publications. This growth in attachment theory research has been fueled by its application to every human developmental stage, every type of human relationship, to religious devotion, and even to organizational management. Seldom can a theory boast this breadth of application, not to mention the leap across medical, psychological, social, and business disciplines. John Bowlby, the "father" of attachment theory, would have been impressed.

He would also have taken issue with the notion that the attachment between infant and mother begins long before birth. Attachment, as Bowlby understood it, was a reciprocal behavioral process initiated by the neonate to ensure survival. How could this begin before there was a baby in arms? Nevertheless, a few key individuals, inspired by what they observed between mother and newborn in the hours after birth (as well as the wellspring of grief in mothers experiencing a fetal demise), believed traditional attachment theory explained processes of prenatal bonding in a way clinically meaningful to both medical and psychological communities.

The Family Tree of Attachment Theory

Bowlby's attachment theory was an amalgam of concepts he took from ethology, cybernetics, information processing, developmental psychology, and psychoanalysis, focusing on the infant's goal to secure maternal response (Bretherton, 1992). He conceptualized human attachment as a system of evolutionary behaviors beginning at birth

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and persisting through adulthood, motivated by or toward fear, affection, exploration, and caregiving (Bowlby, 1958). Regulation of the dyadic attachment interactions of mother and infant, Bowlby reasoned, was solely biological; he posited that the infant's primary goal was to maintain a certain degree of physical proximity to the mother for survival. Bowlby later added to his stance that attachment would include psychological goals on the part of the developing child and mother (Bowlby, 1969), but his insistence that attachment was an independent behavioral system and was not necessarily determined by unconscious drives set his theory apart from the psychoanalytic theories of his era (Bretherton, 1992).

A colleague of Bowlby, Mary Ainsworth, believed that the infant's contribution to the attachment process was more than biological and included his or her own affective appraisal of the mother's behaviors (Ainsworth, Blehar, Waters, & Wall, 1978). Her "Strange Situation" laboratory test[1] was the first attempt to scientifically capture the activation of attachment system behaviors between mother and child (Ainsworth & Wittig, 1969). This research not only established a nomenclature for attachment styles that is still in use today but, by taking note of the mother's responses to the infant at reunion, it suggested the attachment system included influential maternal behaviors. Ainsworth and colleagues noted that these maternal behaviors revealed the mother's degree of engagement with the emotional world of her baby and labeled this "sensitivity" (Ainsworth et al., 1978). Mothers who exhibited sensitive caregiving behavior were those able to (a) attune to infant's signals with attentiveness, (b) appropriately interpret the signals, (c) respond appropriately to the signals, and (d) react promptly, in a time period that did not provoke excessive frustration for the child. As one would expect, maternal sensitivity was highly positively correlated with a secure attachment style in infants. The type of caregiving an infant received was understood to become central to a preverbal set of expectations, or an internal working model, regarding human interaction that the infant would develop and carry throughout life. This understanding injected an importance into the actions of the maternal part of the dyad that the previous systemic view of attachment behaviors had not (Bowlby, 1973; Sroufe & Waters, 1977).

Concurrent with Bowlby's empirical study of human attachment, psychoanalytic analyses of the experience of pregnancy were advanced by three women theorists, Deutch, Bibring, and Benedeck, who explained prenatal attachment as a process in which a pregnant woman's psychic energy was emotionally invested into the fetus (Benedek, 1959; Benedek & Liebman, 1958; Bibring, 1959; Bibring, Dwyer, Huntington, & Valenstein, 1961; Deutch, 1945). They hypothesized that the fetus becomes more human to the woman as pregnancy progresses, and eventually the fetus becomes loved both as an extension of self and as an independent object. This early relationship received anecdotal support from the work of clinicians who noted that the intense grief exhibited by mothers of infants who died during birth was uninfluenced by whether or not the mothers had any physical contact with the babies after delivery (Kennell, Slyter, & Klaus, 1970).

The work of Donald Winnicott, a pediatrician and psychoanalyst, is also important to acknowledge in a discussion of prenatal psychological processes. He felt that late pregnancy included "a very special state of the mother, a psychological condition which deserves a name, such as *Primary Maternal Preoccupation*" (Italics in original work, 1956, p. 301–302). Although Winnicott believed that this dissociated fugue-type psychological state was necessary for healthy infant development and that mothers who did not experience primary

[1]The Strange Situation is a 20-minute procedure composed of eight episodes of mother-infant separation and reunion. Infant behaviors are evaluated to examine attachment and exploratory behaviors under conditions of high and low stress, resulting in the classification of one of three attachment styles: A, B, or C (Ainsworth et al., 1978). Later studies have given these categories labels: A = avoidant, insecure-avoidant, or anxious-avoidant; B = secure; C = anxious, anxious-ambivalent, insecure-ambivalent, anxious-resistant, or insecure-resistant (Mikulincer & Shaver, 2007).

maternal preoccupation would be "faced with the task of making up for what has been missed" (p. 302), nothing in Winnicott's early work indicates that he had prenatal or postnatal attachment in mind (Winnicott, 1956). In fact, it appears he was describing a temporary obsessive-compulsive anxiety phenomenon recent researchers have identified that develops late in pregnancy, peaks within a few days after delivery, and, in most women, slowly declines during the first few months postpartum (Leckman et al., 2004; Leckman et al., 1999). In later years, additional research drew attention to the deleterious effects of early separation between mother and neonate and introduced ways of enhancing early postnatal attachment (Klaus & Kennell, 1970) but, until recently, interest in early attachment seemed to lay fallow while devotees of attachment theory moved in other directions.

Those who followed Bowlby and his fellow pioneers of theory stepped beyond infancy and began exploring attachment through the internal worlds of young children (Main, Kaplan, & Cassidy, 1985), adolescents (Kobak & Sceery, 1988), and adults (George, Kaplan, & Main, 1985). Moving from the behavioral level to the representational level allowed for the exploration of how early attachment experiences were remembered by adults as well as how these memories might act as templates for interpersonal relationships. However, researchers from this point forward seem to have allied themselves with one of two camps: developmental/clinical psychology or personality/social psychology (see Mikulincer & Shaver, 2007, for a comprehensive review of adult attachment theory). Research generated by each of the individual camps rarely informed the other, the research questions themselves differed with respect to orientation (intergenerational transmission of attachment patterns being explored by developmentalists and clinicians, social-cognitive-behavioral patterns being investigated by personality and social psychologists), and the two camps used distinctly different research methods and measures (Mikulincer & Shaver, 2007). Clinicians and developmental psychologists to this day view the Adult Attachment Inventory (AAI), developed by Main and her graduate students, as their gold standard for the identification of adult attachment style.[2] On the other side, social and personality psychologists moved away from the complex interview assessment model by developing a multitude of brief questionnaires that reported self-observed behaviors and self-endorsed beliefs. Interestingly, both camps through the years have divided adult attachment into perspectives complementing life: romantic relationships (Crowell & Waters, 2005; Hazan & Shaver, 1987), any adult relationship (Bartholomew & Horowitz, 1991; Feeney, Noller, & Patty, 1994; George & West, 2001), parental relationships (George et al., 1985; Kenny, 1987), friendships (Grabill & Kerns, 2000), and the client-therapist relationship (Borelli & David, 2004; Farber, Lippert, & Nevas, 1995). The social-personality researchers have additionally applied attachment theory to group processes (Smith, Murphy, & Coats, 1999). However, neither camp has given much time or attention to the idea of prenatal attachment.

The Evolution of a Theory of Prenatal Attachment

The development of a formal theory of prenatal attachment took a circuitous route, beginning largely with nurses. Rubin, a nurse specializing in maternity care doing doctoral work at the University of Chicago, perhaps laid the foundation for a theoretical construct of attachment that begins before birth as she explored women's attainment of the maternal role, concluding the immediate bond between postpartum mother and neonate was a consequence of prenatal processes (Rubin, 1967a, 1967b, 1975). She identified four specific tasks the women she observed navigated before childbirth: (1) Seeking safe passage for self and baby,

[2]This semi-structured interview involves twenty questions designed to elicit as many details as possible about the individual's childhood attachment experiences as well as any personal evaluations of the effects those early events have on current life functioning. An elaborate coding strategy allowed the style of attachment (autonomous, dismissive, enmeshed, and unresolved) to be identified heavily from the unconscious nuances of the narrative rather than its content (Main et al., 1985).

(2) ensuring that the baby is accepted by significant others, (c) "binding-in"[3], and (4) giving of herself. These tasks formed a framework for her conceptualization of the psychological experience of pregnancy and, although she did not use the term "attachment," Ruben states: "By the end of the second trimester, the pregnant woman becomes so aware of the child within her and attaches so much value to him that she possesses something very dear, very important to her, something that gives her considerable pleasure and pride" (Ruben, 1975, p. 145).

Meanwhile, a perinatal epidemiologist in Australia was interviewing primagravidas (first pregnancies) at various time points throughout the three trimesters of pregnancy, finding they were able to imagine their babies in an increasingly human way over the passage of time (Lumley, 1972). The introduction of ultrasound during pregnancy inspired her to examine the impact on maternal bonding of a visual image of the fetus (Lumley, 1980). Lumley's findings suggested this early view of the fetus enhanced a mother's ability to differentiate it as a "little person." Her next project was one of the first empirical longitudinal studies of prenatal attachment. Through the use of simple tape-recorded interviews at 5 time points before and after childbirth, she attempted to capture first-time parents' attitudes of their fetus. She conceptualized attachment as being an "established relationship with the fetus in imagination," a point at which mothers thought of their babies as a "real person" (Lumley, 1982). Lumley reported this phenomenon in 30% of her subjects in the first trimester, 63% in the second trimester and, by 36 weeks gestation, in 92%. She interpreted delayed attachment as being related to unpleasant symptoms of pregnancy and lack of interest or support on the part of husbands.

Carrying on similar work in the United States, Leifer, a psychologist at the Illinois Institute of Technology, authored a monograph reporting findings from a study of 19 primigravidas on the psychological changes observed during the course of gestation (Leifer, 1977). She concluded that, while pregnancy was a time of emotional upheaval and rapid role change, it was also a time of developmental maturation. Leifer also introduced the element of personality into the psychological state of pregnancy, concluding the degree of personality integration achieved during the first months of pregnancy could predict psychological growth throughout the rest of pregnancy and into early motherhood.

The empirical study of this developing concept of prenatal attachment continued to be carried on in earnest by nurses, often in the process of graduate work. Mecca Cranley wrote the first literature review of the subject as her dissertation, proposing a multidimensional model composed of six aspects of maternal-fetal attachment (MFA) that she identified in her research (Cranley, 1979). By virtue of this early work and her subsequent development of a scale to measure MFA, Cranley is considered the formal creator of the theoretical construct and credited with the first definition (p. 282): "The extent to which women engage in behaviors that represent an affiliation and interaction with their unborn child" (Cannella, 2005; Cranley, 1981a).

Müller, a researcher who utilized Cranley's construct of maternal fetal attachment, found this strategy of conceptualizing the phenomenon to be so focused on behaviors that it excluded the thoughts and fantasies she believed also revealed the growing affiliation between mother and fetus (Muller, 1992; Muller & Ferketich, 1993). In her work, she redefined prenatal attachment as (p. 11) "the unique relationship that develops between a woman and her fetus. These feelings are not dependent on the feelings the woman has about herself as a pregnant person or her perception of herself as a mother" (Muller, 1990). Müller

[3]Rubin used this term to describe the process during pregnancy in which a woman incorporates the idea of the child into her own system of self and develops a sense of "we-ness" (Rubin 1975, p. 149).

proposed a new model of attachment in pregnancy, postulating that an expectant mother's early experiences with her own mother (or primary caregiver) led to the development of internal representations, which then influenced subsequent attachments to family, partner, and friends. Ultimately this process enabled a woman to adapt to pregnancy and attach to her fetus.

Muller was not alone in her conceptual critique of Cranley's work; an Australian researcher, John Condon, also found Cranley's work insufficient in the description of MFA. He went back to adult attachment theory and proposed Bretherton's broad view of attachment as an "emotional tie" or "psychological bond" to a specific object was not only applicable to MFA but added coherence to the construct (Bretherton & Waters, 1985; Condon, 1993). Condon suggested that antenatal attachment contained the core experience of love, and could be described as a developing relationship in which the mother seeks "to know, to be with, to avoid separation or loss, to protect, and to identify and gratify the needs of her fetus." He later formally defined prenatal attachment as simply (p. 359) "the emotional tie or bond which normally develops between the pregnant parent and her unborn infant" (Condon & Corkindale, 1997). Now there were three definitions to the developing construct of prenatal attachment that did not have much in common.

The most recent conceptualization of prenatal attachment has attempted to combine these behavioral, cognitive, and emotional approaches in this working definition (p. 110): "Prenatal attachment is an abstract concept, representing the affiliative relationship between a parent and fetus, which is potentially present before pregnancy, is related to cognitive and emotional abilities to conceptualize another human being, and develops within an ecological system" (Doan & Zimerman, 2003). However, no consistent use of any of these four definitions of the construct has been noted in recent research.

Measuring Prenatal Attachment

The abstraction of the concept of MFA has not deterred its proponents from attempting to capture it in assessment. In the way of the social/personality attachment researchers, MFA measures have largely been brief self-report questionnaires. The first antenatal attachment scale, the Maternal Fetal Attachment Scale (MFAS), was based on the six aspects Cranley postulated in her dissertation: Differentiation of self from fetus, Interaction with the fetus, Attributing characteristics to the fetus, Giving of self, Role-taking, and Nesting (Cranley, 1981a). The scale consisted of 37 items based on attachment-charged statements identified by clinicians and childbirth educators as being common to their conversations with pregnant women. In the pilot, the test instrument was completed by 71 pregnant women between 35 and 40 weeks gestation. Due to a lack of statistical reliability, Cranley eliminated the Nesting aspect after this pilot; the resulting 24-item instrument consisted of five subscales and one global measure of maternal-fetal attachment. Having an instrument such as this pushed prenatal attachment research ahead quickly, as most previous studies had been qualitative with small samples. The MFAS gave the field a quantitative measure appropriate and efficient for cross-sectional studies of larger samples and, 25 years after its development, continues to be the instrument most frequently used by nurse researchers in prenatal studies (Beck, 1999; Grace, 1989).

Müller, as one of the first researchers to use Cranley's scale, was troubled by the inconclusive and often contradictory results of the MFAS in her own research as well as in her subsequent 1992 literature review (Muller, 1992; Muller & Ferketich, 1992). She began to entertain doubt that five subscales truly captured prenatal attachment, and even wondered if MFA could be viewed in such a multidimensional fashion. Another research team who had also questioned the reliability, validity, and theoretical base of the MFAS made their

data from a study on antepartum stress available to Müller (Mercer, Ferketich, DeJoseph, May, & Sollid, 1988). Müller was then able to conduct a secondary analysis of the interviews with those participants, leading to her conclusion that only three of Cranley's subscales corresponded with the categories generated by the interview data, while two others (Giving of Self and Interaction with the Fetus) did not correspond at all. Müller theorized Cranley's items were not capturing certain emotional elements Müller had documented from the open-ended interviews of women in the Mercer et al. study (1988). Mercer participants often made statements about their unborn babies using words like "hope," "wish," and "imagine;" they seemed to be expressing feelings (or mental states) rather than just engaging in behaviors. This analysis led to the development of a new scale, the Prenatal Attachment Inventory (PAI) (Muller, 1990). The 29 items of this instrument were designed to measure affectionate attachment or the personal relationship that the mother develops during pregnancy with her baby fetus. The construction reflected Müller's disagreement with a multidimensional view of MFA and contained no subscales, providing only a global score. Müller's intent was for this scale to emphasize affiliation, exclude behavioral measures, and stand as an adjunct measure to Cranley's MFAS, with the broad goal of increasing agreement across studies (Muller, 1993). Unfortunately, the PAI has seldom been utilized in augmentation to the MFAS, and although some have reported merging the two scales into one instrument, little research has established the validity or reliability of such a consolidated measure (Huang, Wang, & Chen, 2004).

Müller's claim that the MFA construct was unidimensional and her assertion that the PAI yielded only one global measure was challenged some years later by a research team with a sample of 171 Swedish women in their third trimester of pregnancy (Siddiqui, Hagglof, & Eisemann, 1999). Their analysis revealed an underlying dimensional structure with five identifiable factors representing recurrent themes that accounted for 53.9% of the variance: Affection, differentiation of self from fetus, interaction, sharing pleasure, and fantasy. This team proposed that Müller's measure actually supported a multidimensional construct of MFA, pointing out several possible explanations for the disagreement. Their most convincing argument was that Müller's work had been conducted on women at various points in their pregnancy, anywhere between 14 and 40 weeks of gestation, while the Siddiqui et al. team administered the PAI during a narrow window of the third trimester (between the 36^{th} and 40^{th} week of gestation). Since literature was abundant with findings strongly indicating that MFA increased through the course of the pregnancy, Müller's data was confounded by this variation (Cranley, 1981a; Grace, 1989; Lerum & LoBiondo-Wood, 1989).

The newest instrument on the MFA scene was developed in Australia by John Condon (Condon, 1993). Condon believed that the existing instruments inadequately differentiated the attitude toward the fetus from the attitude toward the state of pregnancy and motherhood. He included 19 items in his Maternal Antenatal Attachment Scale (MAAS), focusing exclusively on thoughts and feelings about the baby and ignoring attitudes about the physical state of pregnancy or the maternal role. Two factors, "quality" and "intensity," were generated. "Quality" described the affective experiences the mother reported, such as closeness/distance, tenderness/irritation, positive/negative, joyful/unpleasant anticipation, and a vivid/vague internalized representation of the fetus as a real person. "Intensity" referred to the amount of time she spent thinking about, talking to, dreaming about, or tactilely interacting with the fetus. Condon mapped these two factors as perpendicular continuums, forming four quadrants of MFA style: (1) Strong/health attachment, (2) Positive quality of attachment but low preoccupation due to distraction or avoidance, (3) Uninvolved or ambivalently involved with low preoccupation, and (4) Anxious, ambivalent or affectless preoccupation.

One other scale, the Prenatal Maternal Attachment Scale, is mentioned in the literature, however, only one published study in addition to the initial methodological study has reported its use (Fowles, 1994; LoBiondo-Wood & Vito-O'Rourke, 1990). Twenty-nine items are designed to be administered at any time during pregnancy, and ten additional items are completed only after quickening (discernable fetal movement).

Of these described instruments, Cranley's MFAS and Condon's MAAS are the most commonly used measures (Laxton-Kane & Slade, 2002). No doubt these multiple approaches to capturing the attachment process have stimulated the increased attention and empirical research devoted to MFA, with particular curiosity concerning relationships between the nature of such attachment and the mother's early parenting experiences, her cognitive capacity to develop an internal working model of her fetus, her own adult attachment style, her level of social support, and links to perinatal depression, anxiety, and postnatal attachment (Cannella, 2005).

Paternal-Fetal Attachment

In keeping with the growth of interest in the male transition to fatherhood, both Cranley and Condon hypothesized that, complementary to maternal-fetal bonding, a paternal-fetal attachment process exists (Condon, 1985; Weaver & Cranley, 1983). Cranley's research with an adaptation of the MFAS, named the Paternal Fetal Attachment Scale (PFAS), suggested some differences in attachment to the fetus. Men scored higher than women on the subscales "Differentiation of self" and "Role-taking," while women scored higher on "Interaction with the fetus," "Attributing characteristics and to the fetus," and "Giving of self"(Cranley, 1981b). A later study reported the quality of both maternal and paternal prenatal attachment was associated positively with the quality of the marital relationship (Weaver & Cranley, 1983). While Condon and Corkindale reported on comparisons of maternal and paternal antenatal attachment in 1985, their measure of attachment was not published in the literature for some time (Condon, 1993). Beyond one other research team (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988), little attention was paid to the paternal side of the attachment construct for more than a decade.

Paternal adaptations of the MFA measures have been increasingly included in prenatal research with findings from a handful of studies speculating its importance in the transition to parenthood. To date, findings have been inconsistent, with some finding no difference in maternal- and paternal-fetal attachment (Wilson et al., 2000) and others finding maternal-fetal attachment scores to be greater than paternal scores (Lorensen, Wilson, & White, 2004; Pretorius et al., 2006). However, as mentioned earlier in this discussion, the lack of common instrumentation and measurement methods is a limiting factor in interpreting multiple studies.

Criticism of the MFA Construct

Bowlby's original theory was built on the premise of reciprocal elements in the attachment system. Since prenatal attachment can only be investigated through one part (mother) of this system, some feel that attachment cannot be measured antenatally with any validity (Wilson et al., 2000). However, the Bowlbian world was without such advanced technology as fetal imaging, prenatal diagnostics, genetic screening, and fetal surgery—processes that undeniably individuate the fetus from the mother. Fetal imaging, for example, provides the context for the expectant mother to assign reciprocity to the fetus in terms of movement and activity. Most studies of prenatal attachment have reported that quickening is consistently positively correlated with attachment as measured by questionnaires (Muller, 1992). Zeanah et al. reported that mothers with higher levels of prenatal attachment perceived more movement from their fetus' than those with lower attachment (Zeanah, Carr, & Wolk, 1990).

Additionally, an exploratory study of 26 couples proposed four levels of parental awareness during the third trimester of pregnancy, one of which was “awareness of infant interactive ability” (Stainton, 1990). Some participants described their infants as actively participating in communication with them by moving toward abdominal stroking, extending a limb, or increasing/decreasing activity when certain voices were present. Further, mothers across prenatal and postnatal timepoints have been found to consistently interpret their baby’s emotions, commonly ascribing feelings such as interest, sadness, surprise, and contentedness to the fetus/infant (Siddiqui, Eisemann, & Hagglof, 2000).

A second theoretical objection to the concept of prenatal attachment is the suggestion of a motivation for activation of the attachment system counter to the original theory of the attachment system. Infant and adult attachment in the Bowlbian sense had the goal of security seeking; attachment behaviors were triggered by survival needs, distress, or fear of separation from the attachment figure. During pregnancy, attachment seems to have the goal of *providing* security; emotions and cognitions seem to be stimulated by the mother’s feeling of responsibility for the well-being of the fetus. It has been proposed that prenatal attachment is more appropriately viewed as an “emotional bond” that bears similarities to attachment but is not the same as traditional infant and adult attachment (Pollock & Percy, 1999). Along this line of thinking, it has been suggested that prenatal attachment inventories are no more than attitude measures that may be confounded by social desirability and adjustment (Waters, 2005, personal communication).

That prenatal and postpartum mother infant attachment may require different conceptual frameworks is inarguable; nevertheless, their interrelationship is visible in the consistent attention early attachment theorists give to the mother’s own cognitive representations of caregiving and by viewing the feelings and behaviors related to this internal working model as critical to her contribution as an attachment figure for her infant. The possibility there is a convergence between MFA and mother-infant attachment is illustrated by the significant associations found between measures of prenatal attachment and the following: Postnatal attachment style categorization (Muller, 1996), parental behavior before and after birth (Condon & Corkindale, 1997; Pollock & Percy, 1999) maternal feelings for the neonate after delivery (Leifer, 1977), feeding behavior and maternal sensitivity to an infant’s cues (Fuller, 1990b), and postnatal maternal involvement with the infant (Siddiqui & Hagglof, 2000). In the absence of the infant’s contribution to the matrix (appearance, temperament, etc.), measuring prenatal attachment may provide an avenue for a purer investigation of factors that are solely maternal, such as the mother’s own personality, attachment style, and mental representations of her own early caregiving experiences.

Lastly, fetal perceptions in utero are speculative, at best. Some theorists have hypothesized that intrauterine experience appears to leave “dim residues” that influence later preference for open versus closed spaces (Balint, 1959), sleeping positions, and sensory sensitivities (Piontelli, 1987, 1988). Neonatal research has found that newborns can recognize their mother on the basis of visual cues alone (Bushnell, Sai, & Mullin, 1989), by voice (Fifer, Gomes-Pedro, Nugent, Young, & Brazelton, 2002), and by odor (Porter, Winberg, Varendi, Hopkins, & Johnson, 2005). In one older trial, neonates could produce either the mother’s voice or the voice of another female by sucking on a nonnutritive nipple in different ways (DeCasper & Fifer, 1980). It is conceivable that, beyond our measurement ability, some intrauterine fetal phenomenon complementary to maternal attachment takes place. Therefore, without disregarding the issues raised concerning the validity of prenatal attachment measures, the literature available supports their use in further research (Beck, 1999).

The Relevance of Prenatal Attachment

Bowlby and colleagues illustrated how critical responsive and sensitive caregiving is for the psychological health of humans from infancy through development, and the contributions of the others described in this discussion have strongly suggested mothers develop caregiving capacity during pregnancy. As a result, from a clinical standpoint, the concept of prenatal attachment facilitates a description of the emotional experience of pregnancy, as well as an understanding of the psychological cost of the loss of a fetus (Boyce, Condon, Wilson, & Raphael, 2000; Condon, 1986; Frost & Condon, 1996; Laxton-Kane & Slade, 2002; Stainton, 1990). Women unsure of their attachment may respond to appropriate interventions, and women unaware of or unconcerned about their attachment to their fetus may benefit from education and motivation (Shieh, Kravitz, & Wang, 2001; Shieh, 1999). For example, in one randomized controlled observational study of a sample of 213 women with uncomplicated pregnancies, fetal movement counting resulted in a statistically significant increase in total attachment scores on the Cranley scale of maternal-fetal attachment (Mikhail et al., 1991). This simple intervention illustrates the importance of learning more about the concept of attachment to an unseen baby, the asymmetrical nature of prenatal attachment, what facilitates its growth, and what prevents or stifles it (Carson & Virden, 1984; Carter-Jessop, 1981; Cranley, 1992; Mikhail et al., 1991).

Longitudinal studies, although inconclusive, have reported modest correlations of MFA with: 1) maternal feelings of attachment 24 hours after delivery (Reading, Cox, Sledmere, & Campbell, 1984), 2) postnatal maternal interaction (Fuller, 1990a), 3) maternal competence (Mercer & Ferketich, 1994), and 4) mutuality in family relationships and infant mood (White, Wilson, Elander, & Persson, 1999). These findings are clinically significant, hinting at the very least MFA is a forerunner of mother-infant attachment, but also demonstrate how much more work needs to be done in the investigation of the effect of MFA on offspring.

A generational quality to attachment is suggested by a landmark study conducted in Great Britain with a sample of 100 primagravidas (Fonagy, Steele, & Steele, 1991). On the basis of AAI classifications given to expectant parents during the last trimester of pregnancy, the research team was able to predict the Strange Situation category of infant attachment (secure, anxious ambivalent, anxious avoidant) to parent when the child was 1 year of age. The correlation between parents' and babies' styles in the "secure" and "insecure" categories was robust ($r = 0.75$). This suggests that a parent's state of mind with regard to attachment has a significant effect upon the quality of attachment of their child (this is not to suggest that various life events during the first year of life do not have an effect). These findings stimulated many replication studies with the same link between secure mothers and secure babies, and insecure mothers and insecure babies (Levine, Tuber, Slade, & Ward, 1991; Mikulincer & Florian, 1999; Priel & Besser, 2000). The implication that we might be able to target families at risk for insecure attachment provides a new venue for developing interventions to intervene in vicious cycles and foster healthier attachment.

Poor attachment has also been associated with the painful topic of fetal and child abuse. A study in England with a sample of 40 women referred by Social Services departments suggested that "negative preoccupied" antenatal attachment (as measured by the Maternal Antenatal Attachment Scale) was predictive of an increased likelihood of symptoms of anxiety, mood disturbance, and depression, self-reported irritation with the fetus, and even fetal abuse (Pollock & Percy, 1999). Other researchers have looked at the association between insecure attachment in mothers and the incidence of child abuse and found positive correlations (Moncher, 1996). Contrastingly, strong MFA has been associated with positive health practices during pregnancy, such as abstinence from tobacco, alcohol, and illegal

drugs, obtaining prenatal care, healthy diet and sleep habits, adequate exercise, use of seat belts, and learning about pregnancy, childbirth, and infant care (Lindgren, 2001).

Quality of attachment has also been associated with the perinatal mental health of the mother. Weak prenatal attachment has been associated with postpartum anxiety (Blumberg, 1980; Gaffney, 1989) and depression during pregnancy and in the postpartum (Brandon et al., 2007; Condon & Corkindale, 1997; Lindgren, 2001). On the other hand, strong attachment was found to be a moderator of the vulnerability to postpartum depression in one sample of women in Israel (Priel & Besser, 1999). Personality vulnerability factors to depression were measured, and highly self-critical women reported less depression when strongly attached to the fetus during pregnancy.

Future Directions

Along with increased empirical knowledge comes responsibility to investigate ways to identify mothers at risk for poor attachment and subsequent insensitive caregiving as well as to develop interventions that can adequately prepare women for motherhood. As reported in one integrative review, associations between attachment and psychosocial variables have been disappointing, partly because much of the previous work has been exploratory in nature and not theory-driven (Cannella, 2005). In addition, methods used across studies have been inconsistent, and the psychometric properties of all instruments have not been consistently valid and reliable.

Longitudinal research is sorely needed to assess the impact of antenatal attachment on postpartum mental health, parenting behaviors, and infant/child outcomes. Mental health research would be advanced by an understanding of the relationship of MFA to psychopathology as well as factors of resilience in parents and in children. Since attachment theory has provided a framework for understanding adult and adolescent depression (Marton & Maharaj, 1993; Roberts, Gotlib, & Kassel, 1996), its application to prenatal attachment could contribute to an understanding of prenatal and postpartum depression as well as inform treatment (Segre, Stuart, & O'Hara, 2004; Whiffen & Johnson, 1998). However, this type of knowledge cannot emerge from single-time-point data collections and, in view of the youth of the theory, older data sets rarely include the necessary data.

A strong limiting factor of current knowledge is the large gap in existing research with diverse populations. Psychometric data of current prenatal attachment measures has largely been established using samples of low-risk, middle-class, married, Caucasian pregnant women (Shieh et al., 2001). Studies incorporating other populations may elucidate psychosocial and cultural components of MFA that would be clinically important.

Conclusion

The theory of prenatal attachment posits that a unique relationship develops between parents and fetus long before a child is born. Since its introduction in the 1970's by a few key individuals, notably nurses, measures of prenatal attachment have been developed to enable the assessment of maternal and paternal fetal attachment. Research has suggested that prenatal attachment motivates good health practices during pregnancy, facilitates adaptation to the role of parenthood, and perhaps even serves as a protective factor against perinatal depression, making this theoretical approach to pregnancy important across the disciplines of medicine, psychiatry, and social work, both academic and clinical. As research on attachment disturbances continues, new importance is ascribed to early identification and intervention. Inge Bretherton aptly applied one of Freud's statements as she outlined the origins of attachment theory:

> So long as we trace the development from its final outcome backwards, the chain of events appears continuous, and we feel we have gained an insight which is completely satisfactory or even exhaustive. But if we proceed in the reverse way, if we start from the premises inferred from the analysis and try to follow these up to the final results, then we no longer get the impression of an inevitable sequence of events which could not have otherwise been determined (Bretherton, 1992; quoting (Freud, 1955), p. 167).

Ideally, additional knowledge about the role of MFA could stimulate the development of interventions that begin before birth and prevent poor mother-child attachment from being an "inevitable sequence of events."

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