Anomalous Maternal Behavior at Four Months

and Infant Attachment Disorganization at One Year

by

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Abstract

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The present study examines the link between 4-month mother-infant affective communication and patterns of infant attachment at one year, highlighting the relation between anomalous maternal behavior at 4-months and infant attachment disorganization at one year. The study's first aim was to expand on the work of Bronfman, Parsons & Lyons-Ruth, (1999) and of Kelly (2004), by identifying a select array of maternal behaviors, assessed at 4-months, projected to be salient critical predictors of disorganized infant attachment. The next aim was to determine whether selected anomalous maternal behaviors could distinguish infant attachment patterns at one year.

Subjects were 75 low-risk mother-infant pairs. Anomalous maternal behavior was assessed at 4-months from videotaped, face-to face interactions using *The Modified AMBIANCE – Selected Affective Errors, 4-Months (M-AMBIANCE)* (Miller, 2010). The M-AMBIANCE, which identifies 9 anomalous maternal behaviors to be coded, is a modification of Kelly's (2004) adaptation of the AMBIANCE (Atypical Maternal Behavior Instrument for Assessment and Classification, Bronfman, Parsons & Lyons-

Ruth, 1999). At one year, quality of infant attachment was assessed during Ainsworth's Strange Situation (Ainsworth et al., 1978, Main & Solomon, 1990).

Results indicate that selected anomalous maternal behaviors capture disturbances in maternal affective communication associated with infant attachment disorganization. Contrary to expectations, it was not the quantity of anomalous maternal behavior that best distinguished disorganized from organized dyads, but the quality of anomalous behavior. Mothers of disorganized infants were more apt to become aggressive with their infants and to respond anomalously to infant distress. While mothers of secure infants behaved anomalously with their infants, they did not become aggressive and were significantly less apt to respond anomalously to infant upset. A subset of secure infants (*vulnerable secures)* displayed higher levels of disorganization at 1-year and had mothers who at 4-months displayed more total anomalous behavior and overriding behavior than mothers of *pure secure* infants. *Vulnerable secure* mothers also displayed more overriding behaviors than mothers of disorganized infants, and were judged to be more disrupted in 4-month affective communication than mothers of insecure or *pure secure* infants. Results have implications for attachment theory and for the early identification and treatment of high-risk dyads.

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Chapter One

Introduction

> "Attachment studies typically assess parental "sensitivity" as the aspect of parental behavior associated with infant attachment security....What is required from the parent to merit this description is a continuing attempt to apprehend the infant's current subjective reality (affect state, current desired goal, ...level of understanding) and an attempt to devise a response that acknowledges and comments or elaborates on that state.....[However,]....the difficulty of knowing another's mind guarantees that communication will be fraught with error and require many procedures for disambiguating messages, detecting and correcting misunderstandings, and repairing serious communicative failures....[Parent-infant dialogues] that are open to the entire array of affective communications; that include both partners' initiatives in a balanced mutually regulated dialogue; that are characterized by active negotiation and repairing of miscues, misunderstandings, and conflicts of interest; and that are actively scaffolded by the developmentally more advantaged partner toward more flexible and inclusive forms are associated with positive outcomes for the child." (Lyons-Ruth, 1999, pp. 583-4).

Research has shown that the early years are a critical developmental period for the growing child, and that unfavorable circumstances during this time can potentiate considerable and irreparable lifelong consequences. The early relational environment, in particular, is recognized as the primary context out of which development and personality emerges. Over the past several decades, a great deal of research has focused on yielding an ever more fined tuned understanding and articulation of the crucial features and long-term implications of this primary bond, the attachment relationship between mother and child.

The concept of attachment was first introduced by John Bowlby to describe the affectional tie an infant forms with his mother, and the range of behaviors an infant displays to ensure proximity with this principal haven of protection and comfort during moments of stress and fear. Bowlby's thinking about the primacy of the mother-child

bond was first described in 1944, when he published his groundbreaking research on 44 juvenile thieves, empirically documenting an association between early relational ruptures and later psychopathology. Among the 44 young delinquents whom Bowlby studied, the great majority had suffered prolonged and devastating early separations from their mothers; close to half of this group were characterized as “affectionless”, exhibiting a lack of responsibility, care, affection or regard for others. This was a significant contrast to Bowlby’s control group of clinic patients, very few of whom had experienced early maternal separations, and none of whom were labeled “affectionless”. Despite some limitations of the study, this data established a verifiable link between deprivations in the early caregiving environment and later social-emotional disturbances, which ranged from antisocial behaviors (such as stealing), to more severe expressions of psychopathology (evidenced by Bowlby’s subset of juveniles labeled “affectionless”).

Harlow’s (Harlow & Zimmerman, 1959; Harlow & Harlow, 1962) work with rhesus monkeys offered further evidence that grave disturbances in the early mother-infant bond can have devastating and enduring social, emotional, and behavioral consequences. Raised amidst surrogate mothers constructed from either wire or cloth, Harlow’s monkeys showed a preference and propensity to attach, only with the cloth figures, irrespective of whether these surrogates offered nourishment. These findings buttressed Bowlby’s claim of an innate and universal predilection to attach to a protective and comforting maternal figure. However, monkeys raised in social isolation went on to develop grossly aberrant social behaviors. Under conditions of stress they could be seen crying, screaming, rocking, frantically moving from one object to the next, huddled on

the floor, or staring blankly. Years later, they were aggressive with peers and unable to mate and produce offspring.

Mary Ainsworth (Ainsworth et. al., 1978) went on to develop an experimental protocol designed to empirically examine differences in patterns of infant-mother attachment. Ainsworth's 20-minute "Strange Situation" procedure exposed 12- month-old infants to a series of mounting stressors, involving separations and reunions with the mother along with interactions with a stranger, and was intended to activate the infant's attachment behavioral system. Based on the infant's capacity to use the mother as a secure base from which to explore the environment, and the infant's reactions to maternal separations and reunions, the quality of infant-mother attachment was determined.

Ainsworth initially identified 3 organized patterns of infant-mother attachment, which correlated significantly with the quality of maternal caregiving that she and her research team had observed within the home during the infant's first year of life. Infants with secure attachments to their mother showed a flexible balance of exploratory and attachment seeking behavior, and while often evidencing distress following maternal separations, they were readily soothed by their mother when she returned. Infants with insecure-resistant patterns of attachment displayed a high amount of approach and attachment seeking behaviors, yet reduced exploratory behaviors. During maternal separations these infants showed heightened distress, yet they were not easily soothed by their mother when she returned. Infants with insecure-avoidant attachment patterns exhibited a high level of exploratory behavior, yet very little approach and attachment seeking behavior. These infants showed no outward signs of distress during maternal separations, and avoided their mother completely when she returned. While mothers of

secure infants were found to be highly sensitive and responsive to infant cues and signals, mothers of insecure-resistant infants were judged to be highly inconsistent and unpredictable in their interactions, and mothers of avoidant infants were found to be highly rejecting and intrusive in their interactions. Throughout 30 years of cumulative research, the quality of infant attachment, as determined via Ainsworth's protocol, has become a well-established, reliable, and valid means of assessing the caregiving relationship, and predictive of an wide scope of developmental outcomes.

It was noted shortly after Ainsworth described her classificatory system, however, that not all children could readily be grouped into one of the 3 organized patterns of attachment. In 1986, Main & Solomon described a group of infants who evidenced disturbed attachment behaviors during maternal separations and reunions, including indices of bizarre, contradictory or disoriented behaviors, and the absence of a singular, coherent strategy of coping when the attachment behavioral system was activated. The only unifying feature among this group of infants was their display of disorganized or disoriented behaviors in the face of attachment related stress; as such, Main and Solomon labeled this group insecure-disorganized in relation to attachment (Main & Solomon, 1990).

Since the discovery of the disorganized category of infant attachment in 1986, the literature has documented a robust link between this pattern and the most detrimental outcomes throughout childhood, adolescence, and into adulthood (e.g., Carlson, 1998; Lyons-Ruth & Jacobvitz, 1999; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999; Fonagy, Gergely, Jurist & Target, 2002, Grossman, Grossman &, Waters, 2005). Attachment disorganization has been found to put a child at risk for a host of social-

emotional, developmental, and pathological outcomes, including childhood behavioral problems, severe forms of psychopathology, such as borderline personality disorder, and dissociative symptomology. For Lyons-Ruth, disorganized infant attachment reflects a malfunctioning in the attachment relational system. As Carlson (1998) describes, "disturbed attachment relationships are linked to later psychopathology, not as early disorders of the infant, but as markers of a beginning pathological process, risk factors for later pathology in the context of a complex model of interactive, biological and environmental variables" (Carlson, 1998, p.1108)

Considering the detrimental sequelae linked to this classification, the need to ascertain the origins of attachment disorganization has been of paramount concern for both clinicians and attachment theorists, and a great deal of research has been devoted to this end throughout the past decade. While it has been shown that severe maltreatment and neglect strongly predicts infant attachment disorganization, (Carlson et al., 1989) 15% of the infants from low-risk, middle class samples, who have not been subjected to gross maltreatment and neglect, also reveal disorganized patterns of attachments (van IJzendoorn, Schuengal, & Bakermans-Kranenburg, 1999). Parental unresolved mental representations of their own early attachment related loss or trauma, as measured by the Adult Attachment Interview (AAI, George, Kaplan, & Main, 1985), have been found to account for additional variance in infant disorganization (Madigan et. al., 2006). However, parental loss or trauma does not account for all instances of attachment disorganization and it is not yet clear exactly how the intergenerational transmission from parental representation to infant coping style transpires. This gap in theoretical and

clinical understanding is referred to in the attachment literature as the "transmission gap" (van Ijzendoorn, 1995; Madigan et. al., 2006).

It is a common tenet of attachment theory that the quality of the early interactive caregiving environment strongly influences the quality of infant-mother attachment. Over the past two decades, numerous researchers have explored the etiology of attachment disorganization, and have made substantial strides in describing the parental interactive features associated with infant disorganization. Nevertheless, there is still more work to do in this area, to hone in, and more fully articulate and establish the precise parental behavioral interactive features linked with infant attachment disorganization.

Early on, the primary body of literature looking at antecedents to attachment, focused on the role of maternal sensitivity and its relation to secure patterns of infant attachment. While numerous empirical studies have documented the link between maternal responsiveness to infant rhythms, cues and signals and infant attachment security (see De Wolff & van IJzendoorn, 1997; Ainsworth, 1978), these studies were conducted prior to the identification of the disorganized category of attachment. Maternal sensitivity, as measured by Ainsworth's global rating scale (Ainsworth et al., 1978), has not been predictive of disorganized attachment status (van IJzendoorn et al., 1999). This earlier body of research predominantly employed global measures and ratings to assess broad qualities of maternal conduct. Yet, these scales offered little insight into the behavioral specificities inherent in these global codes. As noted by Lyons-Ruth and Jacobvitz (1999), "[Ainsworth's scale] does not appear to be differentiated and specific enough regarding the affective communication involved in fear-related behavior to predict infant disorganization".

Seeking to clarify the early interactive mechanisms of transmission leading to disorganized attachment, Main & Hesse (1990) and Lyons-Ruth (Lyons, Bronfman, & Parsons, 1999) identified 3 hypothesis that have all gained some empirical support. Main & Hesse (1990) initially proposed that disorganized attachment was related to frightened or frightening parental behavior, which placed an infant in the irresolvable situation of "fright without solution", in which the caregiver becomes both the source and the solution to distress. Building on this theory, Lyons-Ruth and her associates (Lyons-Ruth, Bronfman & Parsons, 1999) suggested that both contradictory caregiving behavior and "extreme parental misattunement" (Lyons-Ruth and Jacobvitz,1999, p.531) were likely to perpetuate fear, and lead to the breakdown of an organized attachment strategy. According to Lyons-Ruth and others, an organized strategy has to work well enough to elicit some basic comfort and protection from the parent. If the parent becomes unresponsive, unpredictable and unavailable, beyond a critical point, the child experiences no felt protection and loses the capacity to sustain an organized strategy.

Attempting to design a comprehensive clinical instrument that would identify the full scope of disturbances in mother-infant affective communication associated with disorganized patterns of infant attachment, Karlen Lyons Ruth and colleagues developed The Atypical Maternal Behavior Instrument for Assessment and Classification (AMBIANCE) (Bronfman, Parsons, & Lyons-Ruth, 1999),. The AMBIANCE incorporated Main & Hesse's (1992) *FR* scale (*Frightening, Frightened, Dissociated, or Disorganized Behavior on the Part of the Parent*), which indexed a large array of frightened, frightening, and disoriented maternal behaviors theoretically linked to infant disorganization, as well as incorporating additional behaviors theoretically or empirically

linked with disorganization or maltreatment. The original AMBIANCE was designed to be used within the Strange Situation when infants were 12-24 months old. In 2004, Kelly adapted the AMBIANCE (Bronfman, et. al., 1999) to use with infants 6 months and younger.

While many studies have established a significant relationship between *anomalous* parenting behavior and disorganized infant attachment using both the AMBIANCE and FR scales (see Madigan et al., 2006), very few studies have assessed anomalous parenting behavior prior to 12 months, and much of the variance in disorganized attachment, according to Madigan et al., has still not yet been accounted for. In a meta-analysis by Madigan & her colleagues (2006), which incorporated 12 studies and 851 mother-infant dyads, a limited proportion of the variance in disorganized attachment was found to have been accounted for by anomalous parenting behavior at 12 months or later. As Madigan and colleagues note, however, the very breadth and extensive nature of these scales may inadvertently weaken the link between anomalous parenting behavior and disorganized attachment. They emphasize the need for an explication of "those components or behavioral indices of anomolous behavior that are most directly implicated in the development of disorganized attachment relationships" (p.106).

Lyons-Ruth and colleagues (Lyons-Ruth, Bronfman & Parsons, 1999) reported that affective communication errors (e.g., not attempting to soothe infant when distressed, or laughing while infant was crying) was the only dimension of atypical maternal behavior that significantly distinguished mothers of organized from disorganized infants in their sample of high risk families, although negative-intrusive behaviors (e.g., pulls

infant by the wrist; mocks teasing infant), and disoriented behaviors were correlated with an infant's level of disorganization.

This current study will expand on the work of Lyons-Ruth, Bronfman & Parsons, (1999) and of Kelly (2004) by identifying a select array of parental behaviors projected to be the most salient, critical predictors of disorganized infant attachment. Thus, this investigation will strive to address the very gap in attachment research emphasized by Madigan et.al.(2006). In addition to establishing a more refined, selective, and focused coding system for assessing severe disturbances in mother-infant interactive behavior, this study will expand on the work of Kelly (2004), by examining 4-month mother-infant exchanges, and endeavoring to identify earlier clinical indices of disorganized infant attachment, the most vulnerable and at-risk population of children the literature has yet to identify. Earlier detection of at-risk dyads offers the hope of providing earlier intervention, and the prevention of adverse developmental and psychological outcomes.

Chapter Two

Literature Review

The goals of this study are twofold. The first aim is to expand on the work of Lyons-Ruth, Bronfman & Parsons (1999) and of Kelly (2004) by identifying a select array of parental behaviors projected to be the most salient and critical predictors of disorganized infant attachment. The second aim of this study is to determine whether selected *anomalous* maternal behaviors at 4 months can distinguish attachment styles at one year. If so, then this is a step toward creating a more refined, focused coding system for assessing early disturbances in mother-infant affective communication and for predicting attachment.

The literature review will thus set out to examine the centrality of the mother-infant relationship as described within the psychoanalytic, attachment, infancy, and neurobiological literatures, addressing developmental implications emphasized by both theoretical and empirical findings. The developmental implications of early caregiving behavior, in particular, will be reviewed, with emphasis on the study of attachment. The role of the mother as a regulator of the infant's affect and psychobiology will subsequently be examined, as will the consequences when derailments in this process ensue. A discussion of disorganized attachment will follow, including a review of the research illuminating the link between disorganized infant attachment and anomalous parental behaviors. A discussion of findings, theories, and suggested implications for future research will follow.

The Mother-Infant Relationship

Psychoanalytic theory- the early years.

The early years are commonly understood to be a formative period, when a child's personality and habits of responding to the world are developing. It is also a time, according to Freud (1949), when a child is most vulnerable, for the ego, which has not yet fully developed, has limited capacity to cope, and thus remains highly susceptible to traumas and neurosis. For early psychoanalytic thinkers, however, traumas and neurosis were thought to result largely from thwarted biological drives or derailments in psychosexual development. The mother, during this early period, was perceived as significant chiefly for her role in reducing drives and gratifying the infant's physical and physiological needs.

As studies of institutionalized children began to show (Freud & Burlingham, 1943; Spitz, 1945; Robertson, 1952), however, it was not the mere fulfillment of physical or biological needs that ensured an infant's well-being and healthy development. This work suggests that without the physical, social, and emotional availability and responsiveness of a primary caregiver, a child's psychological development is compromised.

Psychoanalytic theory-the later years.

Winnicott (1960a, 1960b, 1967) recognized and described the mother's vital early role in ensuring an infant's healthy personality organization and developing self structure. Early on, he emphasized the link between the quality of the parental environment, particularly during the earliest phase of dependency, and the young child's emerging development of self. During this beginning phase of life, he explained, an

infant may be viewed as "an immature being who is all the time *on the brink of unthinkable anxiety"* (1960a, p. 57). Winnicott (1962) described this state as a continuum of psychotic anxieties that includes "going to pieces", "falling for ever" "having no relationship to the body", and "having no orientation" (p.58). He maintained that during early infancy a child remains completely dependent on his or her external environment, and will suffer or thrive based on the quality of attention and care he receives (1960a). While possessing an "inherited potential" to grow and evolve into an independent being, this potential cannot come into fruition without the adequate care of a mother figure. In a state of dependency, the infant is seen to be merged with its mother, who must intuit all the infant's needs. Because of the mother's 'primary maternal preoccupation' and ability to identify with her child she is able to empathize, recognize what her child feels and requires, and meet the child's basic environmental and holding needs.

Mothers who have difficulty physically holding their infants, however, inevitably induce states of suffering and distress in their young offspring. Without good-enough mothering, the infant is left alone and becomes sensitized to assaults, which are not easily deflected. Then there is not only a resultant weakening in the ego, but a rupture in the youngster's continuity of being. As Winnicott (1960a) wrote: "If maternal care is not good enough then the infant does not really come into existence, since there is no continuity of being; instead the personality becomes built on the basis of reactions to impingements" (p.54). Thus, for a child to come to know him or herself a good-enough holding environment is essential.

For Winnicott (1960a), in fact, the principle role of the mother figure, is as "holding environment" to facilitate the infant's "continuity of being", or "inherited potential", by guarding the infant against destructive intrusions. The continuity of one's self may be endangered, he maintains, inducing a sense of annihilation, not only by external factors (e.g., interactive failures), but also by one's own ego-alien drives and impulses that are unmanageable to the newly formed ego. When the mother's care supports the infant's ego and facilitates it to become strong and steady, the id comes under the control of the ego and becomes restrained. Then there is an uninterrupted experience of 'going on being'. Under such conditions of satisfactory maternal care, while periodic occurrences of disintegration may occur, impingements may nevertheless be mastered through omnipotent fantasies. Thus, the good-enough holding environment allows for an inner sense of instinctual gratification, while providing the necessary ego support for ego organization to unfold; and ultimately makes possible and is indeed a prerequisite for the child to come to know him or herself. Whether successful or not, this experience forms the basis of the infant's object relational experience.

Winnicott (1960a), in fact, believed that the range of character disorders that appear in adulthood may be linked with failures in holding, the critical early condition of self-development. As he saw unfolding in the transference of many borderline and highly regressed patients, there was a reversion to the stage of dependence, marked by a reactivation of the early parent-infant relationship where the most primal and infantile wishes and needs became expressed (1960b). When this emerges in the transference, Winnicott believed, it is an echo of unmet hopes and needs of the mother-infant relationship.

Dare & Holder (cited in Meissner, 1986) expound further on the critical role of maternal responsiveness and "holding" in infant self-formation:

> We believe under normal conditions the earliest self-experiences are almost totally determined by the nature of the mother-infant relationship. It is a necessity that the mother and infant adapt to each other...When [the mother] smiles and cuddles the infant closely, the emergent self-image will be associated with feelings of warmth, safety, and being cherished. When the mother is withdrawn, depressed or angry, the emergent self is experienced as fragile, unloved, and unvalued. Later, of course, the child whose mother is consistently negative towards him may come to regard himself as the cause and source of the mother's unhappiness or hostility (pp 61-62).

In addition to the mother's role as holding environment, Winnicott (1967) also discussed the necessity of the mother in the role of mirror. From his perspective, healthy emotional development is contingent on the infant being able to look at the mother's face and see him or herself reflected back. As he put it: by "giving back to the baby the baby's own self" the baby comes to know himself (p. 118). Lichtenstein agreed that the infant looks at the mother's face and gets back a picture of his or her self, an experience that then becomes internalized and forms the basis of the infant's primary identity (cited in Meissner, 1986).

For the baby who looks, however, and never sees his own experience or state reflected back, the outcome may be dire (Winnicott, 1967). The mother's face may display her own state, her own fixed pattern of defense, or may even display nothingness; in any case, the baby who does not find himself anywhere he looks inevitably stifles his

own needs and creative impulses in a desperate effort to protect his innermost core from perceived assault. Reared in such an environment, Winnicott writes, the infant "will grow up puzzled about mirrors and what the mirror has to offer. If the mother's face is unresponsive, then a mirror is a thing to be looked at but not to be looked into" (p.113). In the most extreme cases, where the environment is severely changeable and unpredictable, the infant adapts by withdrawing, save to look as a means of self-protection.

For Fonagy, Target & Gergely (1999), when there is an early failure in parental mirroring, the infant is left on his or her own to cope with overpowering thoughts and feelings. Without external support in the form of containment, the child is likely to be consumed by states of rage which will either be directed against the external environment and others, or against the self. Inevitably, he suggests, this sets the stage for severe psychopathology and personality disorders.

According to Sherwood and Cohen (1994), when parents regularly show a distorted mirroring response, infants will adapt and behave in a manner conducive to eliciting whatever reaction they can from the essential other. The infant's behavior will no longer reflect their true internal reality, but will become centered around that which is pleasing to the other. They claim that when this occurs, "the child may become a sensitive but shallow reflection of the fantasies, expectations, and projective identifications of the parent" (p.10).

The True Self's essence, according to Winnicott (1960b), is spontaneous, alive, and creative, and may be detected via the infant's natural, unprompted gesture. However, a True Self can come into being only when there is a good-enough mother, who can

continually recognize, “meet,” and thus authenticate her infant’s “spontaneous gesture or sensory hallucination” (p.145). Then, the infant’s sense of omnipotence is reinforced by the external environment, and encourages further spontaneous expressing. The more the True Self is able to express itself, the stronger it becomes. As this occurs, the infant possesses a greater ability to withstand disruptions to the true self without fragmenting. The infant also develops a capacity for responding compliantly and moving into a false-self mode without getting lost or stuck there.

When the early caregiving environment is overly frustrating, aversive, or unavailable, however, there is a disturbance not only in the internalization process, but a concomitant disruption in the formation of the self-structure. What then occurs, according to Meissner (1986), is “that forming structures are organized in terms of defensive needs or are overly influenced by and vulnerable to drive derivatives” (p. 64). He reiterates that this is a sure pathway for personality disorders to develop. For, whatever the form of maternal failure, the child is left with “a sense of lack, discomfort, and dis-ease” (p.65). The external world is then experienced as undependable and unpredictable, and the negative and damaging quality of the mother’s affective engagement becomes incorporated into the self-experience. The inner self becomes narcissistically depleted, flooded by states of distrust and insecurity, and introjection replaces identification as the primary form of internalization. For the ego to fully develop, Hendrick maintained that optimal levels of gratification, as well as frustration were essential (cited in Ross, 1967).

Attachment Theory And Research

Early on, John Bowlby (1969, 1982) noticed a link between childhood psychopathology and serious ruptures in the mother-child bond, specifically separations. Unlike Freud's psychoanalytic secondary drive theory, which postulated that the infant's bond with the mother was tied to her role as a gratifier of the drives, Bowlby saw that the child's tie to its mother was not the result of secondary drive fulfillment, but rather the result of an evolutionary based need to seek proximity, comfort, and protection from a more powerful partner. By seeking out proximity and attaching to the mother, the young infant ensured not only protection from danger, but survival.

Harlow's work with rhesus monkeys, that were raised amidst surrogate mothers constructed from wire and cloth, buttressed Bowlby's claim of an innate and universal predilection to attach to a protective and comforting maternal figure (Harlow & Zimmerman, 1959; Harlow & Harlow, 1962). Studies across an array of species have since confirmed a universal display of behaviors, that keep young infants in close proximity to their mothers, while mothers across species are similarly seen promoting this connection (Lorenz, 1935; Hofer, 1987, 2006; Harlow& Zimmerman, 1959). Harlow's work offered further evidence that grave disturbances in the early mother-infant bond can have devastating and enduring social, emotional, and behavioral consequences. Having been reared in isolation, these monkeys evidenced both severe psychological disturbance and grossly aberrant social behaviors.

Attachment theory emphasizes the role of the parent-child relationship and highlights the need for sensitive and responsive caregiving to ensure a child's emotional well-being and healthy development. The attachment bond may be referred to as an

enduring affectional tie with a specific important partner, whose closeness and proximity is sought, especially under conditions of fear, fatigue, or pain (Bowlby, 1969, 1982). According to Bowlby, attachment behavior, which can include crying, eye gaze, smiling, vocalizing, and proximity seeking, is a natural instinctive response that serves to unite a child with his caregiver and in doing so, protects him from aversive conditions. Bowlby maintains that to preserve his safety and survival, an infant's attachment behavioral system will be activated whenever stress inducing or threatening conditions arise. When a child's distance from his parent increases, when a child becomes separated from his parent, or when a child finds himself in a strange or unfamiliar situation, the attachment behavioral system is likely to become activated. Internal stressors such as fatigue, hunger, discomfort or distress can also induce attachment and comfort-seeking behaviors. Under such conditions, the child will seek contact with the protective caregiver and environmental exploration will diminish. Even under conditions of ill-treatment from an attachment figure, attachment seeking behaviors will persist.

The quality of infant attachment is widely recognized as a reliable and valid marker of the caregiving relationship, and a powerful predictor of a wide scope of developmental outcomes, not only during infancy and early childhood, but throughout one's lifespan. The quality of an attachment relationship is said, for instance, to impact a child's development of self, their capacity to feel secure and trusting, their inclination to experience an ordered and predictable universe, and later, their ability to go out into the world and achieve mastery (Belsky & Cassidy, 1994; Karen, 1990, Slade & Aber, 1992). While the most optimal outcomes are associated with secure patterns of infant attachment, less optimal outcomes are associated with insecure patterns of attachment, and the most

detrimental outcomes are associated with disorganized attachments. According to Bowlby (1969, 1982), security of attachment reflects the same constructs described by Melanie Klein as "introjection of the good object" and by Eric Erikson's notion of "basic trust".

Over the past two decades, a large body of research has established that quality of attachment reflects an enduring form of behavioral organization (Matas, Arend & Sroufe, 1978; Waters, 1978; Waters, Wippman & Sroufe, 1979), with attachment styles at 12 months stable at 18 months, and predictive of later functioning across social, emotional, and cognitive spheres (Matas, Arend & Sroufe, 1978; Waters, 1978; Waters, Wippman & Sroufe, 1979; Arend, Gove & Sroufe, 1979). Without significant life events (e.g., a death in the family, a separation from a parent, a divorce, a serious family illness, parental psychopathology, etc) and under stable conditions, a strong continuity in attachment organization and adaptive functioning has been found to extend from infancy into toddlerhood (Matas, Arend & Sroufe, 1978), into later childhood (Main, Kaplan & Cassidy, 1985), and on into adulthood (Waters, E., Treboux, D., & Crowell, J. (2000). Infant attachment patterns have also been shown to have cross-situational stability (Ainsworth et al., 1978; Lyons-Ruth & Jacobvitz, 1999; Erikson & Egeland, 2004; Grossman, Grossman & Waters, 2005).

Ainsworth.

A child's attachment status has traditionally been determined within the context of Ainsworth's 'Strange Situation', a standardized, lab-based protocol administered at 12 to 18 months of age. In this unfamiliar, stress inducing context, infants are put through a

series of separations and reunions with their parent, while also exposed to a sequence of interactions with a stranger, which is a procedure designed to activate the attachment behavioral system. Early on, Ainsworth (1978) noted 3 predominant patterns of infant coping most evident during episodes of maternal separation and reunion. These distinctive styles of affective and behavioral responding reflect differential, yet organized patterns of balancing attachment seeking and exploratory behavior. While infants classified as securely attached *(B)* exhibited a fluid balance between attachment seeking and exploratory behavior, avoidant *(A)* infants showed little attachment seeking behavior yet a high amount of exploratory behavior, and ambivalent-resistant *(C)* babies exhibited a high amount of attachment seeking yet little exploratory behavior.

Maternal behvaioral correlates and antecedents of infant attachment

In 1978, Ainsworth published her seminal work that linked attachment security in the first year with maternal caregiving. Specifically, ratings of sensitive, responsive and attentive maternal care, assessed throughout the infant's first year, were associated with security of infant attachment status at twelve months. While there has been some contradictory empirical work, a great deal of research has corroborated these findings (van IJzendorn,1995; DeWolff & van IJzendoorn, 1997; Belsky, Rovine & Taylor, 1984; Lyons-Ruth, Connell, Zoll, & Stahl, 1987; Smith & Peterson, 1988; Isabella & Belsky, 1991; Grossman & Grossman, 1991; Isabella, 1993;). Mothers of infants who later became classified with secure (B) attachments have been found to be more sensitive and tolerant toward their infants, more engaged, more positive (Ainsworth, 1978; Lyons-Ruth et al., 1987; Isabella & Belsky, 1991; Isabella, 1993 – at 1 and 4 months), more accurate

in their perceptions and interpretations of infant behavior and signals, and more contingently responsive to infant cues (Ainsworth, 1978; Isabella & Belsky, 1991; Belsky, Rovine & Taylor, 1984; Smith & Peterson, 1988). They have also been observed to be more responsive to infant crying and distress (Ainsworth, 1978, Belsky, Rovine & Taylor, 1984; Grossman & Grossman, 1991), more affectionate, more apt to pick up distressed infants (Grossman & Grossman, 1991), less affectively negative (Lyons-Ruth et al., 1987), less rejecting (at 1 and 9 months; Isabella, 1993), and quicker to attend to infant vocalizations (Belsky, Rovine & Taylor, 1984). In addition, these mothers have evidenced moderate or mid-range levels of maternal stimulation and interaction (Belsky, Rovine & Taylor, 1984, Beebe et al., 2000; Jaffe et.al., 2001).

In the same Baltimore study of white middle class families, Ainsworth (Ainsworth et al., 1978) went on to note differential patterns of maternal interaction among mothers of future secure and future insecure infants. From home-based observations of the same mother-infant pairs over the course of the infant's first year, Ainsworth and her colleagues identified 3 distinct patterns of maternal interaction, which corresponded precisely with her 3 discrete categories of organized infant attachment. After decades of attachment research, infant researchers continue to view infant attachment status as an outgrowth of the infant's early interactional history, reflecting the dominant quality of mother-infant engagement during the infant's first year.

Later attachment researchers continued to explicate maternal behavioral correlates linked to distinctive categories of insecure infant attachment. In general, infant attachment insecurity has been linked to maternal insensitivity, involving less accurate perceptions and interpretations of infant behavior and signals, less appropriate and

contingent responding to infant cues, decreased responding to infant crying, and decreased displays of affection (Ainsworth, 1978; Isabella & Belsky, 1991).

Over 72 hours of home observation spread throughout the infant's first year, Ainsworth and colleagues (Ainsworth et al., 1978) found mothers of future insecure-avoidant (A) infants to be more physically intrusive and disruptive, more avoidant of close physical contact, more verbally rejecting, more negative, more angry, critical, irritable, hostile, and to display less positive affect. Several later studies also linked avoidant (A) patterns of infant attachment with heightened maternal intrusion, hostility, and rejection, while also observing higher degrees of overall maternal involvement, stimulation, overstimulation, and, vocal engagement, yet vocally less contingent with infant vocalizations or behavior (Belsky, Rovine & Taylor, 1984; Isabella & Belsky, 1991; Cassidy & Berlin, 1994). In general, the mother of the avoidant (A) infant is found to discourage attachment seeking behaviors, while encouraging autonomy and exploratory behavior.

In contrast, insecure-resistant (C) infant attachment status has been linked to maternal under-involvement, lack of verbal and interactive engagement and responding (Belsky, Rovine & Taylor, 1984; Isabella & Belsky, 1991), inconsistent responding to infant cues, (Ainsworth, et. al.,1978; Belsky, Rovine & Taylor, 1984; Isabella & Belsky, 1991; Cassidy & Berlin, 1994), less contingent and sensitive maternal behavior, less affection, less responding to infant crying and distress (Ainsworth et al., 1978; Belsky, Rovine & Taylor, 1984), and disruptions during autonomous activity (Ainsworth, et. al.,1978; Cassidy & Berlin, 1994). So in general, while mothers of ambivalent (C) infants have evidenced a pattern of decreased overall availability and consistency, they have

displayed elevated responsiveness and behavioral interfering during moments of independent infant exploration. Thus, the behaviors of these mothers has vacillated from neglectful (Egeland & Sroufe, 1981) to intrusive (Cassidy & Berlin, 1994), and in doing so has served to promote infant attachment seeking behaviors while discouraging autonomy.

While early research linked attachment with global measures of maternal sensitivity, in an extensive meta-analysis van IJzendorn (1995) found that maternal sensitivity accounted for only a moderate proportion of the variance in infant attachment status. Later theorists aimed to delineate more detailed accounts of maternal and infant correlates and antecedents to attachment. To this end, researchers eventually began engaging in more descriptive studies to empirically document different aspects of the overall mother-infant exchange.

Infant Research

Developmental and infant researchers (e.g., Tronick, Stern, Beebe, Trevarthen, Murray) began looking at the parent-infant interaction on a more micro level, engaging in frame-by-frame analysis, and examining more discrete segments of the exchange. Through microanalytic studies of mother-infant interaction, the link between maternal and infant behavior was empirically confirmed (Cohn & Tronick, 1989, Field et al., 1988; Field, Healy, Goldstein, & Guthertz, 1990, Stern, 1971; Beebe & Cohen, 1991). The Mutual Regulation Model, which highlights the dyadic nature of mother-infant interactions, points to the moment by moment influence of one partner's behavior on the other, and of the infant's process of continually adapting to the mother's changing

behavior in an effort to maintain a state of attunement or connection (Beebe and Lachman, 1988; Gianino & Tronick, 1988, Tronick, 1989).

Research has shown that infants come into the world with an array of specific capabilities that equip them to act on and influence their environment, elicit caregiving, and propel the mother-infant bond. Research verifies that infants are endowed with the ability to affectively communicate and respond to maternal behavior, and in doing so, will impart their desire to either alter or sustain a given maternal action (Gianino & Tronick, 1988). Through qualitative and affective aspects of behavior, a mother conveys to her infant the extent to which she has attuned or misattuned to her child's affective communication and internal feeling state (Stern, 1984). Studies show that infants will work to repair interactional errors or mismatched affective states by engaging in a variety of behaviors (Brazelton, Koslowski & Main, 1974). When unable to effect an interactional change, however, or to achieve a state of synchrony, infants may exhibit heightened levels of distress, withdrawal or dysphoria (Tronick, Als, Adamson, Wise, & Brazelton, 1978; Stern, 1984; Massie, 1982).

Microanalytic studies were able to observe the scope and intensity of affect exhibited by mothers and infants, as well as the extent of contingency, synchrony, and matching of mother-infant affects and behaviors. Contrary to the earlier idealized models of interaction, involving images of highly positive, sensitive, and synchronous parents and children, research has found that it is much less likely to find a dyadic system always in tune, and more likely to find a system with errors, working again and again to repair and come back together (Gianino & Tronick, 1988; Tronick, 1989; Beebe 2000, 2006; Beebe & Lachman, 1994,). Reparation, which can be measured by the rate of change

between matching and mismatching states is one way to understand how relationships are organized. According to Tronick (1989; Cohn & Tronick, 1987) typical mother-infant interactions are characterized by recurrent moves between coordinated and miscoordinated states, such that healthy development requires the repeated reparation of interactive errors and the ongoing conversion of negative affect into positive affect. While positive affect is evidenced when an infant achieves his goal, negative emotions arise, according to Tronick, when infants are not successful in obtaining their desired aim. A distressed infant's inability to elicit a coordinated or attuned response from his caregiver would thus be likely to promote more negative affect. As Tronick (1989) goes on to explain, when infants become "stuck in affectively negative miscoordinated interactive states and their messages calling for change are disregarded" they are left with heightened states of negative affect to manage on their own (p.116). Tronick (1989) maintains that when such situations persist, infants become absorbed by self-regulation at the expense of interactive engagement, setting the stage for defensive modes of coping with negative affect and the development of pathological processes.

Beebe adds that infants who experience a chronic inability to repair interactional errors or mismatched states, are likely to form expectancies (Beebe & Lachman, 1988, 1994; Beebe, Lachman & Jaffe, 1997) that their behavior has little impact on others, and internalize a sense of helplessness and ineffectance that may be carried into subsequent interactions, including interactions with more sensitive and responsive partners (Gianino & Tronick, 1988, Kramer, 2001, Phelan, 2001).

Unable to rely on their mothers to help regulate affective states, such infants may be left with heightened states of distress to manage on their own, and may become

preoccupied with self-regulation at the expense of interactive regulation. With limited means for coping with such extreme states of arousal, these infants may exhibit disturbances not only in their interactions with others, but also in their ability to regulate their affect and distress. Infant research has shown growing evidence that self-regulatory difficulties in infancy (i.e., a disturbed capacity to regulate behavior and state) may be predicted by maternal behavior, specifically disrupted affective communication between mother and child during the first year of life (Field et al., 1988; Cohen & Tronick, 1989; Malatesta, Culver, Rich, and Shepard, 1989; Leadbeater, Bishop, & Raver, 1996). Whereas maternal attunement and responsiveness has been found to help contain and enhance an infant's capacity to attend and become motorically and behaviorally organized, insensitive or unresponsive mothering has been shown to impede this process (Brazelton et al., 1974). As demonstrated in Tronick et al.'s (1978) still face paradigm, when a child is unable to elicit a reaction from the parent they will initially work harder to do so. However, after a prolonged period of unresponsiveness, they tend to withdraw and become listless.

Emotional Regulation: Theories and Research

To begin to understand the construct of emotional regulation, it is useful to examine how this concept has been described and defined in the literature. For Calkins (1994), the construct of emotional regulation refers to the processes and strategies involved in regulating emotional arousal. Expanding on this view, Thompson (1994) defines emotional regulation as "the extrinsic and intrinsic processes responsible for

monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (pp. 27-28).

According to Thompson (1994), emotional regulation pertains not only to the ability to inhibit and calm, but also the ability to sustain and heighten emotional responses. His notion of emotional regulation reflects an individual's overall capacity to modulate emotions in the service of desired aims. While the process of emotional regulation is dependent on a self-regulating capacity, it is highly influenced by the availability of significant others to help regulate states of arousal.

In childhood as well as adulthood, the capacity for managing and regulating emotions has been linked to successful functioning in the spheres of socialization, behavior, and cognition (Thompson, 1994). The inability to adequately regulate emotions has been linked to disruptions and disturbances in these same areas of functioning (Cole, Michel & Teti, 1994). In fact, Cole et al. point out that emotional dysregulation is a primary trait among diverse forms of psychopathology and DSM disorders. Taylor, Bagby, & Parker (1997) go as far as to state that affect dysregulation is at the root of virtually all psychiatric illness. Glucksman (2000), too, maintains that "disorders of affect regulation are found across virtually the entire psychopathological spectrum including bipolar, personality, anxiety, depressive, and dissociative disorders" (p. 263). As the literature explains, over time, characteristic ways of regulating emotions or evidence of emotional dysregulation tends to become an increasingly stable feature of one's personality organization (Thompson, 1994).

What is optimal emotional regulation?.

There are different ways to understand what may be optimal forms of emotional regulation. Thompson (1994) purports that "emotional responses must…be flexible (rather than stereotypical), situationally responsive (rather than rigid), and performance enhancing (rather than over- or underarousing) and must change quickly and effectively in order to adapt to changing conditions if they are to support organized, constructive functioning in higher organisms" (p.26). His notion of optimal emotional regulation includes the ability to manage emotions in the service of desired outcomes while also recognizing that optimal emotional regulation is a process that includes "the enlistment of strategies that permit flexibility, quick reappraisals of emotionally provoking situations, access to a broad range of emotions, and efficient goal-directedness" (p.46). Thompson concedes, however, that what is viewed as optimal emotional regulation may be situation specific, dependent on goals that are individually and culturally valued, and not easily defined in a global, and all-inclusive manner. Thus, what appears to be an optimal example of emotional regulation in one circumstance may, under alternate circumstances, be deemed as emotional dysregulation.

What is being regulated?

At the root of emotional regulation is the capacity to regulate underlying states of neurophysiologic arousal (Thompson, 1994). Beneath the arousal of emotion and the ability to master such fluctuations, there are neurophysiological processes that must be mastered. However, the ability to gain control over these processes remains contingent on the gradual maturation of neurophysiological systems.

As maturation unfolds, there are additional factors and capacities that come to impact how the growing child regulates emotion. How one attends to or disengages from emotionally arousing stimuli, how one interprets emotionally arousing stimuli, and how one interprets physiological indicators of emotional arousal all have bearing on emotional regulatory functioning (Thompson, 1994). While these capacities may be affected by extrinsic regulating forces early on (e.g., parents), they come to be facets of what is internally regulated over time.

Infant capacities for regulating emotions.

In early infancy, the newborn possesses an immature nervous system, and has few means for independently regulating states of arousal (Brazelton & Yogman, 1986, Thompson, 1994). During the first months of life, the infant also lacks control over processes of activation and restraint (Thompson, 1994). As neurophysiological development progresses, however, the infant gains greater means to rein in and control behavior and emotions. There is also a growing ability to process and incorporate external regulatory pressures. As the neurophysiologic systems mature over the first year, there is a gradual stabilizing process that occurs, so that states of arousal become increasingly more nuanced and specific. Automatic reflexes gradually drop away, and sleep-wake cycles begin to regulate.

By 4 months, coincident with developments in the cerebral cortex, infants display emerging capacities for inhibiting arousal, while simultaneously displaying more organized patterns of behavior (Thompson, 1994). Actions such as turning or looking away, sucking, hand to mouth, or fingering clothes are early means for reducing some of

the heightened or over-arousing states of internal stimulation (Field, 1981). As physiological systems develop and become more organized and coordinated, the infant gains increasing capacities, not only for managing more complex physical movements, but also for regulating his state.

Rothbart (cited in Thompson, 1994) has found that, as infants exhibit higher levels of neurophysiological organization, they begin, somewhere near 4 months, to reveal improved command over visual stimulation. Able to sustain improved attention to both people and objects, they begin to demonstrate the capacity for smiling and laughing in response to social stimulation. They also start to gain control over the visual input that they take in and block out (Field, 1981). This is a significant milestone, which enables infants to disengage from over-arousing or disturbing stimuli, and contrasts with earlier periods when they lacked any means to do so. As this development occurs, infants gain the ability to be distracted or redirected by visual stimuli. This developmental gain provides the parent or caregiver with a new means to help emotionally soothe and regulate the distressed infant. As infants get older, they gain more complex means for regulating their own emotions, through visual and attentional engagement and disengagement to what is over or under arousing and dysregulating. Toward the end of the first year, developments in the frontal lobe support even greater control over states of arousal, increased emotional responsivity, decreased lags in emotional response time, and intensified expressions of discrete emotions.

The mother as psychobiological regulator.

It is widely recognized that the capacity to regulate internal states of arousal is not present at birth, but an accomplishment that develops over the course of infancy (Dodge & Garber, 1991; Kopp, 1989; Hofer,1987, 2006; Schore, 1994, 2002). For Kopp (1989), the regulation of internal states is a developmental achievement, initially accomplished externally, in interaction with the caregiver, and over time, a process the infant learns to manage more successfully on his own.

As Hofer (1987, 2006) has explained, the nervous system is not yet fully developed at birth and the maturation and development of the nervous system and of an infant's capacity for physiological/ autonomic regulation (i.e., regulation of internal body processes such as blood pressure, heart rate, blood flow, hormones) is highly dependent on an infant's experiences with his external environment, and in particular with the caregiver. Hofer has described the primacy of the primary attachment relationship in influencing the development of physiological regulation.

Schore (1994), too, describes the mother as the infant's "psychobiological regulator," who serves to moderate levels of arousal. In doing so, he explains, she helps to shape and regulate the infant's physiological systems and rhythms of behavior. As he explains, "Maternal sensitivity acts as an external organiser of the infant's biobehavioral regulation" (2002, p. 13). For Schore, attunement is a form of external regulation of the infant's affect and emotions. When a mother attunes to her infant's rhythms and coordinates with his behavior, responding contingently to his cues and internal states, the infant experiences positive affects and becomes internally regulated. Misattunements, he explains, however, activate in the infant states of stress and dysregulation. These states, though, can be repaired, as the mother reattunes to the infant's state, helping him to re-

achieve a state of regulation. Where biobehavioral regulation was initially supported externally, he affirms, the capacity eventually becomes internalized.

Schore (1994) further articulates how the early social interactions between infant and attachment figure have a substantial influence on the developing structures of the infant's brain. Research has indicated that there is a decisive period of brain development and organisation in the first year of life, and that relational experiences during this time play a critical role in shaping the structure of the brain (Schore, 2002). Schore refers to this shaping as "experience dependent maturation of the right brain".

While synchronous and coordinated interactions of secure mothers promote growth in the developing central nervous system, the autonomic nervous system, as well as in the limbic system, early and extreme exposure to stress compromises the maturation of these systems. The right prefrontal cortex controls the ANS, which activates the body in response to stress, stimulation and threats (sympathetic), and subsequently, through parasympathetic activation, slows the body's functions (heart rate, blood pressure, breathing), thus overseeing all physiological reactions to external stimulation.

This system, the right prefontal cortex, functions as the primary control center and inhibitor of behavior, and the capacity for affect regulation, emotional expression and inhibition is seated in this area, as is the capacity for experiencing a coherent sense of self. As the development and maturation of the right cortex is strongly impacted by the dyadic exchanges of the attachment relationship, the growth of this system is powerfully related to the child's ongoing ability to self-regulate emotions, cope with stress, and assess others' emotional states. Research has shown that early relational trauma, or infant maltreatment in the form of abuse or neglect, adversely affects the experience dependent

maturation of the right brain, impairs the emotional and affective inhibitory and regulatory capacities, and hinders the stress managing function of the right prefrontal cortex. Such early adversive experiences predispose a child to increased vulnerability throughout their life. In fact, those found to be at risk for PTSD are those with malfunctioning orbitofrontal systems, and early histories of relational trauma (Schore, 2002).

Attachment as a measure of emotion regulation.

According to attachment theory, the goal of attachment is proximity seeking, and this closeness reduces fear and ensures a state of inner calm. For Sroufe & Waters (1977), more than proximity itself, it is the achievement of "felt security" that is the true aim of attachment behavior. Although not a view of early attachment theorists, in striving for *felt security* attachment behaviors might be seen as infant efforts to reestablish a state of internal homeostasis and regulation. As felt security can be achieved not only from proximity, but also from expectations of an available and responsive caregiver via an internal working model of attachment, expectations of parental availability and responsivity might also be deemed to influence a child's capacity for self-regulation.

This notion began to be articulated by attachment theorists in 1994, as Jude Cassidy went on to describe attachment as a measure of emotion regulation. Incorporating Thompson's 1994 notions of emotional regulation, Cassidy described emotional regulation as resulting from an interaction of internal and external factors, and involving the dampening or intensifying of emotional expression and the regulation of attention. According to Cassidy, distinct patterns of regulating emotions are aimed at a

singular goal: ensuring contact and protection from an attachment figure, who conveys particular messages regarding acceptable modes of emotional expressivity and relatedness. Thus through parental responses, a child learns the reactions or consequences associated with distinctive emotional displays. Based on an attachment figure's distinctive style of caregiving, an infant develops characteristic strategies of behavior to ensure they will maintain contact with and protection from that significant other. Based on repeated experiences of a caregiver's response to distinctive displays of emotion, infants may learn to either heighten or dampen feeling states in order to elicit and maintain contact and protection from the attachment figure. For Cassidy, the way an infant regulates emotion is a primary means for maintaining contact with a particular attachment figure, and is related to that caregiver's style of caregiving. Thus, infants with avoidant attachment styles are seen as dampening or suppressing affect, while infants evidencing ambivalent-resistant attachment styles are apt to heighten affect. In contrast, the securely attached child, who stands in the middle of these two extremes, is able to self-regulate affect without needing to heighten or dampen his affective response.

Maternal affect containment & regulation.

For Slade (Slade , Grienenburger, Bernbach, Levy & Locker, 2005), it is the mother's reflective function, her capacity to understand and reflect on the infant's mental state, which gives the infant the felt experience of comfort and soothing, and "is at the heart of sensitive caregiving" (p.271). As elucidated by Bion, when the mother is able to take in, reflect on, and mirror back the infant's internal distress, she "transforms the

unpleasant sensations and provides relief for the infant who then reintrojects the mitigated and modified emotional experience" (cited in Gergely & Watson, 1996).

Building on Bion's theory of maternal affect containment and regulation, Fonagy & colleagues (Fonagy, Gergely, Jurist, & Target, 2002) stress the vital import of contingent and *marked* affective mirroring, whereby the parent mirrors back, through verbal, nonverbal means, or both, a re-presentation of the infant's own emotional expression in a marked or emphasized form. In distinguishing the parental communication as a reflection, marked mirroring not only enables the infant to recognize the re-presented affect as his own and helps the infant, through repeated experience, to come to know himself, but in the immediate moment, contingent and marked mirroring aids the infant to make sense of his feelings, calms and settles the infant's state of affective arousal, and is emotionally organizing and containing.

For Fonagy and colleagues, the parental propensity to make sense of and adequately contain the infant's negative affect states by representing them back to the infant in a comprehensible and more manageable form is at the core of infant attachment security, while the lack of contingent affective mirroring and marking is believed to underlie attachment disorganization (Fonagy & Target, 1998; Fonagy et. al, 2002). As an aspect of maternal attunement, contingent and marked maternal mirroring is recognized as a form of external regulation of the infant's affects and emotions, while maternal misattunement, and the absence of contingent and marked mirroring is deemed to activate states of stress and dysregulation in the infant.

Research has shown that a mother's proclivity to respond coherently to her infant's distress is related to the mother's reflective functioning (Grienenberger, Kelly &

Slade, 2005), with mothers of insecure and disorganized infants exhibiting significantly less reflective capacity than mothers of secure infants (Slade et. al., 2005). With little reflective function, mothers are unlikely to recognize that their child possesses internal thoughts and feelings, and that these inner states relate to the child's behavior and actions. Not surprisingly, mothers with decreased reflective capacity have been found to engage in more anomalous maternal behavior with their year-old infants (Grienenberger, Kelly & Slade, 2005).

It has been suggested that mothers who lack the capacity to reflect on and make meaning of their infant's behavior or distress may be more likely to become affectively dysregulated in the face of infant upset (Grienenberger, Kelly & Slade, 2005). The capacity to mentalize and to perceive negative thoughts and affects as mental states and not reality enables these states to be reflected upon, contained, and transformed. Through this process, affect is regulated. Mothers, however, who have not adequately worked out their own intrapsychic conflicts, and who are unable to tolerate their own negative affects, may have marked difficulty tolerating their infant's negative affect states (Fonagy et.al., 2002). Fonagy and colleagues predict that mothers with unresolved internal conflicts, who have difficulty regulating their own affects and who are unable to tolerate infant negative affect states (such as distress), are likely to respond to negative infant emotions with realistic negative responses, which are devoid of markedness and/or affectively non contingent.

Disorganized Attachment

In 1986, Main & Solomon first described an insecure-disorganized pattern of infant attachment to identify a large group of infants who had been unclassifiable in the Strange Situation. These infants could not readily be placed into one of Ainsworth's 3 original categories of attachment due to indices of peculiar, atypical behaviors, and the absence of a singular, coherent goal-directed strategy of coping in the face of attachment related stressors and fears. As Main & Solomon (1990) explained, these infants "did not appear to resemble one another in coherent, organized ways. What these infants shared in common was instead bouts or sequences of behavior which seemed to lack a readily observable goal, intention, or explanation" (p.122).

Main & Hesse (1990) suggested that these infants seemed to be struggling with an irresolvable dilemma, in that the attachment figure they were turning to for safety and comfort seemed, at the same time, to be inducing in them terrifying states of fear. Unable to find a satisfactory solution to resolve this dilemma, they were observed engaging in an array of bizarre, disoriented and contradictory behaviors. Following their mother's return, for example, many of these infants displayed incompatible behaviors, such as moving toward their mother (proximity seeking), with their head averted (avoidance). They also exhibited many undirected or incomplete movements, behavioral stilling, freezing, flapping, rocking, spinning, dazed and sullen expressions, as well as moments of appearing fearful and apprehensive toward their mother.

To be classified with a disorganized attachment, according to Main & Solomon's system, an infant had to display multiple or strong indices of disorganization from among the following inventory: 1) contradictory and conflictual behaviors displayed simultaneously 2) or sequentially; 3) undirected, incomplete or interrupted movements

and expressions; 4) disordering of expected temporal sequences; 5) stereotypies, asymmetrical movements, mistimed movements and anomolous postures; 6) direct indices of confusion and apprehension regarding the parent; 7) behavioral stilling, freezing, slowed movements and expressions (Main & Solomon, 1990).

According to Lyon-Ruth (1999), an organized attachment strategy can remain intact as long as it ensures a minimal level of responsivity, protection, and soothing from the caregiver. When a parent is exceedingly unavailable or inconsistent, however, and no single pattern of behavior succeeds at eliciting the most basic level of comfort or protection, an organized strategy of attachment cannot be sustained. Under such conditions, the child is left without any external protection or support amidst overwhelming states of fear or distress and is likely to resort to defensive strategies, such as deactivation and defensive exclusion, to segregate such painful experiences from conscious awareness (Solomon & George, 1999).

Origins & antecedents of attachment disorganization.

Disorganized attachment was originally observed in Main's middle class, low-risk sample, yet was found to be most prominent in high-risk, maltreatment samples, where 80% of the infants evidenced indices of disorganized behavior (Carlson, et.al., 1989). Attachment disorganization was also observed in 17% of socioeconomically matched controls, and in 15% of low-risk samples. Among samples of depressed or alcoholic mothers, 40-50% of the infants evidenced disorganized attachments (Hesse &Main, 1999). Attachment disorganization, however, was not found to be consistent across attachment figures, suggesting that attachment disorganization reflects the quality of the

infant-parent relationship, rather than a function of any inherent quality within the infant (Main & Solomon, 1990; van IJzendoorn et al., 1999).

In seeking to elucidate antecedents to infant disorganization, Main & Hesse (1990) recognized that disorganized indices in the Strange Situation were strongly predicted by a parent's unresolved memories of attachment related loss or trauma on the Adult Attachment Interview (AAI, Main, Kaplan & Cassidy, 1985). Unresolved parental trauma was reflected in lapses in the monitoring of discourse or reasoning on loss or trauma-related segments of the AAI, pointing to a parent's own "disorganized working model of attachment" (Lyons-Ruth, Yellin, Melnick & Atwood, 2005, p.2). Lyons-Ruth and colleagues suggest (Lyons-Ruth, et al,. 1999a) that where there is unresolved maternal trauma or loss, segregated mental contents and unexamined attachment related fears will become activated in the presence of infant fears and distress. Due to the inevitable arousal of a mother's own overwhelming states of unresolved fear, a mother with unresolved loss would likely be less able to attune to her infant's attachment behavior and fear based cues. The stronger a mother's need to prohibit arousal of her own negative affect and segregated mental content, the less she would be observed affectively attuning to her infant's attachment needs and signals, and responding sensitively and contingently. Lyons-Ruth and others (Lyons-Ruth, Yellin, Melnick & Atwood, 2005) go on to conclude that "contradictory and unintegrated behavioral and mental processes [are] a core phenomenon of disorganized attachment relationships" (p.6) and a crucial feature in the intergenerational transmission of disorganization.

Main & Hesse (1990) went on to observe that parents classified with unresolved states of mind evidenced heightened levels of frightened or frightening caregiving

behavior with their infants. They suggest that terrifying parental behaviors may mediate unresolved maternal loss in the intergenerational transmission of attachment disorganization. The arousal of fear, generated by frightened or frightening parental behaviors is deemed to set in motion contradictory, competing, and irreconcilable urges to both approach the attachment figure, who is the locus of protection and comfort, and to flee from the attachment figure, who is at the same time the source of terror. This internal struggle is seen to bring about the dissolution of a cohesive behavioral strategy, which is the hallmark of attachment disorganization.

Outcomes & sequelae of attachment disorganization.

It is now well-documented that infants with disorganized attachments are at the greatest risk for a host of detrimental outcomes throughout childhood, adolescence and into adulthood. Disorganized attachment status leaves a child highly vulnerable to later stressors (Carlson, 1998), and is predictive of emotional difficulties and behavior problems during school age years and high school (Carlson, 1998; van IJzendoorn et al., 1999); lowered self esteem (Cassidy, 1988), impaired social relationships (Jacobvitz & Hazan, 1999); oppositional defiant disorder (Greenberg, 1999); cognitive impairments, including poor school readiness (Stacks & Oshio, 2009), executive functioning deficits marked by deficiencies in planning, organizing, processing, and inhibition (Horvath, 2007), lowered academic confidence, lowered reasoning capacities, and weaker math skills (Lyons-Ruth & Jacobvitz, 1999), elevated PTSD symptomology at school age (MacDonald et al., 2008), dissociative symptomology during childhood and adolescence(Carlson, 1998), psychopathology diagnoses during late adolescence (Carlson,

1998), dissociative disorders (Liotti, 1992; 2004); Borderline Personality Disorder (Fonagy et. al., 1995; Levi et. al., 2006; Diamond, D., Yeomans, F.E., Clarkin, J., Levy, K., & Kernberg, O., 2008), and psychopathology and personality disturbance in later life (Lyons-Ruth & Block, 1996, Lyons-Ruth & Jacobovitz, 1999, Carlson, 1998, Solomon & George, 1999).

Attachment disorganization during infancy is also predictive of disturbances in the mother-child relationship at 2 and 4 years (Carlson, 1998) and of controlling interactions at 6 years (Main & Cassidy, 1988). In the toddler years, disorganized dyads are characterized as having more discordant and misattuned interactions (see Lyons-Ruth & Jacobvitz, 1999c), and disorganized toddlers are more aggressive, combative, and rejecting. Mothers of disorganized toddlers are significantly less responsive and agreeable to their children's requests. From 5-7 years, disorganized dyads display more dysfluent, asynchronous exchanges, and mothers are assessed to be less emotionally available at 7 years. At 6 years, disorganized infants no longer appear behaviorally disorganized (Main & Cassidy, 1988), and display either a controlling-punitive or controlling-parentified style of engaging with their mothers. However, they continue to produce fearful/disorganized responses to images of parent-child separation, become silent and inhibited in the face of attachment related themes, and reveal frightening and helpless catastrophic fantasies. When disorganized mother-infant dyads are observed during this stage, Solomon & George (1999) describe "a relationship that is characterized by mutual feelings of helplessness and clear evidence of segregated or dysregulated representational processes in both mother and child" (p. 17).

Anomalous parenting: parental behavioral correlates of attachment disorganization.

Building on Main & Hesse's theory that infant attachment disorganization arises within a caregiving environment characterized by the paradoxical situation of "fright without solution", marked by frightened or frightening parental behavior, Lyons-Ruth and associates went on to identify two additional features of parental behavior expected to perpetuate infant fear and result in disorganization of coherent attachment strategies. The first parental correlate they identified was "extreme parental misattunement" to an infant's attachment related cues and exchanges (Lyons-Ruth & Jacobvitz, 1999c, p.531). What this behavior referred to was a parent's persistent and critical failure to adjust their caregiving behavior to respond - in a relevant and satisfactory manner - to clear, unambiguous, recurrent infant cueing. The second parental behavioral correlate of disorganization they introduced was "competing strategies", which referred to a parent's conveying contradictory messages and communications within the same exchange (e.g., simultaneously encouraging and discouraging the infant's approach). Both of these styles of parental engagement, when of a chronic nature, are predicted to arouse in the infant extreme and overpowering states of negative affect, which the infant is then left to manage on his own. This heightened state of affective "dysregulation" is expected to result in the breakdown of any organized strategy of coping.

Lyons-Ruth and colleagues (1999c) went on to stress the added importance of "balanced" interactive exchanges. They predicted that highly imbalanced patterns of relating, marked by the overriding of infant initiatives, and devoid of mutual give and take, would leave the infant devoid of control or impact in the relationship. This lack of

control and inability to have an impact on the caregiver was again expected to activate overwhelming, unregulated states of stress and fear, promote contradictory internal models, and be predictive of attachment disorganization. In each of these scenarios of anomalous parental behavior, what is perpetuated in the infant is heightened states of unrepaired negative affect.

Relation between early caregiving relationship, affect regulation, and disorganization.

According to Schore (2002, 2006), attachment disorganization reflects a severe and chronic deficit in affect regulation, arising from an inability to repair chronically dysregulated states of heightened negative affect. Whereas maternal attunement is a form of external regulation of the infant's affect and emotion, maternal misattunement activates states of stress and dysregulation in the infant. Mothers of disorganized babies, who are viewed to chronically misattune, don't help to organize the infant, but instead engage in behaviors that create states of mutually escalating overarousal. As Schore explains, "in the infant brain, states become traits" (2002, p.18), thus, disruptive early interactive experiences produce long-term, characteristic modes of being, on a brain that is in the process of rapid growth and development. DeOliveira, Bailey, Moran & Pedersen (2004) agree that disorganized attachment may signal "a fundamental dysregulation of emotion" (p.438), along with an incoherent representation of the attachment figure.

Research has indeed shown that children with disorganized attachments display heightened physiological markers of stress, including elevated heart rate and cortisol levels in response to maternal separations (Spangler & Grossman, 1993; 1999). While

experiencing pronounced negative affect, children with disorganized attachments are not able to regulate and manage this affect in any adaptive way.

While security of attachment has been recognized as the most optimal pattern of regulating affect, avoidant and ambivalent attachment patterns, though forms of attachment insecurity, also represent organized and stable patterns of behavior. They reveal coherent strategies of heightening or dampening affect in an effort to optimize maternal caregiving and responsiveness, based on predictable patterns and expectations of maternal responding (Cassidy, 1994). And so these patterns, although insecure, reflect predictably consistent ways of regulating affect. In contrast, disorganized attachment represents not only a complete breakdown in any organized strategy of behavioral interaction with the attachment figure, but the lack of any consistent mode of regulating emotions in times of crisis and stress. The "behavioral and physiological dysregulation" (Lyons-Ruth, Bronfman & Atwood, 1999a) evidenced by disorganized infants has been attributed to elevated and unrelenting states of negative affect that remain unrepaired due to the infant's chronic inability to have an impact upon the caregiver. The maternal capacity to repair interactive errors and mismatched states and the ongoing conversion of negative affect into positive affect is what has been found to be most significant (see Cohn & Tronick, 1987; Tronick, 1989, Beebe, 2000).

Segregated mental contents and defensive exclusion.

Through an internal working model of attachment (Bowlby,1969, 1982), a child internalizes not only a representation of what they have experienced and have come to expect in terms of their attachment partner's availability and responsiveness, but an

image of their own worth as judged from how they have been treated by their significant other. Internal working models of attachment relationships will also impact how a child acts and experiences all future relationships. When a child is cared for and protected by a sensitive, committed and consistent partner, and feels loved and protected, they are likely to internalize a nurturing available other, who is expected to be there to meet their needs. Under such conditions, the internalized representation of both the attachment figure and the self are likely to be sufficiently compatible (Belsky & Cassidy, 1994; Fonagy et al., 1995).

When attachment behaviors, however, do not succeed in drawing forth the much needed caring object, the child is likely to feel rejected and unloved. It is then likely that defensive strategies will be erected to bar this information from awareness (Solomon & George, 1999). When a caregiver is highly punitive, critical, violent, and/or unresponsive, there are bound to be multiple representations of self and other that are inconsistent and hard to assimilate. Profoundly disturbing realities are then likely to be split off (Liotti, 1999; Solomon & George, 1999).

As Fonagy et al. (2002) have described, this defensive process enables the young child to get by without having to confront the reality that one they love and depend upon may possess hateful thoughts and intentions toward them. This refusal to think about the contents of another's mind, however, may not only impair one's reflective function, that is their capacity to mentalize and to make sense of their own and others' behavior, but "…leaves them to operate on inaccurate, schematic impressions of thoughts and feelings… [making them] immensely vulnerable in intimate relationships" (p.394). Aware that there is a large segment of personality disordered patients with histories of

chronic abuse who survived their early years by not thinking about the contents of their abuser's mind, Fonagy and his colleagues maintain that a disturbance in reflective function may not only be related to a history of trauma and abuse, and of a negative internalized object, but may be a predictor of personality disorders in later adulthood.

Main and colleagues (Main & Hesse, 1990; Hesse & Main, 1999) have added that a range of frightened and frightening "FR" maternal behaviors, displayed by disorganized mothers, such as withdrawal and trance-like states, are indicative of the mothers' internal preoccupation with traumatic memories, which are encapsulated or dissociated, and greatly interfere with their capacity to interact. Such episodes may be triggered in any instant, by an idiosyncratic association to something in the external environment, by a dissociated and unprocessed thought, or by a memory, highlighting the mother's continual state of internal fear and mental fragmentation, which may be unexpectedly conveyed to the infant via frightened or frightening interactive parental behavior. According to Hesse & Main (1999), frightening maternal behavior becomes disorganizing for an infant, when the source of fear is internal to the parent, not due to a clearly identifiable source, seems to appear unexpectedly from out of nowhere, and is not readily understood by the infant.

The AMBIANCE coding system: Assessing disturbances in mother-infant affective communication.

In 1999, Karlen Lyons-Ruth and her associates, Elisa Bronfman and Elizabeth Parsons set out to test the prominent theories concerning parental behavioral correlates of infant attachment disorganization and constructed the Atypical Maternal Behavior

Instrument for Assessment and Classification (AMBIANCE) (Bronfman, Parsons, & Lyons-Ruth, 1999). The AMBIANCE was built on Main & Hesse's (1990) theory that frightened and/or frightening maternal caregiving behavior was the link between unresolved maternal loss or trauma (as revealed during the Adult Attachment Interview) and disorganized infant attachment. This model rests on the assumption that disorganized infant behavior stems from an irresolvable dilemma that arises when an infant attempts to seek comfort and protection from an attachment figure, who is, in that very moment, the very source of danger and fear from whom they are seeking to flee. Main & Hesse's major hypothesis was that unresolved mothers exist in a continual state of fear and mental fragmentation, exhibiting frightened or frightening behavior when interacting with their infants.

In addition to Main & Hesse's hypothesis that infant attachment disorganization arises within a caregiving environment characterized by the paradoxical situation of "fright without solution", the AMBIANCE rests on two additional and interrelated hypotheses. Both of these describe additional and distinct facets of maternal interactive behavior expected to perpetuate infant fear and result in the disorganization of coherent strategies of attachment. In the "failure of repair" hypothesis, Lyons-Ruth proposes that "extreme parental misattunement" to an infant's attachment related cues and exchanges, and persistent failure to adjust caregiving behavior and respond in a relevant and satisfactory manner to clear, unambiguous, recurrent infant signaling and expressions of distress will lead to heightened states of infant fear and helplessness, and to a breakdown of coherent attachment strategies (Lyons-Ruth & Jacobvitz,1999).

In the "competing strategies" hypothesis, Lyons-Ruth (Lyons-Ruth, Bronfman & Parsons, 1999) suggests that contradictory and conflicting parental messages within the same exchange (e.g., simultaneous or sequential efforts to both intensify and rebuff the infant's attachment related affects and behavior, such as threatening an infant while smiling), which are likely to be conveyed when a parent is fearful of her own longings for attachment, would again promote states of infant fear and helplessness, and lead to a breakdown of attachment strategy. Thus, regardless of whether parental behavior is in itself frightening or frightened, the parental inability to provide a minimal level of responsivity or care during moments of distress and/or need, and to adequately regulate and soothe heightened states of infant fear or distress is expected to result in the collapse of any organized strategy of coping and bring about disorganization (Lyons-Ruth & Spielman, 2004). For an infant to sustain an organized attachment strategy, it must work well enough to elicit a basic level of comfort and protection from the parent. The infant's inability, on the hand, to elicit a minimum of parental care or response during elevated moments of fear and distress is said to induce in the infant states of helplessness and sustained fear.

The development of the AMBIANCE grew out of Lyons-Ruth and her colleagues' (1999b) assessment that while extensive research had previously examined the relationship between maternal sensitivity and infant attachment, there was a lack of adequate research elaborating on the links between maternal *insensitivity* and infant attachment. In studying maternal correlates of high risk infants, they concluded that attachment security and organized attachment strategies may have less to do with maternal sensitivity and more to do with the absence of chronic and persistent patterns of

maternal *insensitivity*. Thus, in contrast to traditional approaches, which aimed at assessing maternal sensitivity in relation to the 3 organized categories of infant attachment, the AMBIANCE was designed to detect severe disturbances in maternal affective communication associated with infant disorganization.

From studies with maltreatment samples, where extensive maternal maltreatment and threat is present, up to 80% of infants had been found to display disorganized behavior (see van IJzendoorn et al., 1999). Within nonclinical samples, where approximately 15% of infants evidence disorganized attachment patterns, Main had proposed that less obvious forms of frightening maternal behavior, such as dissociative behavior or anomalous forms of frightened behavior may be the behavioral mechanism linking disorganized mental processes" and a "frightened mental state" to disorganized infant behavior (Hesse & Main, 1999). All of these maternal acts, Main pointed out, reflect a classic response to fear mimicking the actions of fight, flight, and freezing. In addition to engaging in frightening/threatening, frightened or dissociative maternal behavior, Main suspected that mothers with unresolved, dissociated, and unintegrated traumatic memories might also interact with their infants in a sexualized or role-reversed manner (Main & Hesse, 1990). Main termed this range of anomalous maternal behavior "FR" behavior.

Lyons-Ruth & Block (1996) extended this work by identifying additional characteristic responses associated with unresolved trauma. Incorporating defensive patterns detailed by Terr in the trauma literature, Lyons-Ruth & Block pointed to hostile-intrusive behavior reflective of identification with the aggressor, and a tendency toward numbing or disowning of painful affect as additional key sequelae of childhood trauma.

While hostile-intrusive maternal behavior was observed among mothers with histories of severe physical abuse, physically and emotionally withdrawing behavior in response to infant attachment seeking was observed among mothers with histories of sexual abuse.

Designed to evaluate the full scope of disturbances in mother-infant affective communication thought to be associated with disorganized infant attachment, the AMBIANCE is a comprehensive, clinical instrument. In the construction of the AMBIANCE, Bronfman, et al. (1999) attempted to compile a large list of atypical maternal behaviors theoretically and clinically associated with disorganized infant attachment. They incorporated all items from Main & Hesse's (1992) FR scale, *Frightening, Frightened, Dissociated, or Disorganized Behavior on the Part of the Parent*, which indexed a large array of frightened and frightening maternal behaviors, while also incorporating maternal behaviors that had been theoretically, clinically and empirically linked with unresolved trauma, parental maltreatment, and attachment disorganization. Items were further added from Sroufe, Jacobvitz, Mangelsdorf, DeAngelo, and Ward's (1985) *Boundary Dissolution Scales* and *Spousal Behavior Scales* to capture the range of role-confused behaviors observed during the coding of pilot tapes.

These behaviors were then sorted into 5 dimensions of disrupted caregiving behavior: (1) affective communication errors, (2) role/boundary confusion, (3) fearful, disoriented behavior, (4) intrusive/negative behavior, and (5) withdrawal, with lists of approximately 30-40 relevant behaviors specified within each dimension. These lists, however, were not intended to be exhaustive, and additional behaviors were encouraged to be added to these lists as observed during the coding of any individual protocol. The AMBIANCE scale was initially designed to assess maternal behavior in the Strange

Situation, during interactions with infants 12-24 months old. In addition to measuring the frequency of observed atypical maternal behaviors across each protocol, a global (1-7) Level of Disruptive Maternal Affective Communication score was determined for each parent. Based on these scores, each mother was classified as either "Disrupted" or "Not Disrupted". The AMBIANCE global score and parental classification are qualitative ratings, aimed to represent the gravity of atypical behaviors evidenced during an interactive protocol. Thus, protocols marked by few atypical behaviors yet of a severe nature would be captured in a global rating. The AMBIANCE initially incorporated a failure to repair score as well, a qualitative 3-point rating designed to judge each mother's capacity to repair interactive errors. This scale, however, was not found to sufficiently demarcate the construct intended, and due to its strong correlation with the Level of Disrupted Communication Scale, it was discarded as an independent measure.

The AMBIANCE scale was first utilized by Lyons-Ruth and her colleagues in a study involving 65 high risk mothers and their 18-month old infants assessed within the Strange Situation (Lyons-Ruth, Bronfman, Parsons, 1999). As anticipated, Lyons-Ruth and group found that mothers of disorganized infants evidenced significantly higher levels of disrupted affective communication than mothers of infants who demonstrated organized attachment strategies. While both frequency of atypical maternal behaviors and level of disruption were significantly related to the 9-point scale for level of disorganization, level of maternal disrupted affective communication significantly predicted disorganization, yet maternal classification status did not. Of the 5 atypical behavioral dimensions coded, disorganized mothers evidenced a preponderance of affective communication errors. Although 3 dimensions of atypical maternal behavior

were significantly correlated with level of infant disorganization. (affective communication errors, negative intrusive behaviors, and disoriented behaviors, the only dimension of atypical materials behavior that significantly distinguished mothers of organized from disorganized infants was affective communication errors (e.g., laughing in response to infant distress). While frightening and frightened maternal behaviors did significantly predict disorganized infant attachment in Lyons-Ruth's high risk sample, the broader base of AMBIANCE behaviors was found to more strongly predict attachment disorganization. These AMBIANCE findings were corroborated by naturalistic observations of the same group of high-risk mothers in interaction with their infants at home. The cross-situational stability of these findings underscored the hypothesis that atypical maternal behaviors linked to disorganized ratings are a pervasive feature of the dyadic exchange.

Several studies have employed the AMBIANCE to verify and expand on Lyons-Ruth's findings. Using the AMBIANCE to assess maternal behavior amongst a low-risk, well-educated, middle-class sample, Grienenberger (2001) replicated the above findings, and again demonstrated a strong connection between disrupted maternal behavior and disorganized 14-month infant attachment, with disorganized mothers exhibiting significantly higher frequencies of disrupted behavior. Grienenberger's study was also able to distinguish mothers of secure versus insecure infants using this measure; as well as identifying a strong negative correlation between a mother's disrupted caregiving behavior in the Strange Situation and her reflective functioning, that is her capacity to reflect on her infant's mental states. Several additional studies confirmed the link between infant disorganization and disruptive maternal behavior, as assessed via the

AMBIANCE at 12-18 months (Goldberg, Benoit, Blokland, Madigan, 2003; Forbes, Evans & Moran, 2004), at 24 months (Forbes, Evans & Moran, 2004), and most recently at. 4 months (Kelly, 2004).

In 2004, Kelly modified the original AMBIANCE (Bronfman et. al., 1999), to be able to assess disrupted caregiving behavior with infants under 6 months of age. Using her adapted AMBIANCE system (Kelly, 2004), Kelly was able to predict disorganized attachment classification at 14 months from 4 month mother-infant face-to-face exchanges. Specifically, mothers of disorganized infants exhibited higher (i.e., more disrupted) AMBIANCE scores at 4 months than mothers of infants with secure, ambivalent, or avoidant attachment strategies. Kelly also found stability between maternal behavior during 4 month face-to-face interactions and maternal behavior in the Strange Situation paradigm at 14 months, such that maternal classifications remained the same across time.

Following their post hoc, nonblind research investigations, Lyons-Ruth, Bronfman & Parsons (1999) went on to discover that there were several more serious interactive errors exhibited three times more often by mothers of disorganized infants. Among their sample of 18-month old infants, they could, with a low degree of error, more accurately distinguish organized from disorganized subgroups by categorizing those mothers who did not exhibit any of the more serious interactive behaviors separately from those mothers who exhibited the behaviors at least 4 times. Lyons-Ruth and colleagues further noted that disorganized mothers evidenced a preponderance of affective communication errors, and affective communication errors was the only dimension of atypical maternal behavior that significantly distinguished mothers of

disorganized from organized infants in their sample. Based on these observations, they recommended a refinement and simplification of the AMBIANCE scale to more easily identify high-risk dyads. Madigan et al. (2006) reiterated these recommendations, highlighting the need for an explication of "those components or behavioral indices of anomalous behavior that are most directly implicated in the development of disorganized attachment relationships" (p.106).

Summary of Literature Review & Statement of Problem

Infant attachment status has long been recognized as a powerful predictor of development during infancy, in later childhood, and into adulthood (Grossman, Grossman & Waters, 2005; Belsky & Cassidy, 1994).While attachment security has been linked to the most optimal outcomes across all spheres of development, insecure patterns of attachment have been linked to less optimal outcomes, with disorganized attachment linked to some of the most severe forms of psychopathology in later life.

Although attachment theory widely affirms the predictive link between patterns of early maternal interactive behavior and patterns of infant attachment, the early interactive context out of which disorganized attachment emerges is not yet fully explicated or established. While the association between parental sensitivity and security of attachment has been demonstrated in numerous studies (Ainsworth et. a;, 1978; Belsky, Rovine & Taylor, 1984; van IJzendoorn, 1995), the literature has shown that maternal sensitivity only accounts for a small variance in attachment security, and is not predictive of attachment disorganization (van IJzendoorn et al., 1999). As noted by Lyons-Ruth and Jacobvitz (1999), Ainsworth's global Sensitivity-Insensitivity scale "does not appear to be differentiated and specific enough regarding the affective communication involved in fear-related behavior to predict infant disorganization." (p.532)

Many studies have established a significant relationship between anomalous or "atypical" parenting behavior and disorganized infant attachment, yet in a meta-analysis involving 12 studies and 851 dyads, van IJzendoorn and colleagues (Madigan et. al., 2006) found a moderate effect size for the association between anomolous parenting

behavior and disorganized attachment. Although infants with histories of anomalous parenting had 4 times greater probability of receiving disorganized attachment ratings, much of the variance in attachment disorganization was not accounted for by anomalous parenting, as measured by studies employing the AMBIANCE and Main's FR scale. These authors suggest that the very breadth and extensive nature of these scales may inadvertently weaken the link between anomalous parenting behavior and disorganized attachment. They emphasize the need for an explication of "those components or behavioral indices of anomalous behavior that are most directly implicated in the development of disorganized attachment relationships" (p.106). Acknowledging the complexity of the AMBIANCE coding instrument, Lyons-Ruth (1999b) too, urges the development of a less complex coding tool for more easily distinguishing high risk interactive parental behaviors**.** Madigan et al. (2006) further concluded that the link between anomalous parenting and disorganized infant attachment was reduced when both were assessed within the context of the Strange Situation. In encouraging the assessment of anomalous parenting in alternate contexts it is also notable that very few studies have yet to assess anomalous parenting behavior prior to 12 months.

The literature has suggested that attachment disorganization arises within a caregiving environment characterized by the paradoxical situation of "fright without solution" (Main & Hesse, 1990), marked by frightened or frightening parental behavior. Expanding on this theory, Lyons-Ruth and associates went on to identify additional features of parental behavior expected to perpetuate infant fear and result in disorganization of coherent attachment strategies. Chronic maternal misattunements, evidenced by severe disturbances in a mother's ongoing ability to affectively attune to

her child, extreme patterns of maternal unavailability and lack of responsivity to persistent infant cueing, maternal overriding of infant initiatives, and heightened states of unrepaired negative infant affect (see Lyons-Ruth & Jacobvitz,1999a; Lyons-Ruth et. al, 1999b) are some of the paramount maternal interactive correlates of infant attachment disorganization implicated in the literature that this study will attempt to measure.
To that end, this study will attempt to operationalize the degree to which a mother fails to recognize her infant's state, affect, cues, and initiatives, the degree to which she fails to respond in a manner that validates and acknowledges the infant's experience or request, and the extent to which she fails to repair interactive errors. In the process, the mother will demonstrate her capacity to help regulate negative affect and heightened states of arousal.

This study, then, will expand on the work of Lyons-Ruth et al. (1999b) and of Kelly (2004), by identifying a select array of parental behaviors projected to be the most salient, critical predictors of disorganized infant attachment. That is, this investigation will strive to address the very gap in attachment research emphasized by both Madigan et al. (2006) and Lyons-Ruth et al. (1999b). In addition to making strides toward establishing a more refined, selective, and focused coding system for assessing severe disturbances in mother-infant interactive behavior, this study will expand on the work of Kelly (2004), by examining 4-month mother-infant exchanges, and endeavoring to identify earlier clinical indices of disorganized infant attachment, the most vulnerable and at-risk population of children the literature has yet to identify. Earlier detection of at-risk dyads offers the hope of providing earlier intervention, and the prevention of adverse developmental and psychological outcomes.

Purpose:

The present study examines the link between 4-month mother-infant affective communication and patterns of infant attachment at one year, highlighting the relation between anomalous maternal behavior in the 4th month of an infant's life and infant disorganization at one year.

Aims:

1. The first aim of this study is to expand on the work of Lyons-Ruth, Bronfman & Parsons (1999) and of Kelly (2004), by identifying a select array of parental behaviors projected to be the most salient, critical predictors of disorganized infant attachment.
2. The second aim of this study is to determine whether selected anomalous maternal behaviors at 4 months (as delineated in The Modified AMBIANCE – Selected Affective Errors, 4-Months [M-AMBIANCE]) can distinguish attachment styles at one year. If so, then this is a step toward creating a more refined, focused coding system for assessing early disturbances in mother-infant affective communication and for predicting attachment.

Chapter Three

Methods 1

The Development of The Modified AMBIANCE–Selected Affective Errors, 4 Months, (M-AMBIANCE), Miller, 2010

The AMBIANCE (Atypical Maternal Behavior Instrument for Assessment and Classification, Bronfman, Parsons & Lyons-Ruth, 1999) was originally designed to detect severe disturbances in maternal affective communication associated with infant disorganization during the Strange Situation protocol when infants were 12 to 24 months old, and was later adapted by Kelly (2004) to be used with infants 6 months and younger during a face-to-face parent-infant exchange. The *M-AMBIANCE (Modified AMBIANCE–Selected Affective Errors, 4 Months, Miller 2010)* is a modification of Kelly's adaptation of the AMBIANCE.

The original and adapted AMBIANCE both rate maternal behavior along 5 dimensions of atypical or disrupted communication expected to be linked with disorganized infant attachment: (1) affective communication errors, (2) role/boundary confusion, (3) fearful, disoriented behavior, (4) intrusive/negative behavior, and (5) withdrawal. Within each dimension of atypical communication, there is a list of 30-40 specific behaviors to be coded.

Items from the original AMBIANCE were included in Kelly's (2004) adapted index where relevant, yet frequently reframed to more accurately capture the developmental and practical realities of the 4-month face to face exchange. Kelly's adapted version of the AMBIANCE accounts for the numerous developmental

distinctions between 4 and 12-24 month old infants, while also considering the many procedural distinctions between the separation-reunion paradigm of the Strange Situation and a seated face-to-face exchange. In contrast to 12 to 24-month olds, for example, who can independently ambulate around the room to both approach and retreat from the parent, may possess means for communicating verbally, while also displaying more elaborated nonverbal capacities, 4-month old infants are most apt to communicate through vocalizations, facial gestures, gaze patterns, limb or body movements, communications that may be more subtle and less comprehensible for a new parent to interpret. The inherent nature of the Strange Situation paradigm, which includes a sequence of stressful maternal separations and reunions aimed at activating the infant's attachment behavioral system and proclivity toward attachment versus exploratory behavior pulls for a range of mother-infant response that is no longer relevant in the context of a 4-month face-to-face exchange. During this earlier assessment point, a mother is requested to engage naturally with her infant as she would at home yet without the use of objects. Such procedural variations between the original and adapted AMBIANCE necessitated the addition of numerous behavioral items, which Kelly included in her revised measure. These additional behavioral items were culled from several sources: the infant and attachment literatures, core theories describing the infant-caregiving relationship, research explicating hypothesized parental correlates of disorganized attachment and infant maltreatment, as well as other identified non-optimal parental behaviors. These extensive lists of maternal behaviors were, again, not devised to be finite, and coders are invited to add further behaviors to these lists as they present during the coding of any dyadic exchange.

The AMBIANCE measure (Bronfman et. al., 1999), in both its original and adapted form (Kelly, 2004), was constructed as a clinical scale, to capture clinical dyadic events as they occur sequentially over a span of time. In contrast to microanalytic coding, which strives to determine which discrete behaviors occur each second or even every micro-second, the AMBIANCE is a form of event analysis, with multiple levels of coding.

The first level of coding involves rating behavioral events as they occur, within each of the five dimensions of atypical maternal behavior. This level of coding yields frequency counts for each of the 5 dimensions of atypical behavioral, as well as measuring an overall frequency count of disrupted maternal behavior. These are referred to as the AMBIANCE Subtotal and Total Scores, respectively.

Numerous studies incorporating the original AMBIANCE obtained reliability on the AMBIANCE Total score with infants 12-24 months during the Strange Situation (Lyons-Ruth, Bronfman & Parsons, 1999; Grienenberger, 2001; Benoit, Madigan, Lecce, Shea & Goldberg, 2001; Goldberg, Benoit, Blockland, & Madigan, 2003; David & Lyons-Ruth, 2005). Thus far, however, Lyons-Ruth and colleagues (1999b) have been the only investigators to achieve reliability on the AMBIANCE Subtotal scores, meaning they have achieved reliability on the frequency counts across each of the 5 dimensions in their study with 18-month-old infants. No one, though, has yet attained reliability on either the Total number of atypical maternal behaviors observed during a given protocol or the dimensional Subtotal scores using Kelly's (2004) adapted AMBIANCE with infants under 6 months of age.

A subsequent level of AMBIANCE coding is the global clinical assessment, a qualitative score from 1-7 that rates the overall Level of Disrupted Communication between mother and child, with scores from 1 ("high normal with no evidence of disrupted communication") to 4 ("non-optimal but not disrupted communication) indicative of non-disrupted affective communication, and scores from 5 ("disrupted communication") to 7 ("highly disrupted communication with few or no ameliorating behaviors") indicative of the disrupted affective communication classification. This global score is aimed to highlight more egregious disruptions in maternal affective communication that might not be captured via lowered frequency counts and corresponding Total or Subtotal Scores. Several studies utilizing the original AMBIANCE measure with infants 12-24 months achieved reliability at this level of coding (see Lyons-Ruth, Bronfman & Parsons, 1999; Grienenberger, 2001). However no studies utilizing Kelly's (2004) adapted AMBIANCE with infants under 6 months of age have attained reliability for the global score.

A final level of coding with the original and adapted AMBIANCE involves a bivariate Parental Classification of either *Disrupted* or *Non-Disrupted* affective communicative. While mothers with a Level of Disrupted Communication between 1-4 are classified as Non-Disrupted, mothers with a Level of Disrupted Communication between 5-7 are classified as Disrupted. Lyons-Ruth and colleagues(1999) obtained reliability in their sample of 18-month old infants at this level of bivariate Parental Classification. Kelly (2004) too, was able to obtain reliability at this level, employing the adapted AMBIANCE with 4-month old infants.

As of yet, however, no one has attempted, using either the original or adapted

AMBIANCE, to achieve reliability at the level of individual behaviors. As the coding schemes have been used thus far, to attain a global Level of Disrupted Communication, a bivariate Classification, and an AMBIANCE Total or Subtotal score, it has not been necessary to achieve reliability at the level of specific behaviors. In fact, with over 150 listed behaviors from which to code, it was impossible to get reliable at the level of discrete behavior using the original omnibus coding index.

Based on their own post hoc, nonblind research investigations, however, Lyons-Ruth et al.(1999b) discovered that there were several more serious interactive errors that had occurred 3 times more often among mothers of 18-month old disorganized infants, and recommended a refinement and simplification of the original AMBIANCE scale to more easily identify the high-risk dyads. They determined that among their own sample they could, with a low degree of error, more accurately distinguish organized from disorganized subgroups by categorizing those mothers who did not exhibit any of the more serious interactive behaviors separately from those mothers who exhibited the behaviors at least 4 times. Lyons-Ruth and colleagues, further noted that disorganized mothers evidenced a preponderance of affective communication errors, and affective communication errors was the only dimension of atypical maternal behavior found to significantly distinguish mothers of disorganized from organized infants in their high risk sample.

Kelly (2004) too, in examining her results, described patterns of behavior seemingly more frequent among mothers with Disrupted classifications. As she noted, Disrupted mothers seemed less apt to respond contingently to their infant's cues, meaning their responses appeared less affectively matched and related to their infant's signaling.

They were also less able to help modulate their infant's negative affect. These observations, though, were based on anecdotal impressions and were not verified empirically. In 2006, Madigan and her colleagues went on to highlight the need for an explication of "those components or behavioral indices of anomalous behavior that are most directly implicated in the development of disorganized attachment relationships" (p.106).

Recognizing the need to identify high-risk dyads both earlier and more easily, the current study set out to distinguish salient and critical 4-month maternal behavioral indices predictive of disorganized infant attachment. To permit reliability testing at the level of individual behavior, it became necessary to refine and simplify Kelly's (2004) Adapted AMBIANCE scale for use with infants 6-months and younger. This refinement required specifying a small subset of selected behaviors upon which to become reliable.

Prior to embarking on this endeavor, the present investigator had spent more than 7 years studying and coding different facets of caregiver-infant interaction under the tutelage of Dr. Beatrice Beebe. This examiner was subsequently trained in the original AMBIANCE by Karen Lyons-Ruth, Ph.D., & Elisa Bronfman, Ph.D, two of the three original authors of the scale, over the course of an intensive 3-day workshop. The present examiner and another graduate student in psychology (Sonia Roubeni), next spent a period of 5 months training with Kristen Kelly, to learn the Adapted AMBIANCE for use with infants 6 months and younger (Kelly, 2004). During this training period, the present investigator, Roubeni, and Kelly jointly examined approximately 15 parent-infant video-taped interactions, reviewing Kelly's coding scheme and rules for coding at a discrete behavioral level as well as globally. Discrepancies and disagreements were discussed and

reconciled. This investigator and Roubeni went on to independently score 20 additional 4-month mother-infant face-to-face protocols using the Adapted AMBIANCE that had previously been scored by Kelly.

Striving to identify a small subset of anomalous maternal behaviors expected to be salient predictors of disorganized infant attachment, the present investigator and Roubeni spent extensive time over the subsequent 18 months continuing to study videotapes of 4-month mother-infant face-to-face interactions. This extended training phase allowed coders to better discern and interpret mother-infant dialogues and to become familiar with a wide range of interactive errors and anomalous modes of maternal response. Numerous behavioral items from the original and adapted AMBIANCE were observed and coded during this phase, while additional anomalous maternal behaviors were also identified.

The selection of anomalous maternal behaviors for the refined scale was based on the following considerations: (1) an assessment of high frequency behaviors, based on months of studying and coding 4-month face-to-face, videotaped interactions using an alternate, yet similar sample of mother-infant pairs; (2) an identification of behaviors that were clinically salient, (3) predictive and robust in other research, (4) and feasible on which to become reliable. In adapting the original AMBIANCE to use with younger children, Kelly (2004) had to make the scale appropriate and relevant for coding mother-infant face-to-face interaction at 4 months. In continuing to refine the scale to become reliable at the level of individual behavior, in the current study, it was necessary in many instances not only to continue to make the scale appropriate and relevant for coding mother-infant face-to-face interactions at 4-months, but to make the selected behaviors

more explicit, descriptive, and operationalized. The original and adapted AMBIANCE scales rate up to 150 behaviors across 5 dimensions and 14 subdimensions of atypical or disrupted communication. In contrast, the current study identified an array of nine maternal behaviors projected to be the most salient critical predictors of disorganized infant attachment, which coalesce within a singular dimension of the AMBIANCE - Affective Communication Errors.

The anomalous maternal behaviors coded are divided across two categories or subdimensions of Affective Communication Errors that were first delineated in Bronfman et al.'s original AMBIANCE scale: (1) Lack of responding to infant cues; and (2) Inappropriate responding to infant cues. Selected behaviors highlight a mother's difficulty tolerating and responding adaptively to infant distress, disengagement, and neutral or positive cues. The following 9 anomalous maternal behaviors were coded:

1) *No response to distress* - Does not attempt to soothe distressed infant, or in any way acknowledge or comment on infant's vocal or physical expression of distress *(e.g., as infant begins to whimper/fuss/cry, mother pauses, staring blankly back)*.

2) *No response to neutral or positive cues* - Does not acknowledge or respond contingently to infant's affectively positive or neutral cues for engagement or communication, meaning responses appeared less affectively matched and related to their infant's positive or neutral signaling *(e.g., infant coos enthusiastically, yet mother does not respond or comment on this*

communication in any way; she may pause or appear suddenly vacant; or she may ask: "What's the matter?" when infant coos with delight).

3) *Disrupts self-regulation* - Interferes with infant's attempts to self-regulate (*e.g., when infant looks away mother calls infant back, pulls apart infant's clasped hands, removes infant's fingers from his mouth, grabs hold of infant's hands while infant's fingers were grasping onto clothing).*

4) *Overrides* - Overrides infant's positive and neutral cues and signals with own agenda/directs infant to new activity while infant is clearly engaged/or persists with activity when infant shows disinterest, fatigue, or desire to do something else. (*e.g., as infant gazes over at wall, mother claps vigorously and calls to infant to sing a song; as infant reaches for mother's hand, mother pulls hand back and begin's tapping infant's feet, as infant attempts to pull his hand from mother's grasp, mother continues singing and jiggling infant's hand).*

5) *Distracts or overrides during distress* - Overrides infant's distress signals with own agenda/ directs distressed infant to new activity/or persists with activity in the face of infant distress *(e.g., when infant becomes distressed, mother attempts to distract infant out of distress by calling him to "look at this" instead).*

6) *Positive during distress* - Responds to infant's distress/negative affect/dampened or subdues state with positive affect, or laughter. *(e.g., as infant begins to escalate fussing/whimpering mother responds by smiling broadly while making positive comments).*

7) *Stimulates during distress* - Responds to infant's distress, negative affect, dampened or subdued state with heightened stimulation, *(e.g., as infant begins to escalate fussing/whimpering mother attempts to top infant's volume by singing nursery rhymes, moving infant's legs while engaging in rapid reduplicative babbling, rapidly shaking infant's hand,*

8) *Aggressive Response* - Responds to infant disengagement (8A), distress (8B) or neutral or positive cues (8C) with disapproval, disgust, criticism, threats or mockery *(e,g., as infant turns away, mother threatens: "Oh no you don't!", as infant starts to whimper mother warns: "don't you dare start to cry!").*

9) *Pleading or Role Reversal* - Responds to infant disengagement (9A), distress (9B) or neutral or positive cues (9C) with pleading, begging, or role reversal *(e.g., as infant looks away, unresponsive to calls to attend, mother begs: "please look at me", pleads: "come on," or starts using "baby talk").*

See Appendix A for details on the derivation of these codes.

Due to the modification in behaviors coded in the current study, neither the original or adapted global rating scale for measuring Parental Level of Disrupted Communication were still relevant to the range of maternal behaviors being presently assessed. Accordingly, the behavioral descriptors at each Parental Level (1-7) of Disrupted Communication Scale were modified and can be reviewed in Appendix B.

Chapter Four

Methods 2

Methods of the Study

Subjects

The subjects in this study are part of a larger ongoing study of maternal depression, mother-infant interaction, and attachment conducted by Beatrice Beebe, Ph.D. and Joseph Jaffe, M.D. at the New York State Psychiatric Institute. Between September 1994 and December 1996, 132 mother-infant pairs were recruited from the maternity ward at Columbia Presbyterian Hospital in New York City. Medically eligible primiparous mothers, age 18 or older, who had given birth within 21 days of their due date, had an uncomplicated pregnancy, delivery (vaginally or by Cesarean section), and perinatal assessment, were told of the opportunity to participate by an obstetrical nurse 1-2 days after giving birth. Interested mothers were introduced to a graduate student in psychology who described the study as investigating mother-infant communication and infant social development, and informed consent was obtained. Informed consent was obtained for a second time at 4 months postpartum, when mother-infant dyads made their initial visit to the New York State Psychiatric Institute laboratory. All mothers were married or living with a partner, who displayed no gross maternal psychopathology during the initial contact. Infants were required to have a minimum Apgar score of 7 by 5 minutes, with a birth weight of at least 2,500 grams (5.5 pounds).

Of the 132 mother-infant pairs, 84 pairs returned for a 12-month taping. Out of these 84 video-taped pairs, 9 of the recordings were uncodeable due to technical reasons,

including: lack of sound (dyads 1015, 1027, 1080, 1121, 1124), poor sound quality (dyads 1107, 1207), and the predominant use of a foreign language (dyads 1133, 1209). The remaining 75 mother-infant pairs were used in the current investigation. No differences in maternal age, ethnicity, education or infant gender were found between the dyads at the 12 month taping and those who had dropped out of the study after 4 months.. Despite substantial efforts to maintain subjects, the elevated level of attrition was believed to be related to the transient nature of urban living and mothers returning to work.

Demographic Data: Mothers ranged in age from 18-43, with a mean age of 29 (S.D. 6.4). Forty (53.3 %) were white, 22 (29.3 %) were Hispanic, 12 (16 %) were Black, and 1 (1.3 %) was Asian. The Mothers were highly educated, with 31% having post college educations, 34.5% with college degrees, 26.2% with some college, 4.8% with high school degrees, and 3.6% without high school degrees. This sample presented no evident risk factors. Among the infants, 30 (40 %) were female and 45 (60 %) were male.

Procedures

At 4 months postpartum, mothers brought their infants to the New York State Psychiatric Institute Communications Science Laboratory, a sound-proof video studio, for a scheduled visit. Timing of visits was scheduled around infant's eating and sleeping patterns. Infants were placed in an infant seat mounted upon a table. Mothers sat in a chair across from their infants, and were instructed to play with their infants as they would at home, yet refrain from using toys or other objects. Mother-infant interactions were filmed using 2 cameras and a split-screen generator. With one camera focused on

the mother and the other camera on the infant, frontal images of each were transmitted to a video recorder that produced a split-screen picture. This yielded a simultaneous side by side frontal view of both mother and infant. Filming lasted for approximately 12 minutes. However, if the infant cried strongly for more than 30 seconds during the filming, taping was halted. If the infant remained in a state of heightened distress during a second attempt at filming, the session was ended and rescheduled for another day. Mothers were given $20 to cover the cost of transportation and were provided with a videotaped copy of the interaction.

At 12 months, 84 mothers and their infants returned to the lab for a scheduled appointment and were videotaped in the Ainsworth Strange Situation (Ainsworth, Blehar, Waters & Wall, 1978). Videotaping of the Strange Situation occurred following a brief face-to-face interaction, a break, and a snack.

Measures

The Modified AMBIANCE–Selected Affective Errors, 4 Months (M-AMBIANCE), (Miller, 2010).

The first uninterrupted 2 ½ minute segment of videotaped interaction in which the mother and infant were both visible and the infant was not crying persistently was used for coding. Maternal behavior was coded for affective communication errors using the M-AMBIANCE (Miller, 2010). The following 9 anomalous maternal behaviors were coded:

1) *No response to distress* - Does not attempt to soothe distressed infant, or in any way acknowledge or comment on infant's vocal or physical expression of distress.

2) *No response to neutral or positive cues* - Does not acknowledge or respond contingently to infant's affectively positive or neutral cues for engagement or communication, meaning responses appeared less affectively matched and related to infant's positive or neutral signaling.
3) *Disrupts self-regulation* - Interferes with infant's attempts to self-regulate.
4) *Overrides* - Overrides infant's positive and neutral cues and signals with own agenda/directs infant to new activity while infant is clearly engaged/or persists with activity when infant shows disinterest, fatigue, or desire to do something else.
5) *Distracts or overrides during distress* - Overrides infant's distress signals with own agenda/ directs distressed infant to new activity/or persists with activity in the face of infant distress
6) *Positive during distress* - Responds to infant's distress/negative affect/dampened or subdues state with positive affect, or laughter
7) *Stimulates during distress* - Responds to infant's distress, negative affect, dampened or subdued state with heightened stimulation.
8) *Aggressive Response* - Responds to infant disengagement (8A), distress (8B) or neutral or positive cues (8C) with disapproval, disgust, criticism, threats or mockery.
9) *Pleading or Role Reversal* - Responds to infant disengagement (9A), distress (9B) or neutral or positive cues (9C) with pleading, begging, or role reversal.

In addition to rating each of the anomalous maternal behavioral events as they occured, according to the coding rules detailed below, each dyad was also given a global rating from 1-7, an overall assessment of the Level of Disrupted Affective Communication between mother and child. This qualitative score is aimed at representing the gravity of anomalous maternal behavior evidenced during an interactive protocol. Thus, protocols marked by fewer interactive errors, yet of a severe nature, would receive higher global ratings. Ratings from 1 ("high normal with no evidence of disrupted communication") to 4 ("non-optimal but not disrupted communication) are indicative of non-disrupted affective communication, and scores from 5 ("disrupted communication") to 7 ("highly disrupted communication with few or no ameliorating behaviors") indicative of the disrupted affective communication classification. Based on these ratings, each mother can be classified as either "disrupted" or "not-disrupted".

The following scores were calculated for each dyad: 1) A Total score, reflecting the total number of anomalous maternal behaviors; 2) Subtotal tallies for the frequency of each of the 9 selected anomalous maternal behaviors; and 3) A Global Rating of Disrupted Affective Communication, a qualitative score ranging from 1 ("high normal") to 7 ("disrupted communication with few or no ameliorating behaviors").

Procedures for coding 4-month mother-infant interactions using the Adapted AMBIANCE were established by Kelly (2004) and modified in the present study. Modifications are italicized:

1. Watch the videotape in its entirety without writing anything down.
2. Watch videotape again - pausing and rewinding as necessary in order to see and hear each interaction fully.

3. *Write down a narrative, outlining each occasion when the mother or infant does or says anything new, or when they repeat an action.*
4. *Code each event, using the list of Selected Anomalous Maternal Behaviors.*
5. Add up the total number of anomalous behaviors *observed during the videotaped interaction.*
6. *Add up the subtotal for each of the 9 selected anomalous maternal behaviors observed during the videotaped interaction.*
7. Use the list of coded behaviors, and if necessary, review portions of the videotape again in order to assign a global score designating the level of disruptive affective communication as outlined in the *Modified Global Rating Scale for Measuring Level of Maternal Disrupted Affective Communication based on 9 select Behaviors (see Appendix B).*
8. The coding of each protocol is expected to take anywhere from 30 minutes to 3 hours.

Rules for coding are as follows: An event occurs every time a partner does something new; code one behavior only per moment or event, no double coding per event or moment; if behavior persists, code it as a new behavior after 5 seconds; if two behaviors are occurring simultaneously, code most dominant aspect of behavior: code 6 (*positive during distress*) over another code, whenever it is observed. Rules for distinguishing between 2 codes: 3 vs 4 – Code 3 (*disrupts self-regulation*) whenever mother is calling infant back to her, regardless of whether she appears to notice infant engaging in regulatory activity. If mother is directing infant to another activity, code 4 (*override*). Code 4 (*override*) whenever a mother's own agenda takes precedence,

overriding infant's self-initiated behavior. 5 vs 7 – Code 7 (*stimulate during distress*) whenever there is a frenetic quality to mother's activity, or when she is upping or topping infant's distress in her volume or speed. Code 5 (*distract or override during distress*) whenever mother is trying to get infant to focus on something else, or to keep infant focused on a previous activity – without significantly heightening her volume or speed. 3 vs 7 – code 3 (*disrupts self-regulation*) whenever mother is calling infant or working to get infant to re-attend. Code 7 (*stimulate during distress*) if there is a frenetic, heightening, or staccato quality to mother's speech or activity.

Interrater reliability between the two coders (JM and SR) was assessed in 3 phases to prevent drift. In each phase, raters blindly and independently scored seven videotapes. Coders were both blind to attachment status and demographic data. The statistic employed to assess reliability was the intraclass correlation coefficient, which measures the degree of consistency between independent raters. Across the 3 phases, the intraclass correlation coefficient (2,1) for *Total Anomalous Behavior* was .94, .72, .80 with a mean ICC of .80.; for *Global Level of Disrupted Communication* it was .92, .46, .76 with a mean ICC of .84; for (1) *No response during distress* it was .0, .92, 1.0 with a mean ICC of .91; for (2) *No response during neutral, positive* it was .85, .80, .84 with a mean ICC of .85; for (3) *Disrupts regulation* it was .73, .80, .88 with a mean ICC of .84; for (4) *Overrides infant cues* it was .82, .84, .85 with a mean ICC of .85; for (5) *Distracts or overrides during distress* it was .87, .83, .88 with a mean ICC of .85; for (6) *Positive during distress* it was .81, .80, .83 with a mean ICC of .83; for (7) *Stimulates during distress* it was .47, .62, .85 with a mean ICC of .68; for (8) *Aggressive Response* it was .90, .73, .71 with a mean ICC of .83; for (9) *Plead, role*

reverse response it was .0, .0., .0 with a mean ICC of 0. The lowest intraclass correlation occurred for variable (9) *Pleading, role-reversed maternal response*, where the ICC was zero in each wave. This was due to it being an extremely rare behavior, which was not evidenced at all in the first 2 waves of reliability testing. In the third wave there was a single role-reversed event, however it was only detected by one rater. Due to the lack of interrater reliability achieved on this variable, it was not analyzed further in the current study. Interrater reliability was also low during the first wave of assessing variable (1) *No response during distress.* However this too was due to it being a rare event, occuring only once and observed by one rater during the preliminary phase of reliability. Subsequent reliability points were higher, with a mean ICC of .91. Variable (7) *Stimulating during distress* yielded lower ICC scores in the first 2 phases, .47, .62, However the ICC in phase 3 was .85 and the mean ICC was .68, which is an acceptable level. The *Global Rating of Disrupted Communication* also yielded a low ICC score of .46 in the second wave of reliability testing, although the first and third waves were higher .92, .76, with a strong overall mean ICC of .84.

The Ainsworth Strange Situation

The quality of an infant's attachment to his mother was assessed using Ainsworth's Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978). This 20 minute standardized protocol is broadly recognized as a reliable and valid measure of infant attachment. During this procedure, infants are put through a series of mounting stressors, involving separations and reunions with their mother, in addition to a sequence of interactions with a stranger, all designed to activate the infant's attachment behavioral system. This protocol involves a sequence of 8 episodes of approximately 3 minutes

each. At the onset, a mother and her infant are introduced to an unfamiliar play room filled with toys. The mother then sits down off to the side as the infant is free to explore the materials. A stranger then enters the room, engaging the mother then the infant, at which point the mother inconspicuously leaves the room. The mother then returns, greets, comforts her infant or both, then attempts to reengage the infant in exploration. During this time the stranger leaves the room, and shortly thereafter the mother leaves the room. After a brief period alone, the stranger reenters the room. The mother then returns for a final segment of reunion, greeting and picking up her child, followed by a period for the infant to continue to explore. If during any episode an infant cries continuously for one minute, or strongly for 30 seconds, the episode is halted.

Based on an infant's responses to maternal separations and reunions, attachment classifications are determined. The infant's ability to use the mother as a secure base is appraised through four 7-point scales of proximity-seeking, contact-seeking, avoidance of proximity and contact, and resistance to contact and comforting. The scope of an infant's exploratory behavior is also assessed, with particular consideration to the infant's balance of exploratory and attachment seeking behavior. Four patterns of infant attachment are then coded: secure (B), avoidant (A), anxious-resistant (C), and disorganized (D).

D ratings are given to infants whenever one of the "strong indicators" of disorganization is observed during the Strange Situation. As described by Main & Solomon (1990), strong indicators of disorganization can include: simultaneous or sequential displays of parental approach and avoidance; parental avoidance accompanied or followed by indices of anger or distress; parental approach and positive affect accompanied or followed by indices of aggression or postural collapse; fearful or

distressed affect accompanied by parental avoidance; slow or limp acts of aggression; freezing or stilling beyond 20 or 30 seconds accompanied by dazed expression; fearful expression at reunion accompanied by abrupt movement away from parent, confused expression or actions at reunion.

Each dyad is subsequently rated for Level of D-ness (from 1-low to 9 - high), according to the following scale: (1) no signs of disorganized/disoriented behavior; (3) slight signs of disorganized/disoriented behavior yet no inclination to assign D classification; (5) moderate indices of disorganized/disoriented behavior, though not clearly sufficient for D classification (e.g., there may be an absence of very strong indicators, a lack of pervasive indices, or indices that suggest some rationale for their expression), due to questionable certainty surrounding D classification, an assignment must be "forced"; (7) definite qualification for D classification, yet without very strong, persistent, or extreme indicators; (9) definite qualification for D status, with strong, persistent, and/or extreme indicators. Ratings below 5 (e.g., 4.5) are thus not given a D rating, while ratings above 5 (including 5.5) are classified as D (Main & Solomon, 1990).

Coding of all 12-month attachment classifications in the current study was performed by Elizabeth Carlson, who is widely recognized as an expert in this area.

Hypotheses:

1. Anomalous maternal behaviors will be significantly related to insecure and disorganized forms of attachment.
    a. Mothers of insecure infants will exhibit significantly greater *total* frequency of anomalous behavior at 4-months than mothers of infants with secure patterns of attachment.
    b. Mothers of disorganized infants will exhibit significantly greater *total* frequency of anomalous behavior at 4-months than mothers of infants with organized patterns of attachment.
    c. Mothers of insecure infants will receive significantly higher *global ratings* of disrupted affective communication at 4-months, than mothers of infants with secure patterns of attachment.
    d. Mothers of disorganized infants will receive significantly higher *global ratings* of disrupted affective communication at 4-months, than mothers of infants with organized patterns of attachment.

*Anomalous Behaviors: (1) no response to distress, (2) no response to neutral or positive cues, (3) disrupting self-regulation, (4) overriding positive or neutral cues (5) distracting or overriding during distress, (6) smiling or laughing in response to distress, (7) stimulating during distress, (8) aggressive responding (9) pleading or role reversed responding.

2. Anomalous maternal responses to infant distress will significantly differentiate mothers of insecure infants from those of secure infants and mothers of disorganized infants from mothers of organized infants.

a. Mothers of insecure infants will exhibit significantly more anomalous responses to infant distress at 4-months than mothers of infants with secure patterns of attachment.
b. Mothers of disorganized infants will exhibit significantly more anomalous responses to infant distress at 4-months than mothers of infants with organized patterns of attachment.

*Anomalous Responses to Distress: (1) no response to distress, (5) distracting or overriding during distress, (6) smiling or laughing in response to distress, (7) stimulating during distress, (9B) pleading or role reversed response to distress.

3. Aggressive maternal responding to infant distress, disengagement, and neutral or positive cues at 4-months will significantly distinguish mothers of insecure infants from secure infants and mothers of disorganized infants from mothers of organized infants.
    a. Insecure and disorganized mothers will exhibit significantly more aggressive responses to infant distress, disengagement, and neutral or positive cues.
    b. Disorganized mothers will exhibit significantly more aggressive responses to infant distress, disengagement, and neutral or positive cues than mothers of organized infants.

*Aggressive Forms of Anomalous Responding: (8A) aggressive response to disengagement, (8B) aggressive response to distress, (8C) aggressive response to neutral or positive cues.

Rationale:

Attachment disorganization is expected to arise within a caregiving environment characterized by "fright without solution" (Main & Hesse, 1990), extreme maternal misattunement, contradictory cueing (Lyon's-Ruth, Bronfman, & Parson, 1999b), and unbalanced relational processes (Lyons-Ruth, Bronfman & Atwood, 1999a). Such interactive patterns are deemed to be an outgrowth of fearful, fragile, and disorganized maternal mental states related to unresolved maternal loss or trauma. Unable to integrate or tolerate their own fearful, distressing and traumatic affects and attachment experiences, disorganized mothers are not likely to be emotionally available or equipped to attend to, recognize, or adaptively respond to their infant's ongoing attachment related cues and needs. Infant distress and disengagement may be particularly difficult for these mothers to endure, potentially triggering their own painful memories, intolerable emotions, and maladaptive urges. This may lead to an array of anomalous maternal responses, with infants left on their own to regulate disturbing affect and heightened levels of arousal.

As such, mothers of disorganized infants may be distinguished from organized infants by displaying a hierarchy of problematic modes of engagement projected to overwhelm and disorganize the attachment behavioral system of their infants. At a global level, these mothers are predicted to exhibit more anomalous maternal behaviors overall and to be given higher ratings of disrupted mother-infant affective communication. When looking at subsets of anomalous behavior, they are expected to evidence more anomalous responses to infant distress, while also more likely to become aggressive with their infants.

Data Analysis Strategy

This study's data analysis involved several phases. First, descriptive data was calculated across the whole sample and subsequently for mothers of Secure (B), Resistant (C), and Disorganized (D) infants to determine the mean, minimum, maximum, sum, standard deviation, standard error, and skewness for all maternal variables. Due to the unusually low N in the Avoidant (A) category (3 infants), this group was not analyzed separately. Avoidant dyads, however, were included in all analyses examining the larger group of mothers of insecure and organized infants. In other words, when comparing Secure versus Insecure Dyads (B versus non-B) or Organized versus Disorganized Dyads (non-D versus D), Avoidant dyads were included in the Insecure and Organized groups. Second, planned bivariate analyses were conducted using standard parametric and non-parametric statistics to assess the association between hypothesized independent variables and dependent variables. When the independent variable was normally distributed and the dependent variable was categorical, a t-test was calculated. When the independent variable was normally distributed and the dependent variable was continuous, a Bivariate Correlation was run. Non-normally distributed variables tended to be rare events, whereby a large proportion of mothers within the sample studied never engaged in those specified behaviors. As such, those variables were transformed into binary dummy codes to reflect the groups of mothers who either did or did not 'ever' engage in the specified behavior. When the independent and dependent variables were both categorical, Chi-Squared Analyses were run. When the Chi-Square assumption that each expected cell size have a count of 5 or greater (in 2 x 2 matrix) was not met, however, Fisher's exact test was run to assess exact probabilities of associations between two categorical

variables. The following tests were run for all planned hypothesis: Secure versus Insecure (B versus non-B), Disorganized versus non-Disorganized (D versus non-D), Disorganized versus Secure (D versus B), Level of infant disorganization (D-ness).

Third, multivariate analyses were performed to assess the potential impact of demographic control variables on the original bivariate relationship. Multivariate analyses also served to examine the combined influence of multiple variables upon the dependent variable. When the independent and dependent variables were both continuous, a linear regression analysis was performed. When either or both the independent and dependent variables were categorical, however, logistic regression analyses were run. Multiple regression analysis is recognized as a preferred statistic for distinguishing relationships when there are multiple independent predictor variables yet a single outcome variable.

Fourth, post hoc bivariate analyses were conducted to assess patterns of association between independent and dependent variables not initially hypothesized. The tests were run as specified above.

Chapter Five

Results

Results are presented in three stages. Following descriptive information on attachment classifications and selected anomalous maternal behaviors, planned analyses based upon apriori hypotheses investigate the association of 4-month anomalous maternal behavior with quality of infant attachment at one year. In the second stage, multivariate analyses assess the role of potentially confounding demographic variables (maternal ethnicity, age, education, and infant gender) in the above associations, but only when planned comparison were initially found to be significant. Based upon these findings, post hoc analyses go on investigate the possibility that secure dyads can be differentiated by high or low levels of D-ness in relation to anomalous maternal behaviors, for selected planned analyses that were initially non-significant.

Descriptive Information

The 75 infants in this study were classified as Secure, Avoidant, Resistant, and Disorganized according to the Strange Situation coding procedures (Ainsworth et al., 1978, Main & Solomon, 1990), resulting in the following distributions: 40 Secure (53%), 3 Avoidant (4%), 15 Resistant (20%), and 17 Disorganized (23%). Anomalous maternal behaviors were observed across the entire sample, according to the following frequencies of occurrence:

(1) *No Response to Distress* - 17 (Sum), 0 (Min), 2 (Max), .2 (Mean), .5 (S.D.), 16.0 (% Mothers ever displayed behavior);

(2) *No response to Neutral or Positive Cues* -108 (Sum), 0 (Min), 25 (Max), 1.4 (Mean), 3.2 (S.D.), 45.3 (% Mothers ever displayed behavior);

(3) *Disrupts Regulation* – 352 (Sum), 0 (Min), 19 (Max), 4.6 (Mean), 4.4 (S.D.), 88 (% Mothers ever displayed behavior);

(4) *Overrides Infant Cues* - 1101 (Sum), 0 (Min), 50 (Max), 14.6 (Mean), 9.5 (S.D.), 98.7 (% Mothers ever displayed behavior);

(5) *Distracts during Distress* - 125 (Sum), 0 (Min), 18 (Max), 1.6 (Mean), 3.3 (S.D.), 37.3 (% Mothers ever displayed behavior);

(6) *Positive during Distress* – 66 (Sum), 0 (Min), 16 (Max), .8 (Mean), 2.3 (S.D.), 26.7 (% Mothers ever displayed behavior);

(7) *Stimulates during Distress* - 139(Sum), 0 (Min), 25 (Max), 1.8 (Mean), 4.7 (S.D.), 32.0 (% Mothers ever displayed behavior);

(8) *Aggressive Response* - 96 (Sum), 0 (Min), 27 (Max), 1.2 (Mean), 3.7 (S.D.), 29.3 (% Mothers ever displayed behavior);

(9) *Pleading/Role Reversing Response* - 35 (Sum), 0 (Min), 16 (Max), .4 (Mean), 2.0 (S.D.), 13.3 (% Mothers ever displayed behavior).

A Priori Hypotheses

Hypothesis 1

Hypothesis 1a: The Relationship between Total Frequency of Anomalous Maternal Behavior and Infant Attachment Security

Hypothesis 1a predicted that mothers of insecure infants would exhibit significantly more anomalous behaviors at 4-months than mothers of infants with secure patterns of attachment (B versus non-B). See Appendix C, Table C1 for descriptives of Total Frequency of Anomalous Maternal Behavior across the entire sample of 75 dyads and across attachment groups. To assess the impact of maternal behavior on infant attachment security, the 3 insecure categories of attachment were collapsed.

A t-test was performed, revealing no significant difference in the mean number of anomalous behaviors between mothers of secure (n = 40, M = 27.12, SD = 11.77) and insecure infants (n = 35, M = 27.26, SD = 12.33), *t = .047 (df = 70.67) p = .962.* An alpha level of .05 was used for all tests of significance.

Hypothesis 1b: The Relationship between Total Frequency of Anomalous Maternal Behavior and Infant Attachment Disorganization

Hypothesis 1b predicted that mothers of disorganized infants would exhibit significantly more anomalous behaviors at 4-months than mothers of infants with organized patterns of attachment (D versus non-D, D versus B, Dness). This hypothesis received some support. To assess the impact of anomalous maternal behavior on infant disorganization, the 3 organized categories of attachment were collapsed.

While t-tests revealed no significant difference in the mean number of anomalous behaviors between mothers of disorganized (n = 17, M= 29.1, SD = 11.63) and organized infants (n=58, M=26.62, SD =12.08), t = .771 (df = 26.967) p = .447, or between mothers of disorganized (M= 29.1, SD = 11.63) and secure infants (n =40, M = 27.12, SD = 11.77): t = .589 (df =30.582) p = .602, a Pearson Correlation revealed a significant association between the total frequency of anomalous maternal behaviors at 4-months

and the 9-point scale for level of disorganized infant attachment behavior at one year, r (73) = .264, p = .022.

Hypothesis 1c: The Relationship between Global Ratings of Disrupted Affective Communication and Infant Attachment Insecurity

Hypothesis 1c predicted that mothers of insecure infants would be assigned significantly higher global ratings of maternal disrupted affective communication at 4-months than mothers of infants with secure patterns of attachment (B versus non-B). See Appendix C, Table C2 for descriptives of global ratings of maternal disrupted affective communication across the entire sample of 75 dyads and across attachment groups. To assess the impact of global maternal ratings on infant attachment security, the 3 insecure categories of attachment were collapsed.

A t-test was performed, revealing no significant difference in the mean global rating of disrupted affective communication between mothers of secure (n = 40, M = 4.13, SD = 1.48) and insecure infants (n = 35, M = 4.38, SD = 1.22), t = *-.794 (df =72.79) p = .430.* .

Hypothesis 1d: The Relationship between Global Ratings of Disrupted Affective Communication and Infant Attachment Disorganization

Hypothesis 1d predicted that mothers of disorganized infants would be assigned significantly higher global ratings of maternal disrupted affective communication at 4-months than mothers of infants with organized patterns of attachment (D versus non-D, D versus B, Dness). This hypothesis received some support. To assess the impact of anomalous maternal behavior on infant disorganization, the 3 organized categories of attachment were collapsed.

While t-tests revealed no significant difference in the mean global ratings behaviors between mothers of disorganized (n = 17, M = 4.55, SD = 1.29) and organized infants (n = 58, M = 4.16, SD = 1.38), t = -1.05 (df = 27.53) p = .286, or between mothers of disorganized (M = 4.55, SD = 1.29) and secure infants (n = 40, M = 4.13, SD = 1.48): t = .-1.07 (df = 34.29) p = .290, a Pearson Correlation was revealed a significant association between global levels of maternal disrupted affective communication at 4-months and the level of infant disorganization at a year, r (73) = .313, p =.006.

Hypothesis 1 Summary

The total frequency of anomalous maternal behavior at 4-months was found to be a mild, though not a strong predictor of infant attachment at a year. The total frequency of anomalous maternal behavior at 4-months was significantly correlated with the 9-point scale for level of disorganized infant behavior at a year, meaning increased anomalous maternal behavior at a 4-months was associated with increased infant markers of disorganization at 12-months. Contrary to expectation, however, total frequency of anomalous maternal behavior did not distinguish infants across attachment classifications. Thus, there were no significant differences in frequency of anomalous maternal behavior between secure versus insecure, disorganized versus non-disorganized, or disorganized versus secure dyads.

Similarly, global (1-7) ratings of maternal affective communication at 4-months were a mild and not a strong predictor of infant attachment. Global (1-7) ratings of maternal affective communication were significantly correlated with the 9-point scale for level of disorganized infant behavior at a year, meaning higher, more disrupted global ratings of maternal affective communication at 4-months were associated with increased

infant markers of disorganization at 12-months. Contrary to expectation, global ratings of maternal affective communication at 4-months did not distinguish infants across attachment classifications. Thus, there were no significant differences in 4-month global ratings of maternal affective communication between secure versus insecure, disorganized versus non-disorganized, or disorganized versus secure dyads.

Hypothesis 2

Hypothesis 2a: The Relationship between Anomalous Maternal Responses to infant Distress and Infant Attachment Security

Hypothesis 2a predicted that mothers of insecure infants would exhibit significantly more anomalous responses to infant distress at 4-months than mothers of infants with secure patterns of attachment (B versus non-B). Because 35 out of the 75 mothers never demonstrated anomalous responses to infant distress, this variable was recoded using binary dummy codes to distinguish two groups of mothers, those who did and those who did not ever display this behavior. See Appendix C, Tables C3 for crosstabulation *of anomalous maternal response to infant distress ever* by attachment classification. To assess the impact of anomalous maternal response to infant distress on infant attachment security, the 3 insecure categories of attachment were collapsed.

A chi-square analysis showed a significantly greater percentage of mothers of insecure infants (65.7%) displayed anomalous responses to infant distress than mothers of secure infants (42.5%), $\chi 2$ (1, N = 75) = 4.04, p =.04.

Hypothesis 2b: The Relationship between Anomalous Maternal Response to Infant Distress and Infant Attachment Disorganization

Hypothesis 2b predicted that mothers of disorganized infants would exhibit significantly more anomalous responses to infant distress at 4-months than mothers of

infants with organized patterns of attachment (D versus non-D, D versus B, Dness). This hypothesis was strongly supported.

A chi-square analysis showed a significantly greater percentage of mothers of disorganized infants (76.5.%) displayed anomalous responses to infant distress than mothers of organized infants (46.6%), $\chi 2$ (1, N=75)=4.73, p=.03, and a significantly greater percentage of mothers of disorganized infants (76.5.%) displayed anomalous responses to infant distress than mothers of secure infants (42.5%), $\chi 2$ (1, N=75)=5.52, p=.019. A significant correlation was also found between the total number of anomalous maternal responses to infant distress at 4-months and the level of infant disorganization at one year, r (73) = .30, p = .008.

Hypothesis 2 Summary

Anomalous maternal response to infant distress in the 4-month was found to be a strong predictor of infant attachment disorganization at a year. Mothers of disorganized infants were more likely to display anomalous responses to infant distress than were mothers of either organized or secure infants. Increased anomalous maternal responding to infant distress at 4-months was also associated with higher levels of infant disorganization at one year. Mothers of secure infants were less likely to respond anomalously to infant distress than were mothers of insecure infants more generally.

Hypothesis 3

Hypothesis 3a: The Relationship between Aggressive Maternal Response to Infant Distress, Disengagement, and Neutral/Positive Cues and Infant Attachment Security

Hypothesis 3a predicted that mothers of insecure infants would exhibit significantly more aggressive responses to infant distress, disengagement, and

neutral/positive cues at 4-months than mothers of infants with secure patterns of attachment (B versus non-B). This hypothesis was somewhat supported. Because 53 out of the 75 mothers (71%) never displayed aggressive responding to infant distress, disengagement, or neutral/positive cues this variable was recoded using binary dummy codes to distinguish two groups of mothers, those who did and those who did not ever display this behavior. See Appendix C, Tables C4 for crosstabulation of *aggressive maternal response ever* by attachment classification. To assess the impact of aggressive maternal response on infant attachment security, the 3 insecure categories of attachment were again collapsed.

A greater percentage of mothers of insecure infants (40%) displayed aggressive responses to infant distress, disengagement, and neutral/positive cues than mothers of secure infants (20%), however, using the conventional alpha level of .05 this relationship reflects a trend and does not meet more stringent criteria of significance, $\chi 2(1, N=75)=3.6$, $p=.058$.

Hypothesis 3b: The Relationship between Aggressive Maternal Response to infant Distress, Disengagement, and Neutral/Positive Cues and Infant Attachment Disorganization

Hypothesis 3b predicted that mothers of disorganized infants would exhibit significantly more aggressive responses to infant distress, disengagement, and neutral/positive cues at 4-months than mothers of infants with organized patterns of attachment (D versus non-D, D versus B, Dness). This hypothesis was strongly supported. To assess the impact of aggressive maternal response on infant attachment disorganization, the 3 organized categories of attachment were again collapsed.

Chi Square Analyses showed a significantly greater percentage of mothers of disorganized infants (52.9%) became aggressive with their infants than did mothers of either organized infants (22.4%), $\chi 2(1, N=75) = 5.91$, $p = .031$, or mothers of secure infants (20%), $\chi 2(1, N=75) = 6.185$, $p = .013$. Additionally, a Pearson Correlation established that mothers who became aggressive with their infants at 4-months were significantly more likely to have infants with elevated indices of disorganization at a year, $r (73) = .290$, $p = .012$.

Hypothesis 3 Summary

Aggressive maternal responding in the 4-month was found to be a strong predictor of infant attachment disorganization at a year. Mothers of disorganized infants were more likely to become aggressive with their infants at 4-months than were mothers of either organized or secure infants. Increased maternal aggression at 4-months was also associated with higher levels of infant disorganization at one year. Mothers of secure infants were less likely to respond anomalously to infant distress than were mothers of insecure infants more generally, although using conventional criteria of significance this relationship reflects a trend ($p = .058$).

Demographic Associations

When the original independent-dependent relationship had been found to be significant, multivariate analyses were performed to assess the potential impact of demographic control variables (age, ethnicity, education, and gender) on the original independent-dependent association. Multivariate analyses also served to examine the combined influence of multiple variables upon attachment outcomes. When the independent and dependent variables were both continuous, a linear regression analysis

was performed. When either or both the independent and dependent variables were categorical, logistic regression analyses were run. Multiple regression analysis is recognized as a preferred statistic for distinguishing relationships when there are multiple independent predictor variables yet a single outcome variable.

Table 1.
Multiple Linear Regression Model Examining the Impact of Total Frequency of Anomalous Maternal Behavior and Demographic Control Variables on D-ness

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Maternal Total	D-ness	.040	.022*
+ Ethnicity		.031	.112
+ Education		.046	.020*
+ Age		.036	.071
+ Gender		.039	.027*
Black-Non-Black		1.069	.076
Hispanic-Non-Hispanic		.63	.192
Age		-.048	.144

Note. Plus (+) indicates corresponding variable was added into the model along with original independent variable (in this instance Maternal Total). When corresponding p-value < .05, the original independent variable continues to predict the dependent variable, while controlling for the demographic variable in question. When corresponding p-value > .05, the original independent-dependent relationship is confounded and significantly weakened by demographic variable in question. Explanatory variables without a plus (+) were examined separately, due to having confounded the original independent-dependent relationship, and in order to determine whether they predicted the outcome variable on their own. Statistically significant predictors are starred (*).

* $p < .05$.

Hypothesis 1b predicted a relationship between the total frequency of anomalous maternal behavior at 4-months and infant disorganization at one year. As described in section 1b, before controlling for demographic variables, a significant correlation was found between the total frequency of anomalous maternal behavior at 4-months and the level of infant disorganization at one year. These results are verified in the linear regression analysis detailed in Table 1, whereby Maternal Total is shown to be a significant predictor of D-ness ($p = .022$). Maternal Total remains a significant predictor when controlling for Maternal Education ($p = .020$) and Infant Gender ($p = .027$). However, once ethnicity and age are independently added into the linear regression model, total frequency of anomalous maternal behavior no longer predicts level of infant disorganization ($p = .112$ and $p = .071$ respectively). Although confounding and weakening the relationship between total anomalous maternal behavior and level of infant disorganization, neither ethnicity nor age predict level of infant disorganization on their own ($p = .076$, $p = .192$; $p = .144$).

Table 2.
Multiple Linear Regression Model Examining the Impact of Global Ratings of Maternal Disrupted Affective Communication and Demographic Control Variables on D-ness

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Global M Level	D-ness	.420	.006**
+ Ethnicity		.357	.036*
+ Education		.455	.006**
+ Age		.396	.020*
+ Gender		.412	.008**

Note. * $p < .05$. ** $p < .01$.

Hypothesis 1d predicted that mothers of disorganized infants would receive significantly higher global ratings of maternal disrupted affective communication at 4-months than mothers of infants with organized patterns of attachment. Prior to controlling for demographics, a Pearson Correlation revealed a significant association between global rating of maternal disrupted communication at 4-months and the level of infant disorganization at a year. This relationship was reconfirmed by linear regression analysis as can be seen in the table above ($p = .006$). As detailed in Table 2, there is no change in this relationship, which remains significant, after controlling for ethnicity, education, age, and gender.

Summary of Multivariate Analyses for Hypothesis 1

After controlling for the demographic variables of ethnicity and age, the association between total frequency of anomalous maternal behavior at 4-months and level of infant disorganization at a year is no longer significant. Although weakening the above association neither ethnicity nor age independently predicted level of infant disorganization. The association between 4-month global ratings of maternal disrupted affective communication and level of infant disorganization at a year remains significant after controlling for all demographic covariates.

Table 3.
Multiple Logistic Regression Model Examining the Impact of Anomalous Maternal Response to Infant Distress and Demographic Control Variables on Infant Attachment Security

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Anom Response I-Distress	B versus Non-B	.953	.047*
+Ethnicity		.979	.044*
+Education		.965	.048*
+Age		.965	.048*
+Gender		.921	.056†
Gender		.368	.453

Note. † = trend < .06.

Hypothesis 2a predicted that mothers of insecure infants would exhibit significantly more anomalous responses to infant distress at 4-months than mothers of infants with secure patterns of attachment. Prior to controlling for demographics, this hypothesis was supported. As described in section 2a above, a chi-square analysis revealed a significantly greater percentage of mothers of insecure infants displayed anomalous responses to infant distress than mothers of secure infants. This relationship was reconfirmed through logistic regression analysis ($p = .047$) as detailed above (see Table 3). While the predictive relationship between anomalous maternal response to infant distress and infant attachment security slightly weakens ($p = .056$) when gender is added into the regression model, suggesting that infant gender may contribute to some of the variability in infant attachment security, gender alone does not distinguish insecure from secure dyads. The stringent significance level of .05 is not maintained when controlling for infant gender, yet anomalous responding to infant distress continues to

distinguish secure from insecure dyads, suggesting that this relationship is more indicative of a trend.

Table 4.
Multiple Logistic Regression Model Examining the Impact of Anomalous Maternal Response to Infant Distress and Demographic Control Variables on Infant Attachment Disorganization

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Anom Response I-Distress	D versus Non-D	1.31	.036*
+Ethnicity		1.27	.045*
+Education		1.31	.038*
+Age		1.32	.036*
+Gender		1.25	.051*
Gender		-1.40	.042*

Hypothesis 2b predicted that mothers of disorganized infants would exhibit significantly more anomalous responses to infant distress at 4-months than mothers of infants with organized patterns of attachment. Prior to controlling for demographics, this hypothesis was supported. As described in section 2b above, a chi-square analysis revealed a significantly greater percentage of mothers of disorganized infants displayed anomalous responses to infant distress than mothers of organized infants. Logistic regression analysis reconfirmed this association ($p = .036$) (see Table 4). As shown in Table 4, once gender was added into the logistic regression model, the predictive relationship between anomalous maternal response to infant distress and infant attachment disorganization slightly weakened ($p = .51$); however this value can still be considered statistically significant, such that anomalous maternal responding to infant distress at 4-months significantly distinguishes organized from disorganized dyads. As

seen further in the table above, infant gender independently predicts infant disorganization (p = .042) in the current sample, meaning boys are more likely to be disorganized (31%) than are girls (10%). Beebe (2007) earlier reported a similar finding in another study with the same sample.

Table 5.
Multiple Logistic Regression Model Examining the Impact of Anomalous Maternal Response to Infant Distress and Demographic Control Variables on Infant Attachment Security Versus Disorganization

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Anom Response I-Distress	B versus D	1.48	.024*
+Ethnicity		1.45	.029*
+Education		1.51	.025*
+Age		1.51	.025*
+Gender		1.39	.037*

Hypothesis 2b predicted that mothers of disorganized infants would exhibit significantly more anomalous responses to infant distress at 4-months than mothers of secure infants. Prior to controlling for demographics, a chi-square analysis revealed a significantly greater percentage of mothers of disorganized infants displayed anomalous responses to infant distress than mothers of secure infants. This relationship was reconfirmed through logistic regression analysis (p = .024) (see above). As shown in Table 5, controlling for ethnicity, education, age, and gender does not change the impact of this independent-dependent relationship, which remains significant regardless of the variable that is added into the equation.

Table 6.
Multiple Linear Regression Model Examining the Impact of Anomalous Maternal Response to Infant Distress and Demographic Control Variables on D-ness

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Anom M Response I-Distress	D-ness	.061	.008**
+Ethnicity		.055	.022*
+Education		.056	.021*
+Age		.056	.021*
+Gender		.056	.021*

Hypothesis 2b predicted a significant relationship between anomalous maternal responses to infant distress at 4-months and infant disorganization at a year. Prior to controlling for demographics, a significant correlation was found between the total number of anomalous maternal responses to infant distress at 4-months and the level of infant disorganization at a year. This relationship was reconfirmed through linear regression analysis as shown above ($p = .008$). As detailed in Table 6, there is no change in this relationship, which remains significant after controlling for ethnicity, education, age, and gender.

Summary of Multivariate Analyses for Hypothesis 2

After controlling for demographic covariates, anomalous maternal response to infant distress in the 4-month remains a strong predictor of infant attachment disorganization at a year. Mothers of disorganized infants remain more apt to respond anomalously to infant distress than mothers of either organized or secure infants, and increased anomalous maternal responding to infant distress remains associated with higher levels of infant disorganization at a year. When controlling for infant gender,

anomalous responding to infant distress continues to distinguish secure from insecure dyads, though this relationship weakens and is more indicative of a trend. Anomalous maternal responding to infant distress thus appears to be a better predictor of disorganized dyads than of insecure dyads more generally.

While anomalous response to infant distress remains a significant predictor of attachment disorganization when controlling for infant gender, infant gender was found to independently predict infant disorganization. In other words, boys in the current sample are more likely to be disorganized (31%) than are girls (10%). Similarly findings have been reported in another study utilizing the same sample (Beebe, 2007), as well as in other samples (Lyons-Ruth et al., 1999b; Carlson, 1989). Gender is also found to contribute to some of the variability in infant attachment security, although gender alone does not distinguish insecure from secure dyads.

Table 7.
Multiple Logistic Regression Model Examining the Impact of Aggressive Maternal Response and Demographic Control Variables on Infant Attachment Disorganization

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Aggressive M Response	D versus Non-D	-1.35	.019*
+ Ethnicity		-1.44	.023*
+ Education		-1.46	.023*
+ Age		-1.52	.018*
+ Gender		-1.30	.029*

Hypothesis 3b predicted a significant relationship between aggressive maternal responses to infant distress, disengagement, and neutral/positive cues at 4-months and infant disorganization at a year. Prior to controlling for demographics, a chi square

analysis showed a significantly greater percentage of mothers of disorganized infants became aggressive with their infants than did mothers of organized infants. This relationship was verified through logistic regression analysis (p = .019) (see Table 7). As shown in Table 7, after controlling for ethnicity, education, age, and gender this relationship remains significant.

Table 8.
Multiple Logistic Regression Model Examining the Impact of Aggressive Maternal Response and Demographic Control Variables on Infant Attachment Security Versus Disorganization

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Aggressive M Response	B versus D	1.50	.016*
+ Ethnicity		1.50	.020*
+ Education		1.51	.016*
+ Age		1.61	.021*
+ Gender		1.48	.023*

Hypothesis 3b predicted a significant relationship between aggressive maternal responses to infant distress, disengagement, and neutral/positive cues at 4-months and infant disorganization at a year. Prior to controlling for demographics, a chi square analysis showed a significantly greater percentage of mothers of disorganized infants became aggressive with their infants than did mothers of secure infants. This relationship was reconfirmed above through logistic regression analysis (p = .016). As shown in Table 8, there is no change in this significant relationship after controlling for ethnicity, education, age, and gender.

Table 9.
Multiple Linear Regression Model Examining the Impact of Aggressive Maternal Response and Demographic Control Variables on D-ness

Explanatory Variables	Dependent Variable	Coefficient β	P-Value
Aggressive M Response	D-ness	1.16	.012*
+ Ethnicity		.96	.047*
+ Education		1.16	.013*
+ Age		1.05	.032*
+ Gender		1.13	.015*

Hypothesis 3b predicted a significant relationship between aggressive maternal responses to infant distress, disengagement, and neutral/positive cues at 4-months and infant disorganization at a year. Prior to controlling for demographics, a Pearson correlation established that mothers who became aggressive with their infants at 4-months were significantly more likely to have infants with elevated indices of disorganization at a year. As shown in Table 9, linear regression analysis confirms that aggressive maternal responding at 4-months is a significant predictor of D-ness or level of infant disorganization at a year ($p = .012$). There is no change in this relationship, which remains significant, after controlling for ethnicity, education, age, and gender.

Summary of Multivariate Analyses for Hypothesis 3

After controlling for demographic covariates, aggressive maternal responding at 4-months remains a strong predictor of disorganized infant attachment at a year. Mothers of disorganized infants remain more likely to become aggressive with their infants than mothers of either organized or secure infants, and increased maternal aggression at 4-months remains associated with higher levels of infant disorganization.

Post Hoc Analyses

Post Hoc Analyses were performed to further investigate the impact of D-ness, or level of infant disorganization, on attachment security for selected planned analyses that were initially non-significant.

Post Hoc Hypothesis 1

Post Hoc Hypothesis1a: The Relationship between Total Anomalous Maternal Behavior and Infant Attachment Security

Given that total frequency of anomalous behavior at 4-months initially failed to distinguish secure from insecure, organized from disorganized, and secure from disorganized dyads at a year, yet was associated with elevated levels of disorganization (D-ness) at 12-months, post hoc analyses sought to investigate the influence of D-ness on attachment security and related non-significant outcomes. As described earlier, D-ness scores of 1-9 are given to all infants at 12-months. While scores of 1-3 reflect virtually no signs of disorganization, scores above 5 reflect notable to strong indices of disorganization, and lead to a definitive disorganized attachment classification. Scores from 4-5, however, reflect mild to moderate indices of disorganization, with scores of 5 reflecting uncertainty regarding attachment placement. Thus scores of 5 often necessitate a *forced* classification, and can result in classifications of either attachment disorganization, attachment insecurity, or attachment security.

Post Hoc Hypothesis 1a predicted that mothers of secure infants who displayed high levels of disorganization at a year (*vulnerable secure*) would exhibit significantly more anomalous behaviors at 4-months than mothers of secure infants who displayed low levels of disorganization at a year (*pure secure*) (pure B versus vulnerable B). This hypothesis was strongly supported. To assess the relation between total anomalous

maternal behavior on infant attachment security and level of infant disorganization, secure infants were divided into 2 groups, those with low D-ness scores at one year (between 1-3), and those with high D-ness scores at one year (between 4-5).

A t-test revealed a significant difference in the mean number of anomalous behaviors between mothers of secure infants in the high D-ness category (vulnerable secure) (n =10, M = 37.8, SD = 15.04) and mothers of secure infants in the low D-ness category (pure secure) (n =30, M = 23.57, SD = 7.98), t = -3.85 (df = 38) p = .000, with mothers of vulnerable secure infants displaying significantly more anomalous behaviors at 4-months than mothers of pure secure infants. See Appendix C, Table C10 for descriptive statistics of Total Anomalous Maternal Behavior across entire sample and across Infant Attachment Categories, including Attachment Security in pure and vulnerable conditions.

Post Hoc Hypothesis1b: The Relationship between Total Anomalous Maternal Behavior and Infant Attachment Security

Given that total frequency of anomalous maternal behavior at 4-months initially failed to distinguish secure from insecure dyads, while mothers of pure secure infants displayed significantly less anomalous behaviors at 4-months than mothers of vulnerable secure infants, **Post Hoc Hypothesis 1b** predicted that mothers of pure secure infants would exhibit significantly less anomalous behaviors at 4-months than mothers of insecure infants (pure B versus non-B), including mothers of vulnerable secure infants. Given that vulnerable secure infants displayed increased indices of disorganization at 12-months, they are expected to better classified within the insecure category of attachment. This hypothesis was strongly supported. To assess the impact of maternal behavior on infant attachment security, taking into account the level of infant disorganization, the 3

insecure attachment groups and the vulnerable secure attachment group were collapsed, creating a refined group of insecure dyads.

A t-test was performed, revealing a significant difference in the mean number of anomalous behaviors between mothers of pure secure infants (*n* =30, *M* = 23.57, *SD* = 7.98), and mothers of insecure infants, including mothers of vulnerable secure infants with high D-ness scores (*n* = 45, *M* = 31.62, SD =13.54 **),** *t = -2.196 (df =73) p = .031.*

Post Hoc Hypothesis1c: The Relationship between Total Anomalous Maternal Behavior and Infant Attachment Disorganization

Given that total frequency of anomalous maternal behavior at 4-months initially failed to distinguish secure from disorganized dyads, **Post Hoc Hypothesis 1c** predicted that mothers of pure secure infants would exhibit significantly less anomalous behaviors at 4-months than mothers of disorganized infants (pure B versus D). This hypothesis was somewhat supported.

A t-test revealed less anomalous behavior among mothers of pure secure infants (*n* =30, *M* = 23.57, *SD* = 7.9) than among mothers of disorganized infants, (*n* = 17, *M* = 29.1, SD =11.6 **),** *t = -1.748 (df =24.712) p = .059.* However, using the conventional alpha level of .05 this relationship reflects a trend and does not meet more stringent criteria of significance.

Post Hoc Hypothesis1d: The Relationship between Total Anomalous Maternal Behavior and Infant Attachment Disorganization

Given that total frequency of anomalous maternal behavior at 4-months initially failed to distinguish secure from disorganized dyads, and given that mothers of vulnerable secure infants displayed significantly more anomalous maternal behaviors at 4-months than mothers of pure secure infants, **Post Hoc Hypothesis 1d** predicted that

mothers of vulnerable secure infants would exhibit significantly greater total frequency of anomalous behavior at 4-months than mothers of both disorganized infants (vulnerable B versus D), and insecure infants (disorganized, insecure-resistant, insecure-avoidant infants) combined (vulnerable B versus non B). This hypothesis was not supported.

A t-test revealed no statistically significant difference in total frequency scores between mothers of vulnerable secure (n =10, M = 37.8, SD = 15.04) and disorganized infants (n = 17, M = 29.12; SD = 11.63), t = 1.569 (df = 15.37) p = .137 or between vulnerable secure and insecure infants (n = 35, M = 27.44, SD =12.2 **),** *t = 2.0 (df =12.4) p = .068.*

Summary of Post Hoc Analyses Hypothesis 1

Mothers of pure secure infants, who had little to no indices of disorganization at one year, displayed significantly less total anomalous behavior at 4-months than mothers of vulnerable secure infants, who had elevated indices of disorganization at a year. Mothers of pure secure infants also displayed significantly less anomalous behavior at 4-months than mothers of insecure infants, including mothers of vulnerable secure infants, and than mothers of disorganized infants, although this latter relationship is a trend. There was no statistical difference in total frequency scores between mothers of vulnerable secure and disorganized infants or between vulnerable secure and insecure infants.

Post Hoc Hypothesis 2

Post Hoc Hypothesis 2a: The Relationship between Global Ratings of Maternal Disrupted Communication and Infant Attachment Security

Given that global ratings of disrupted affective maternal communication at 4-months failed to distinguish secure from insecure, disorganized from non-disorganized,

and secure from disorganized dyads at a year, yet higher global ratings were associated with elevated levels of disorganization at a year, **Hypothesis 2a** predicted that mothers of pure secure infants would have significantly lower global ratings of maternal disrupted affective communication at 4-months than mothers of vulnerable secure infants (pure B versus vulnerable B). This hypothesis was strongly supported.

A t-test revealed a significant difference in the mean global rating of maternal disrupted affective communication between mothers of pure secure infants (n =30, M = 3.68, SD = 1.26) and mothers of vulnerable secure infants (n =10, M = 5.5, SD = 1.27), t = -3.92 (df = 15.39) p = .001, demonstrating that mothers of future vulnerable secure infants are judged to be more disrupted in their affective communication at 4-months than are mothers of future pure secure infants.

Post Hoc Hypothesis 2b: The Relationship between Global Ratings of Maternal Disrupted Communication and Infant Attachment Security

Global ratings of disrupted affective maternal communication at 4-months failed to distinguish secure from insecure dyads at a year, and mothers of pure secure infants had significantly lower global ratings of disrupted affective maternal communication at 4-months than mothers of vulnerable secure infants. Given these findings, **Post Hoc Hypothesis 2b** predicted that mothers of pure secure infants would have significantly lower global ratings of maternal disrupted affective communication at 4-months than mothers of insecure infants overall (pure B versus non-B), including mothers of vulnerable secure infants. This hypothesis was strongly supported.

A t-test revealed a significant difference in the mean global level of maternal disrupted communication between mothers of pure secure infants (n =30, M = 3.68, SD =

1.26) and mothers of insecure infants, including mothers of vulnerable secure infants (*n* =45, *M* = 4.63, *SD* = 1.30), t = -3.14 (df = 63.78) p = .003.

Post Hoc Hypothesis 2c: The Relationship between Global Ratings of Maternal Disrupted Communication and Infant Attachment Disorganization

Given that global ratings of disrupted affective maternal communication at 4-months failed to distinguish secure from disorganized dyads at a year, and given that mothers of pure secure infants had significantly lower global ratings of disrupted affective maternal communication at 4-months than mothers of insecure infants, **Post Hoc Hypothesis 2c** predicted that mothers of pure secure infants would be assigned significantly lower global ratings of maternal disrupted affective communication at 4-months than mothers of disorganized infants (pure B versus D). This hypothesis was supported.

A t-test revealed a significant difference in the mean global rating of maternal disrupted affective communication between mothers of pure secure infants (*n* =30, *M* = 3.68, *SD* = 1.26) and mothers of disorganized infants (*n* = 17, *M* = 4.56, *SD* = 1.29), t = -2.24 (df = 32.6.78) p = .032.

Post Hoc Hypothesis 2d: The Relationship between Global Ratings of Maternal Disrupted Communication and Infant Attachment Disorganization

Given that global ratings of disrupted affective maternal communication at 4-months failed to initially distinguish secure from disorganized dyads at a year, given that mothers of pure secure infants had significantly lower global ratings of disrupted affective maternal communication at 4-months than mothers of both vulnerable secure infants and disorganized infants, and given the theoretical and clinical interest in more fully differentiating and describing the vulnerable secure group of dyads, **Post Hoc**

Hypothesis 2d predicted that mothers of vulnerable secure infants would be assigned significantly higher global ratings of disrupted affective maternal communication at 4-months than mothers of both disorganized infants (vulnerable B versus D) and mothers of insecure infants (disorganized, resistant, and avoidant) (vulnerable B versus non B). This hypothesis was partially supported.

A t-test revealed a significant difference in the mean global rating of maternal disrupted affective communication between mothers of vulnerable secure infants (n =10, M = 5.5, SD = 1.27) and mothers of insecure infants (disorganized, resistant, avoidant) infants combined (n = 35, M = 4.4, SD = *1.21*), t = 2.44 (df = 13.9) p = .029, with mothers of vulnerable secure infants receiving significantly higher global ratings of disrupted affective communication than mothers insecure infants. No difference was found, however, in the global ratings of maternal disrupted affective communication between mothers of vulnerable secure infants (n =10, M = 5.5, SD = 1.27) and mothers of disorganized infants *(*n = 17, M = 4.56, SD = 1.29), t = 1.84 (df = 25) p = .079.

Summary of Post Hoc Analyses Hypothesis 2

Mothers of pure secure infants were given lower (better) global ratings of disrupted affective communication at 4-months than mothers of vulnerable secure infants, mothers of insecure infants, including mothers of vulnerable secure infants, and mothers of disorganized infants. In contrast, mothers of vulnerable secure infants were given significantly higher (worse) global ratings of disrupted affective communication, thus judged to be more disrupted in their mother-infant affective communication than mothers insecure infants (mothers of disorganized, insecure-resistant, and avoidant infants).

Post Hoc Hypothesis 3

Post Hoc Hypothesis 3a: The Relationship between Maternal Overriding Behavior at 4-Months and Infant Attachment Security

Given that mothers of vulnerable secure infants had significantly elevated total frequency of anomalous behavior scores in comparison to mothers of pure secure infants, discrete behaviors were investigated to determine which behaviors were contributing to distinguishing vulnerable and pure secure dyads**.** As established during Lyons-Ruth et al. (1999b) study, non-blind post-hoc analyses were performed to further delineate the distinctive anomalous maternal behaviors associated with infant disorganization. Given that overriding maternal behavior was the highest frequency discrete behavior across the entire sample, **Post Hoc Hypothesis 3a** predicted that mothers of pure secure infants would exhibit significantly less overriding behaviors at 4-months than mothers of vulnerable secure infants (pure B versus vulnerable B). This hypothesis was strongly supported.

A t-test was performed, revealing a significant difference in the mean number of overriding behaviors between mothers of pure secure infants (n =30, M = 13.53, SD = 5.87) and mothers of vulnerable secure infants (n = 10, M= 22.2, SD = 12.29), t = -3.01 (df = 38) p = .005.

Post Hoc Hypothesis 3b: The Relationship between Maternal Overriding Behavior at 4-Months and Infant Attachment Disorganization

Given that mothers of vulnerable secure infants exhibited significantly more total anomalous maternal behavior and more overriding maternal behavior at 4-months than mothers of pure secure infants, and had been judged to be more disrupted in maternal affective communication at 4-months than mothers of insecure infants, **Post Hoc Hypothesis 3b** predicted that mothers of vulnerable secure infants would exhibit

significantly more overriding maternal behavior at 4-months than mothers of both insecure infants (vulnerable B versus non B) and disorganized infants (vulnerable B versus D) This hypothesis was partially supported.

A t-test was performed, revealing a significant difference in the mean number of overriding behaviors between mothers of vulnerable secure infants (n = 10, M= 22.2, SD = 12.29) and mothers of disorganized infants (n = 17, M= 12.35, SD = 7.14), t = 2.50 (df = 25) p = .014. Although the results for vulnerable B versus non B are in the predicted direction, no statistical difference was found in frequency of overriding maternal behavior between mothers of vulnerable secure infants (n = 10, M= 22.2, SD = 12.29) and mothers insecure infants (n = 35, M= 13.56, SD = 10.39), t = 2.03 (df = 12.80) p = .064.

Summary of Post Hoc Analyses Hypothesis 3

Mothers of vulnerable secure infants were found to exhibit significantly more overriding maternal behaviors at 4-months than mothers of both pure secure infants and mothers of disorganized infants.

Table 10.

Hypotheses Summary of Results Table

Hypotheses	Test Mean (SD) or % Ever	Statistic	P =
Planned			
Total Anomalous Behavior	B vs non-B	t = .047	.962
	27.1 (11.7) vs 27.2 (12.3)		
	D vs non-D	t = .771	.447
	29.1 (11.6) vs 26.6 (12.0)		
	D vs B	t = .589	.602
	29.1 (11.6) vs 27.1 (11.7)		
	D-ness	r = .264	**.022**
Global Rating	B vs non-B	t = - .794	.430
	4.1 (1.4) vs 4.3 (1.2)		
	D vs non-D	t = - 1.051	.286
	4.5 (1.2) vs 4.1 (1.4)		
	D vs B	t = -1.074	.290
	4.5 (1.2) vs 4.1 (1.4)		
	D-ness	r = .313	**.006**
Anomalous Response to Distress[a]	B vs non-B	$\chi 2 = 4.04$	**.040**
	42.5% vs 65.7%		
	D vs non-D	$\chi 2 = 4.73$	**.030**
	76.5% vs 46.6%		

(table continues)

Hypotheses	Test Mean (SD) or % Ever	Statistic	P =
Anomalous Response to Distress	D vs B	$\chi 2 = 5.52$	**.019**
	76.5% vs 42.5 %		
	D-ness	r = .30	**.008**
Aggressive Response[a]	B vs non-B	$\chi 2 = 3.60$	**.058†**
	20% vs 40%		
	D vs non-D	$\chi 2 = 5.91$	**.031**
	52.9% vs 22.4%		
	D vs B	$\chi 2 = 6.18$	**.013**
	52.9% vs 20%		
	D-ness	r = .290	**.012**
Post Hoc			
Total Anomalous Behavior	pure B vs vuln B	t = 3.8	**.000**
	23.5(7.9) vs 37.8 (15.0)		
	pure B vs non-B[b]	t = 2.1	**.031**
	23.5 (7.9) vs 31.6 (13.5)		
	pure B vs D	t = 1.7	**.059†**
	23.5 (7.9) vs 29.1 (11.6)		
	vuln B vs D	t = 1.5	.137
	37.8 (15.0) vs 29.1 (11.6)		
	vuln B vs non B	t = 2.0	.068
	37.8 (15.0) vs 27.4 (12.2)		

(table continues)

Hypotheses	Test Mean (SD) or % Ever	Statistic	P =
Post Hoc			
Global Rating	pure B vs vuln B	t = 3.1	**.001**
	3.6 (1.2) vs 5.5 (1.2)		
	pure B vs non-B[b]	t = 2.1	**.031**
	3.6 (1.2) vs 4.6 (1.3)		
	pure B vs D	t = -2.2	**.032**
	3.6 (1.2) vs 4.5 (1.2)		
	vuln B vs non B	t = 2.4	**.029**
	5.5 (1.2) vs 4.4 (1.2)		
	vuln B vs D	t = 1.8	.079
	5.5 (1.2) vs 4.5		
Overriding Response	pure B vs vuln B	t = -3.01	**.005**
	13.5 (5.8) vs 22.2 (12.2)		
	vulnB vs non B	t = 2.188	**.048**
	22.2 (12.2) vs 12.35 (7.14)		
	vuln B vs D	t = 2.649	.064
	22.2 (12.2) vs 13.5 (10.3)		

(table continues)

Note.

Total Anomalous Behavior – Total frequency score of anomalous maternal behavior;

Global Rating = Global rating (1-7) of maternal disrupted affective communication;

B vs non-B = Secure versus Insecure;

D vs non-D = Disorganized versus non-Disorganized;

D vs B = Disorganized versus Secure;

Dness = Level of infant disorganization;

Pure B vs Vuln B = Pure Secure versus Vulnerable Secure;

Pure B vs non-B = Pure Secure versus Insecure, including Vulnerable Secure;

Pure B vs D = Pure Secure versus Disorganized;

Vuln B vs D = Vulnerable Secure versus Disorganized;

Vuln B vs non B = Pure Secure versus Insecure.

[a]Defined as *Yes* or *No* when testing attachment categories B vs non B, D vs non D, D vs B; defined as *Number of Events* when testing D-ness;

[b]Non B = Disorganized, Resistant, Avoidant and Vulnerable Secure

Highlighted values are significant, $p < .05$. † = trend, $p < .06$.

Table 11.

Results Summary Table

	Planned Analyses				Post Hoc Analyses				
Anomalous Maternal Behavior	B vs non B	non D vs D	B vs D	Dness	pure B vs vuln B	pure B vs non B	pure B vs D	vuln B vs D	vuln B vs non B
Total Frequency									
Anomalous Behavior	NS	NS	NS	*[a]	***	*	†[d]	NS	NS
Global Rating	NS	NS	NS	**	**	*	*	NS	*
Total Anomalous Response to Infant Distress	*[b]	*	*	**	----------				
Aggressive Response	†[c]	*	*	*	----------				

	Post Hoc Analyses				
Override	----------	**	----------	*	NS

Note.

------ = no analysis performed.

Global Rating = Maternal Level of Disrupted Affective Communcation (1-7) based on 9 Select Behaviors;

Override = Maternal Override during Infant Neutral or Positive Cue;

B vs non B = Secure versus non-Secure;

Non D vs D = Disorganized versus non-Disorganized;

B vs D = Secure versus Disorganized;

Dness = Level of Infant Disorganization;

(table continues)

Pure B vs vuln B = Secure with low-D-ness versus Secure with high-D-ness (vulnerable B);

Pure B vs vuln B = Secure with low-D-ness versus non-Secure, including Secure with high-D-ness;

Pure B vs D = Secure with low-D-ness versus Disorganized;

Vuln B vs D = Secure with high-D-ness (vulnerable B) versus Disorganized;

Vuln B vs non-B = Secure with high-D-ness (vulnerable B) versus non-B.

[a] Statistical significance reduced after controlling for maternal ethnicity ($p = .112$) and age ($p = .071$);

[b] statistical significance reduced to a trend ($p = .056$) after controlling for infant gender;

[c] $p = .058$;

[d] $p = .059$.

* $p < .05$. ** $p < .01$. *** $p < .001$,

† $p < .06$.

Chapter Six

Discussion

This study set out to identify a select array of maternal behaviors projected to be salient critical predictors of disorganized infant attachment. Specifically, the study aimed to determine whether selected anomalous maternal behaviors, assessed at 4-months, could distinguish attachment patterns at a year. Three primary hypotheses regarding maternal behavior were investigated. The results of this study, summarized in Table 11, suggest that selected anomalous maternal behaviors capture disturbances in maternal affective communication associated with disorganized infant attachment at one year.

As predicted, increased total frequency of anomalous maternal behavior at 4-months and higher 4-month maternal ratings of disrupted affective communication were both related to elevated levels of infant disorganization at one year. However, contrary to expectations, it was not the quantity but the quality of anomalous maternal behavior at 4-months that best distinguished future disorganized from organized dyads.

The link between anomalous maternal responding to infant distress and infant disorganization

Specifically, evidence of anomalous maternal responding to infant distress powerfully differentiated mothers of disorganized infants from mothers of organized and secure infants. Mothers of future disorganized infants were more likely to exhibit anomalous responses to infant distress at 4-months than were mothers of future secure or organized infants. Such anomalous responses included: not attempting to soothe a

distressed infant, or not responding to a distressed infant in any way; distracting an infant during distress, or overriding a distressed infant's cues; responding to a distressed infant with positive affect or laughter; heightened stimulation; and pleading, or role reversed behavior in response to infant distress. Anomalous maternal responding to infant distress was also correlated with level of infant disorganization, such that the more anomalous responses to infant distress a mother exhibited at 4-months, the more indices of disorganization her infant was likely to display at one year.

Anomalous maternal responding to infant distress distinguished mothers of future insecure infants from mothers of secure infants as well. However, after controlling for infant gender, this relationship was shown to be a trend, suggesting that anomalous maternal responding to infant distress is a stronger predictor of infant attachment disorganization than of infant attachment insecurity more generally. Although infant gender may account for some of the variance in infant attachment security, it does not independently predict infant attachment security or insecurity.

These results are highly consistent with current theories linking anomalous parental behavior with infant attachment disorganization, and lend further explication to earlier research, which will be detailed below. The "relational diathesis" model of disorganized attachment (Lyons-Ruth, Bronfman & Atwood, 1999a) highlights the notion that potentially devastating moments of infant stress and threat, which can be tempered by the comfort and soothing of a trusted caregiver, are exacerbated when attachment figures persistently *misattune* to an infant's affective communications. In this model, chronic parental affective misattunement is deemed frightening, as the infant is left unable to influence the caregiver in the direction that he or she needs. The effects of this

become most pronounced when the infant is distressed, with heightened states of unrepaired negative affect to manage on his or her own. Insufficient parental protection, comforting, and containment in the face of such upset is expected over time to lead to the breakdown of coherent mental and behavioral processes and result in the disorganization of attachment strategies at one year.

This theory gained initial support in Lyons-Ruth et al.'s (1999b) study of high-risk dyads, which found that mothers of disorganized infants displayed elevated levels of affective communication errors at 18-months, marked by lack of responding, inappropriate responding, and contradictory responding to infant cues. The current study offers further empirical support to this theory, while verifying and extending Lyons-Ruth's findings in several ways. In the present study, it is not solely maternal affective errors that predicted disorganization, but maternal affective errors during moments of infant distress. Within the current low-risk sample, 76% of mothers of future disorganized infants exhibited anomalous interactive behaviors when their infants became upset, which was a significant contrast to the 42% of mothers of future secure infants and 46% of mothers of future organized infants who did the same.

Via non-blind, post hoc analyses, Lyons-Ruth et al. (1999b) retrospectively examined the range and frequency of atypical behaviors exhibited by mothers of disorganized infants in their Cambridge sample. At infant age 18-months, mothers of disorganized infants were found to have been three times more likely to laugh in response to infant distress and to show no attempt to soothe their distressed infants. The current results, which are obtained from planned empirical tests that set out to investigate, replicate, and expand upon Lyons-Ruth's original observations, identified a wider scope

of anomalous maternal distress responses shown to contribute to disorganized infant attachment behavior (including: no response to distress; maternal distract or override during distress; maternal stimulate during distress; maternal positive during distress; and maternal plead or role reversal during distress). In contrast to detecting such maternal disruptions at 18-months, the present study was able to observe these anomalous maternal responses as early as 4-months. As the current sample is comprised of low-risk dyads, this study confirms that anomalous maternal response to infant distress is a characteristic feature of disorganized dyads in low-risk samples, and can be detected as early as 4 months.

Lyon's Ruth's (1999b) findings were corroborated by naturalistic observations of the same group of high-risk mothers in interaction with their infants at home. The cross-situational stability of these findings underscores the hypothesis that atypical maternal behaviors linked to disorganized ratings are a pervasive feature of the dyadic exchange. Kelly (2004) too, noted stability of levels of disrupted affective communication across time, with mothers who displayed high levels of disrupted affective communication at 4-months apt to display high levels of disrupted affective communication again at 14 months. Kelly's results lend further support to the theory that anomalous maternal behaviors detected in the lab are likely to reflect characteristic and stable aspects of the mother-infant dynamic. That mothers of future disorganized infants in the current study evidenced increased anomalous responses to infant distress at 4-months, and their infants displayed high levels of disorganization 8-months later speaks to the probability that there is a persistent and stable affective interactive disturbance within these dyadic groups. These results also suggest that infants exposed to anomalous maternal distress

responses at 4-months are at increased risk for developing a disorganized style of attachment with their mother 8-months later.

While the present study did not assess infant distress on its own, maternal behavior was coded during instances when infant distress was manifest. Mothers of disorganized infants displayed marked difficulty tolerating moments of infant distress, and were more likely to respond to infant distress in irregular and anomalous ways. They often engaged, for example, in desperate-seeming efforts to extinguish their infant's crying, fussing or glum appearance by stimulating the infant, distracting the infant or overriding the infant's cues. Such anomalous responses lacked reflection and containment of the infant's upset and appeared, repeatedly, to escalate the infant's distress.

One mother (1021), for instance, whose baby was crying, spitting, drooling and coughing, responded by rapidly calling her baby's name four times. As her infant continued to cry, cough, spit and drool, evidencing heightening states of dysregulation, she responded with increasing intensity, attempting to top her infant's volume. She began quickly shaking her infant's hand while continuing to speak rapidly: "'D', 'D', I promise we'll go, drrrrrrr..." (makes trilling sound).... "'D', remember this, drrrrrrrrr, drrrrrrr," (abruptly switches to clicking tongue) "'A'...clk, clk, clk, clk, clk, drrrrrrrrrr...." (smiles) "drrrrrrrrrr".

Another mother (1159) was extremely overriding and intrusive, continually poking and sticking her finger into her infant's mouth, orally teasing, and persisted at poking and teasing even as her infant fussed and cried in response. This mother did not, at any point, show a hint of recognition that there might be a relation between her infant's

distress and her own actions. In one exchange, the infant fussed and the mother overrode this plea, directing: “Where’s your teeth?” The infant fussed again and the mother poked at the infant’s hand. As the infant continued fussing, the mother replied, “Where’s your teeth?...Where’s your teeth?”, rubbing her finger back and forth across the infant’s mouth as she spoke. The infant kicked and the mother again overrode this cue with her own agenda: “Where’s your teeth?”, as she pressed her hand into the infant’s stomach. The infant began fussing again in response and the mother persisted at her attempts to draw the infant’s attention elsewhere: “Where’s your teeth?” again pressing the infant’s stomach. As the infant fussed more, the mother attempted an alternate tact of distraction, grabbing the infant’s foot, she insisted: “Whose foot? Whose foot?”

A third mother (1218) was again highly over-stimulating with her infant, yet displayed no awareness of the link between her non-stop, highly arousing style and her infant’s distress. In one instant, the infant cooed and the mother responded by crashing her hand onto the infant’s stomach. The infant then fussed and the mother waved her fingers wildly, “oh, oh, oh, oh...” The infant fussed, and again the mother rapidly waved her fingers. Moments later the mother responded to the infant’s fussing by bopping the infant on the nose while repeatedly topping: “gonna get you!” Moments after that, as the infant continued to fuss, the mother alternated back and forth between rapidly waving her fingers in the infant’s face, bopping the infant on the nose, and grabbing the infant’s feet.

Anomalous maternal response to infant upset could involve added or alternate behaviors, such as meeting the distressed infant with positive affect, laughter, pleading, or role reversed behavior, or not responding, or not attempting to soothe the distressed infant in any way. As an example, one mother (1120) responded to her infant’s tears by

bursting into laughter and then a smile. This same mother had laughed earlier when her infant began whimpering and on another occasion had mocked her crying infant by realistically mimicking the baby's upset. On another occasion this same mother responded to her infant's distress by pleading and begging her infant, "Just a little while longer? Please? Another mother (1184) was slow to respond to her infant, and displayed an extended pause two times before responding to her infant's distress.

As evidenced in these anecdotes, such anomalous maternal responses to infant distress lacked reflection and containment of the infant's upset, and served repeatedly to prolong, perpetuate, and escalate infant states of agitation and upset. Slade (Slade et.al., 2005) has noted that it is the mother's capacity to understand and reflect on the infant's mental state that gives the infant the felt experience of comfort and soothing. As elucidated by Bion, when the mother is able to take in, reflect on, and mirror back the infant's internal distress, she "transforms the unpleasant sensations and provides relief for the infant who then reintrojects the mitigated and modified emotional experience" (cited in Gergely & Watson, 1996). For Fonagy and his colleagues, the parental propensity to make sense of and adequately contain the infant's negative affect states by re-presenting them back to the infant in a comprehensible and more manageable form is a means of external regulation of the infant's affect and emotions, and is at the core of infant attachment security. Maternal misattunement, in contrast, and lack of contingent affective mirroring and "marking" is hypothesized to activate states of stress and dysregulation in the infant, and is believed to underlie infant attachment disorganization (Fonagy,1995, 1998; Fonagy et. al, 2002). The current results provide confirmation for these hypotheses,

as they verify that elevated indices of misattuned 4-month maternal responses to infant distress are associated with increased markers of infant disorganization at a year.

It is notable that the mothers illustrated above, who responded to their infant's distress at 4-months by distracting, overriding, or excessively stimulating their infants, or by laughing or turning positive, appeared themselves to be internally disordered and overwhelmed by their infants' states of distress. At 12-months, their infants went on to display elevated indices of disorganization. Thus, while striving, at times, it seemed, to take control of the exchange and to halt their infant's anguish, these mothers instead bombarded their infants with their own agitated, distressed, fearful, and disordered-seeming states, which escalated the infant's upset. According to Fonagy (Fonagy et.al., 2002), mothers who have not adequately worked out their own intrapsychic conflicts, and who are unable to tolerate their own negative affects, may have difficulty tolerating their infant's negative affect states and become affectively dysregulated in the face of infant upset.

These maternal responses are consistent with theories linking disorganized infant attachment with frightened and disorganized maternal mental states related to unresolved maternal loss and trauma (Main & Hesse, 1990). When a mother with a history of loss or abuse has received inadequate buffering against her own distressed or fearful affects, she is unlikely to possess means to soothe and comfort her distressed infant (Fraiberg, Adelson & Shapiro, 1975; Lyons-Ruth et al., 1990; Lyons-Ruth et al. 1999a). Instead, unresolved states of maternal fear and distress are likely to be reactivated in the presence of infant distress and need, leading to a decreased or lack of tolerance for negative infant affective states. This may result in reduced awareness and attention to negative infant

affect, and to an array of anomalous responses when distressed infant affect is present. A mother's segregated and unintegrated mental contents and unexamined attachment-related fears and traumas are also likely to become activated whenever the infant's attachment behavioral system is aroused. Due to the inevitable activation of a mother's own overwhelming states of fear and distress, a mother with unresolved loss or trauma is unlikely to be able to attune to her infant's attachment behavior and fear-based cues. In fact, the stronger a mother's need to prohibit arousal of her own negative affect and segregated mental content, the less apt she is to affectively attune to her infant's attachment needs and signals, and to respond sensitively to her infant's distress (Lyons-Ruth et al., 1990). As noted earlier, regardless of whether parental behavior is in itself frightening or frightened, the maternal inability to provide an adequate level of responsivity or care during moments of distress or need, and to adequately regulate and soothe heightened states of infant distress, is expected to result in the collapse of any organized strategy of coping and bring about disorganization (Lyons-Ruth & Spielman, 2004).

Although maternal histories of loss and trauma are unknown for the current sample, episodes of anomalous maternal responding to infant distress were elevated within the cohort of disorganized dyads. These responses, which seemed to reflect maternal intolerance for negative infant affect, and maternal mental and affective dysregulation in the face of infant distress, can be said to contribute to the transmission of disorganized mental and emotional states from mother to child.

As suggested earlier, maternal efforts such as distracting, overriding, and stimulating in the face of infant distress, seemed desperate attempts to take control of the

exchange and eradicate infant negative affect. The controlling facet of these caregiving behaviors has been described by attachment theorists as an indicator of an underlying helplessness and vulnerability (Lyons-Ruth & Spielman, 2004). Lyons-Ruth and her colleagues (1999b) have theorized that highly imbalanced patterns of relating, marked by the overriding of infant initiatives and devoid of mutual give and take, will leave the infant without control or impact in the relationship, activating overwhelming, unregulated states of stress and fear, and resulting in the disorganization of attachment strategies. In the current study, heightened states of unrepaired negative affect were observed clinically when mothers overrode infant expressions of distress in a persistent manner.

. Research has shown that mothers who lack the capacity to reflect on and make meaning of their infant's behavior or distress engage in more anomalous maternal behavior (Grienenberger, Kelly & Slade, 2005). Fonagy (Fonagy et.al., 2002) hypothesizes that mothers with unresolved attachment-related conflicts who are unable to tolerate their own negative affects, will respond to negative infant emotions with realistic negative responses, which are devoid of "markedness" or affectively non-contingent. This was observed on occasion, when mothers responded, for example, to infant crying with mockery or mock crying, or to dampened infant affect by becoming angry and threatening. In such instances, mothers were clearly relaying their own real, negative feelings aroused by their infant's upset, and their responses lacked affective marking. Yet, these instances were rare, and there were varied other anomalous ways in which mothers responded to infant distress. They might for instance, as described earlier, attempt to distract the infant, override the infant's affective cueing, stimulate the infant, or not respond at all. So while on occasion the affect was congruent yet unmarked and realistic,

this appeared to occur, based on clinical impression, only a small proportion of the time. Noncongruent affective reflection was also evident on occasion, as when mothers laughed or smiled in the face of infant upset. However, this was a low frequency event, compared to other anomalous maternal modes of responding to infant upset, such as maternal stimulate or distract. These latter behaviors occurred with much greater frequency in the current cohort of future disorganized dyads.

The link between aggressive maternal behavior and infant disorganization

Mothers of future disorganized infants were found, as hypothesized, to be significantly more aggressive with their infants at 4-months than were mothers of future secure or organized infants. Maternal aggression was evident not only when infants were distressed, but also when they disengaged from their mothers, as well as when they displayed neutral or positive cues. This was evidenced by moments of maternal mocking, threatening, criticizing, disapproving, and responding to infants with disgust. At 4 months, such behaviors were displayed by 52% of mothers of future disorganized infants, while only 20% of mothers of future secure infants, and 22% of mothers of future organized infants ever displayed such behaviors. Maternal aggression was also associated with level of infant disorganization, such that higher levels of maternal aggression at 4-months was linked to increased indices of infant disorganization at one year. At times mothers became disapproving, rejecting or threatening when infants turned away or began to fuss and cry.

One disorganized mother's interactions (1083) were marked by a constant undertone of threats, taunts, mockery, disdain, and hostility, along with ongoing mixed and contradicting messages, such as smiling while threatening or mocking. While this mother did on occasion comment appropriately, recognizing and acknowledging her infant's gestures or vocalizations, she quickly reverted back to an aggressive and overriding mode of engagement. At the onset, for example, she leaned in toward her 4-month-old infant and threateningly warned:

> "Whatever you do...don't grab the wire!" (referring to the microphone wire)...She then grabbed and shook the infant's hands while threateningly warning: "Don't grab the wire --ok?... Because if you do... (said in a threatening/mocking tone, which she punctuated by poking the infant on the nose)...then we're gonna have some problems..." Continuing to threaten, she repeated in a staccato rhythm while bopping infant on the nose: "We're gonna have some problems!"

Moments later this mother commented to her infant:

> "You know where you are? You slept in the cab coming here...You slept in the cab coming here." She then began waving the infant's hands, while taunting and mocking in a singsong rhythm: "Yes, you did, yes you did, yes you did...And so...because of that...you don't know where you are!" She continued challenging and taunting: "I know where you are, but you-don't-know-where–you-are!"

This infant frequently appeared wary of the mother, whose approaches were continually aggressive, hostile, and contradictory. This was most powerfully evident when the mother beseeched the infant to "Come to mommy...", which was followed by a loud and abrupt

taunt: “But you can’t!”. In perhaps one of the most disturbing exchanges, this same mother declared with disdain:

> “That’s right...Your gonna try and get out...and we don’t want you to get out because you know what’s gonna happen...?” She then leaned in and began threatening in an extremely sadistic manner: “Your gonna fall, fall, fall, fall....(smiling)...right to the floor....Yes you are...(still smiling)...And guess what?...(threatening)...Mommy don’t want you to fall on the floor!”

These observations are consistent with Main’s theories linking frightening and threatening maternal behavior with infant disorganization, consistent with results from studies by Schuengel, Bakermans-Kranenburg, vanIJzendoorn (1999) and by Abrams, Rifkin & Hesse (2006). These studies demonstrated that threatening maternal behaviors at 10 months in the home, and at 12-18 months during play sessions in the lab, predicted disorganized infant attachment classifications one week to five months later. They are also in line with Lyons-Ruth, Bronfman & Parsons (1999) who found that negative-intrusive maternal behavior was significantly associated with level of infant disorganization at 18 months.

Extending upon these earlier findings, the current study was able to detect threatening and aggressive maternal behaviors as early as 4-months, which was linked with attachment disorganization eight months later. This was 6 to 14 months earlier than the assessment points in any of the above studies. Thus, the current study offers empirical confirmation that aggressive and threatening caregiving behavior associated with infant attachment disorganization may be successfully detected as early as 4-months. The current investigation was also able to delineate a scope of negative, frightening, and

hostile maternal behavior that coalesced under the rubric of maternal aggression, including threatening, criticizing, mocking, disapproving, and maternal responding with disgust, which could all be observed within the 4-month mother-infant face-to-face exchange.

However, not all of the mothers of disorganized infants evidenced such extreme, extensive, and blatant forms of maternal aggression as that detailed above. Some of the mothers of disorganized infants who displayed aggression revealed only mild forms of maternal disapproval or criticism. One mother, for example, whose infant kept turning away (1020) responded by criticizing: "Come on, don't get cranky!" This same mother displayed only one additional moment of gentle disapproval as the infant looked down yet again: "Come on...!" Another mother (1179) initially responded to her infant's fussing with a sympathetic voice tone and affective mirroring: "Talk to me... What?... What?", yet a moment later she suddenly and abruptly began mocking the infant through her derisive vocal rhythm and facial gesture: "Yuh, yuh, yuh". A different mother (1218), aggressively taunted: "It's mine!...It's mine!". This particular mother displayed no further indices of aggression throughout the two and a half minute protocol, though she did reveal other indices of anomalous interactive maternal behavior. Yet another mother (1185) adaptively commented on her infant's action: "Oh your covering your eyes," then quickly conveyed her gentle disapproval: "Noooo!" Moments later, as her infant sat quietly, the mother began gently hissing at her infant, which led the infant to gaze back with a look of startle. Then in the midst of labeling her own facial features, "...this is your mommy...mommy eyes...[mommy] nose..." she suddenly and frighteningly shouted

out: "[Mommy] mouth!" Soon after, she began kissing her infant's feet, then suddenly in a menacing tone she threatened: I'm gonna tickle your feet."

Aggressive maternal responding to infant distress distinguished mothers of future insecure infants from mothers of secure infants as well. However, this relationship was shown to be a trend, suggesting that aggressive maternal responding is a stronger predictor of infant attachment disorganization than of infant attachment insecurity more generally.

The Hostile-Helpless Internal Model of Disorganized Attachment

Differentiating disorganized infants with secondary classifications of insecure versus secure attachments, Lyons-Ruth & Jacobvitz (1999c) discovered that mothers of disorganized/insecure infants displayed more hostile-aggressive parenting behaviors, while mothers of disorganized/secure infants displayed more indices of fear and withdrawal. Adding support to Main's theory of attachment disorganization linked to unresolved maternal trauma, mothers displaying more hostile-intrusive maternal behavior were found to have histories of severe physical abuse, while mothers who responded to infant attachment seeking with physical and emotional withdrawal were found to have histories of sexual abuse.

Lyons-Ruth & her colleagues (1999a, 2004) went on to describe a hostile-helpless internal model of attachment, which was evident among mothers of disorganized infants whose histories were largely marked by trauma. While those with histories of physical abuse were found to be more hostile and aggressive, and those with histories of sexual

abuse appeared more passive, helpless, and withdrawing, Lyons-Ruth argued that both presentations are facets of a polarized hostile-helpless internal working model that is dually contained within each group. As she explains, those who express only the hostile side of this internal model of engagement are apt to have difficulty tolerating and acknowledging their own underlying feelings of fear, vulnerability and helplessness, likely showing a similar intolerance for their infant's expressions of vulnerability, helplessness, and fear. In contrast, mothers who display the helpless aspect are believed to be fearful of identifying with the aggressor. They deny their own aggressive urges and appear passive and powerless to meet their infants' needs for comfort and soothing. Neither group of parents is adequately able to attend to their infant's attachment needs. The hostile-helpless parental stance therefore captures the dual victim/aggressor, controlled/controlling relational paradigm, which is exemplary of the parent's own relational history and internal working model.

Thus, according to Lyons-Ruth (Lyons-Ruth & Spielman, 2004), parents who engage in hostile caregiving behaviors are likely defending against overwhelming states of underlying helplessness, fear, and vulnerability, which they attempt to manage by controlling others. Alternately, parents who reveal helpless or fearful caregiving behaviors may be hypervigilant to the needs of other, while disconnecting from their own needs, affects and aggression. Easily overwhelmed by others' needs, they may withdraw from interaction in an effort to manage their elevated states of anxiety and fear aroused during social relating.

Maternal withdrawal, fear, and dissociation were not initially coded, due to the limited observation of these behaviors during the development phase of the coding

scheme, as well as the difficulty achieving reliability on these more subtle features of maternal interactive behavior. Retrospectively, however, the protocols of the disorganized dyads were informally examined for indicators of maternal withdrawal, preoccupation, fear, and dissociation. Although this was not empirically tested, many cases were anecdotally noted. One mother (1081), for example, appeared highly depressed, preoccupied and withdrawn, and it appeared to be an effort for her to engage with her infant. This infant appeared hypervigilant to the mother's affects and responses, remaining highly positive and striving, it seemed, to draw the mother out. This mother repeatedly misinterpreted the infant's positive vocalizations asking: "What's wrong?" as the infant playfully cooed. This mother also looked down repeatedly and also looked at the camera. She never seemed fully present with her infant, but instead appeared to be absorbed elsewhere.

Another mother (1103) appeared self-conscious, and several times looked at the camera. There were a number of occasions when she did not respond to her infant's positive cues, and often manipulated her infant's hands or feet while seeming preoccupied internally, and without visually attending to her infant. Nevertheless, there were other instances when she did follow the infant's perspective, comment on the infant's activity, and on occasion, respond to the infant's vocalizations.

In another dyad (1184), the infant, again, had to work hard to get an enlivened response from the mother. While this mother largely gave her infant space to initiate, allowing the infant to take the lead without interfering and imposing her own agenda, she was slower to respond to both positive and negative cues, and displayed an extended pause two times before responding to her infant's distress.

A fourth mother (1185), who was described above interacting at times aggressively, appeared at other times frightened herself. As this occurred, she often made very loud, abrupt, sudden movements, which in turn startled her infant. While this mother was occasionally responsive to her infant's positive vocalizations and actions, the infant often looked anxious and uneasy, and there were three occasions when this mother smiled or laughed in response.

These anecdotes all echo Main's descriptions of unresolved and disorganized maternal states of mind, linking frightened or frightening maternal behavior with intrusive, preoccupying, and/or frightening maternal thoughts, which are triggered by idiosyncratic associations not readily identifiable or understood by the infant (Hesse & Main, 1999). They also reiterate Lyons-Ruth's (Lyons-Ruth, Bronfman & Parsons, 1999) hypothesis surrounding "competing strategies" or contradictory parental messages within the same exchange. These, Lyons-Ruth maintains, are likely to be expressed when a parent is fearful of her own longings for attachment, or fearful of her own attachment figures' hostility, leading to the maternal inability to respond appropriately, which may lead to states of infant fear and helplessness, and to the likely breakdown of any organized attachment strategy.

Relation between frequency of anomalous maternal behaviors and infant attachment disorganization

Contrary to expectations, mothers of future disorganized infants did not exhibit significantly greater frequency of anomalous behaviors at 4-months than mothers of

secure or organized infants. Nor were there significant differences in the mean number of anomalous maternal behaviors between mothers of insecure and secure infants. Lyons-Ruth & associates (1999b) found that mothers of disorganized infants exhibited significantly more atypical behaviors in the strange situation at 14-months than mothers of organized infants. Grienenberger, Kelly & Slade (2004) replicated these findings in their low-risk sample, again demonstrating that mothers of disorganized infants revealed more atypical behaviors at 14-months than mothers of organized infants. In the current study, however, as described earlier, it was not so much the quantity of anomalous maternal behavior that best distinguished disorganized from organized or secure dyads, but the quality of anomalous behavior. At 4-months, mothers of future disorganized infants were found to be significantly more aggressive with their infants, while also responding more anomalously to infant distress.

Initially, the total amount of anomalous maternal behavior observed at 4-months was found to be correlated with the level of infant disorganization observed at a year. These results are consistent with other studies, such as Lyons-Ruth et al. (1999b) and Goldberg et al. (2003), which had found significant associations between the frequency of anomalous behavior as measured by the AMBIANCE (Bronfman et al., 1999) and the level of infant disorganization at a year. Although in both of the above cases, maternal behavior and infant behavior were rated simultaneously, at 12 and18 months respectively, which contrast to the current study, which rates maternal behavior at 4-months and infant behavior 8-months later.

After controlling for the demographic variables ethnicity and age, however, the correlation between total anomalous behavior and level of infant disorganization lost

statistical significance, suggesting that maternal age and ethnicity account for some of the variance in level of infant disorganization. Although neither age nor ethnicity alone predicted level of infant disorganization, they did reduce the strength of association found between amount of anomalous maternal behavior and infant level of disorganization within the current sample. As such, ethnicity and age act as confounding variables, weakening the impact of total anomalous maternal behavior on infant disorganization and insecurity.

Unexpectedly, there were no differences in global ratings of disrupted affective communication at 4-months between mothers of disorganized infants and mothers of secure or organized infants. Nor were there statistical differences in the mean global ratings between mothers of insecure and secure infants. These findings are inconsistent with Kelly's (2004) study which showed that disrupted levels of maternal affective communication at 4-months were associated with disorganized and insecure attachment status at 14 months. Goldberg et al. (2003) and Lyons-Ruth et al. (1999b) had also shown associations between level of maternal disrupted affective communication and infant attachment status. However, 4-month global ratings of disrupted affective communication were correlated, as expected, with 12-month levels of infant disorganization, meaning that mothers who were judged to be more disrupted in their affective communication at 4-months had infants who displayed higher indices of disorganization at a year. These findings are consistent with Lyons-Ruth et al.'s (1999b) findings that linked 18-month global levels of disrupted maternal affective communication with 18-month levels of infant disorganization. In an attempt to better comprehend all of these unexpected

findings, post hoc tests went on to investigate the role of anomalous maternal behavior in relation to D-ness and attachment security.

The identification of a pure secure and vulnerable secure subset

Post hoc analyses demonstrated that mothers of secure infants who displayed more indices of disorganization at a year (*vulnerable secure*) engaged in significantly more anomalous maternal behaviors at 4-months than mothers of secure infants who displayed no indices of disorganization at a year (*pure secure*). In addition, mothers of vulnerable secure infants were judged to significantly more disrupted in their affective communication at 4-months than mothers of pure secure infants, and exhibited significantly more overriding behaviors at 4-months. Mothers of vulnerable secure infants were judged to more disrupted in their affective communication at 4-months than mothers of insecure infants as well, and displayed more overriding maternal behaviors at 4-months than mothers of disorganized infants.

In contrast, mothers of pure secure infants exhibited less total frequency of anomalous behavior at 4-months than mothers of either insecure infants or mothers of disorganized infants, although the latter relationship is a trend ($p=.059$). Mothers of pure secure infants were also judged to be less disrupted in their affective communication at 4-months than mothers of both insecure and disorganized infants.

These findings suggest that there are two distinct groups of securely classified infants in this sample, those with lower disorganized ratings at a year and those with higher disorganized ratings at a year. The *pure secure group* of infants showed no

indications of disorganization at a year and had mothers who engaged in significantly less anomalous maternal behaviors at 4-months. In contrast, the *vulnerable secure group* of infants displayed elevated indices of disorganized behaviors at a year, and had mothers who exhibited significantly more anomalous maternal behaviors at 4-months. Thus the *pure secure* group of infants looked better at a year and had mothers who had also looked better at 4-months. The *vulnerable secure* group of infants, on the other hand, appeared to be at risk at a year, and had mothers who had also appeared to be at risk at 4-months.

The lack of initial association found between quantity of anomalous maternal behavior and infant attachment security/disorganization was strongly affected by the presence of the vulnerable secure group intermixed with the pure secure group. Mothers of vulnerable secure infants displayed significantly more anomalous maternal behaviors than mothers of pure secure infants, while mothers of pure secure group displayed substantially less anomalous maternal behaviors than mothers of disorganized or insecure infants.

Distinct from disorganized mothers, who often became aggressive or responded to infant distress in an anomalous manner, mothers of vulnerable secure infants not only engaged in more overall anomalous maternal behavior, but also engaged in more overriding maternal behavior than mothers of both pure secure and disorganized infants. This involved overriding their infant's positive and neutral cues with their own agenda, directing their infant to a new activity while the infant was clearly engaged, or persisting with an activity when their infant showed disinterest, fatigue, or a desire to do something else.

One vulnerable secure mother (1171), for example, was profoundly intrusive with her baby, poking and prodding at her infant non-stop, as she continually drove the interaction without pause. While rarely communicating verbally to her infant, she repeatedly directed her infant "to smile at mommy," yet, she took no notice when her infant did in fact smile back. Displaying decreased attention to her infant's cues and signals overall, she was unable to take her infant's perspective.

Another vulnerable secure mother (1095) was upbeat and non-hostile throughout the protocol. However she was very directive of the interaction and showed little response on the few occasions when her infant initiated a communication. This infant spent a great deal of time avoiding the mother's gaze.

As Lyons-Ruth and colleagues (1999b) have proposed, highly imbalanced patterns of relating, marked by the overriding of infant initiatives and devoid of mutual give and take, are likely to leave an infant without control or agency in the relationship, which is apt to activate overwhelming, unregulated states of stress and fear and result in attachment disorganization. While vulnerable secure infants were not at one year classified with disorganized attachment patterns, they did evidence heightened indices of disorganization in relation to their caregiver.

Vulnerable secure mothers also had significantly higher mean global ratings of disrupted maternal communication than mothers of pure secure or insecure infants. These distinctions further highlight the existence of two highly distinct groups of secure dyads. While it is unclear whether vulnerable secure dyads with similar profiles are present in other samples, it is notable that a segment of secure infants have historically mystified investigators, by appearing more vulnerable and displaying more problematic

and less optimal outcomes (e.g., Fish, 2000; Belskey & Fearon, 2002). The identification of a vulnerable secure group, which is comprised of 25% of the secure dyads in the current sample, matches the percentage of securely-rated infants elsewhere (e.g., see above) with non-optimal long-term outcomes. This calls into question whether this subgroup might be capturing a more high-risk subset of secure infants that had up until now been unidentified.

There is also a question whether this subset of *pseudo secure* infants might be better classified within the insecure category of attachment. Given that vulnerable secure infants display elevated indices of disorganization at 12-months and have mothers who appear markedly more at risk than mothers of pure secure infants, and display some higher markers of risk than mothers of disorganized and insecure infants, vulnerable secure dyads likely represent an alternate pattern of attachment insecurity.

The significance of D-ness

In the current study *D-ness* or *level of infant disorganization* at a year was found to be a highly sensitive means for detecting disturbances in maternal affective communication at 4-months. Higher levels of infant disorganization at year were associated with several 4-month markers of anomalous maternal behavior, including greater total frequency of anomalous maternal behavior; higher maternal ratings of disrupted affective communication; increased anomalous response to infant distress; and elevated levels of maternal aggressive behavior. Increased indices of infant disorganization at year were also related to *vulnerable* attachment security.

In contrast to the category of disorganized attachment (*D*), which is a less differentiated measure of disorganization, level of disorganization (*D-ness*) reflects a more nuanced appraisal of infant disorganization, which picks up more subtle degrees of attachment disturbance or disorganization. For an infant to be classified as disorganized, there are generally strong or pervasive indicators of disorganized or disoriented behavior in relation to the attachment figure that have been observed. However, when there are mild or even moderate indices of disorganization, an infant will not necessarily be classified as disorganized. Thus less robust manifestations of disorganization are not necessarily captured within the disorganized attachment classification. The continuous (1-9) scale of D-ness, however, picks up these less robust, yet positive markers of disorganization and disorientation, making it an important measure for detecting less blatant, yet potential indicators of risk.

Clinical Observations of Mothers of Disorganized Infants and Implications

When observing the exchanges between mothers and their future disorganized infants, there were many instances of striking contradiction and inconsistency. These mothers, for example, could be observed sharing joint pleasure with their infant in one instant, yet mocking their infant the next. They could be observed sympathizing with the infant's upset at one point, and then overriding or provoking the infant's distress just moments later. This contradicting maternal behavior was described by Lyons-Ruth in her "competing strategies" hypothesis (Lyons-Ruth et. al., 1999b). She suggested that contradictory parental messages within the same exchange would likely promote states of

infant fear and helplessness, and lead to a breakdown of attachment strategy. Such sequential maternal inconsistency, where the mother's interactive style can rapidly and abruptly shift from soothing to frightening, or from encouraging or affectively and attentionally joining to rejecting, is also likely to leave the infant on edge, in a state of emotional vigilance and fright, hyper-attuned to the mother's labile, yet non-comprehensible, abrupt shifts in response. Simultaneous affective inconsistency was also observed, for example, mothers exhibited positive facial or vocal affect or both, while simultaneously threatening their infant, or playfully mocked their infant via sing-song.

Furthermore, many mothers of disorganized babies displayed only isolated instances of anomalous caregiving behavior, while displaying a high degree of positive and sensitive engagement throughout much of the 2.5 minute face-to-face exchange. Unlike the mothers of vulnerable secure infants, who revealed an elevated frequency of anomalous behavior and appeared more consistently disrupted in their affective communication, mothers of disorganized infants often appeared pleasant. They revealed many adaptive and redeeming modes of interactive affective engagement, with, at times, only brief moments of hostility, aggression, or anomalous response to infant distress. As Lyons-Ruth has proposed, disorganization may likely be predicted not so much from maternal sensitivity, but from a lack of egregious acts of maternal insensitivity.

These observations are consistent with Main & Solomon's (1990) observations during the coding of disorganized infants in the Strange Situation. In her study, there was often only a single marker of disorganized/disoriented infant behavior that led to the classification of infant attachment disorganization. As they describe, even an isolated instance of anomalous infant behavior was found over and again to be linked to parental

maltreatment, parental unresolved trauma, or parental psychoses. Similarly, even a single marker of more egregious anomalous maternal behavior at 4-months was linked to disorganized infant attachment status at a year. Such egregious maternal acts included: laughing in response to infant distress, stimulating or distracting an infant during distress, not attempting to soothe a distressed infant or attempting in any way to respond to infant's distress, aggressive response to infant's disengagement, distress, or neutral/positive cues, including threatening, mocking, criticizing, disapproving, and expressions of disgust, no response to infant's neutral or positive cues, and pleading with an infant to respond. Even isolated, gentle expressions of maternal disapproval or criticism were linked on occasion to infant disorganization.

As suggested by several attachment theorists, disorganized mothers from low risk samples may seem harder to identify, due to their lack of blatant infant maltreatment and the many moments of sensitive and adaptive caregiving behavior they display. In the current study, 53% of the mothers of future disorganized infants revealed more anomalous maternal behaviors (>29 events) than the average number of anomalous behaviors displayed by mothers overall (27.19), and were judged to be disrupted in their maternal affective communication. Yet 47 % of the mothers of future disorganized infants displayed less anomalous maternal behaviors (<27 events) than the average number displayed by mothers overall, and the quality of their maternal affective communication was rated relatively positively (not disrupted). And yet, while not judged to be disrupted in their overall maternal affective communication, this latter group of disorganized mothers displayed a marked difficulty tolerating their infant's distress, or evidenced at least isolated markers of aggression or other egregious anomalous acts as

detailed above, including not responding to their infant's neutral/positive cues (coded ever or never).

As Main and Lyons-Ruth have described, it is highly probable these mothers carry unresolved mental contents linked to traumatic attachment-related experiences, which leaves them in a fragile and fearful mental state, easily activated by random external or internal associations. The activation of their infant's attachment-behavioral system might be a primary trigger to induce traumatic maternal memories and dissociated states or acts. This would explain why at one moment these mothers appear to engage in a sensitive and optimal manner, and the next instant their caregiving behavior becomes anomalous, marked by persistent affective communication errors, and egregious, and at times aggressive acts. It is this contradictory and unpredictable style of maternal engagement, combined with extreme maternal unresponsivity to infant cues and signals, and maternal indices of aggression, which seems to promote infant states of vigilance, anxiety, confusion, distress, and disorganization. In this vein, the mother at once, as Main (Hesse & Main, 1990) has proposed, becomes both the infant's source of fright and threat as well as the infant's source of safety. The mother induces an irresolvable dilemma which overwhelms and dysregulates the infant, leading to the collapse of any organized strategy of attachment. Lyons-Ruth et al. (1999a) have proposed that unresolved maternal fear must either be "pervasive" or "profound" (p.37), such that either the repeated or rare expression becomes mentally and behaviorally disorganizing. As Hesse & Main have suggested, even "reasonably good, reasonably responsive, non-abusive parents can create disorganized attachment/ dissociation in their kids by scaring them" (Hesse & Main, 2000).

Limitations and Directions for Future Study

This study has begun to explicate the early interactive context out of which disorganization emerges, highlighting particular patterns of mother-infant affective exchange characteristic of disorganized dyads. Supporting Main's theory linking frightened/frightening anomalous caregiving behavior with infant attachment disorganization, and Lyons-Ruth's "failure to repair" and "competing strategies" hypotheses, mothers of disorganized dyads in the present investigation displayed decreased tolerance for infant distress, more anomalous responses to infant distress, and elevated indices of maternal aggression.

Recognizing the link between unresolved maternal loss/trauma and attachment disorganization, further investigation might examine the trauma and loss histories of the mothers in question. Mothers could be assessed for the degree to which they themselves are unresolved for loss and mourning, and exhibit lapses in their reasoning and monitoring while discussing their own attachment-related experiences. Future work examining maternal histories of trauma and abuse might also investigate whether mothers with physical abuse histories display more overt/hostile patterns of maternal engagement, while mothers with sexual abuse histories display more helpless/withdrawing patterns of maternal engagement. Mothers for example who appear helpless to soothe their distressed infant and exhibit more desperate attempts to manage negative infant affects, for example through heightening stimulation and distraction, might be expected to have histories of sexual abuse. Maternal indices of withdrawal, internal preoccupation, fear, and moments

of appearing frightening might also be coded, and examined in relation to segregated and un-metabolized traumatic mental contents.

As this study involved a longitudinal retrospective design, the associations found between 4-month maternal behavior and 12-month infant behavior do not imply causality. It is possible there are mediating factors affecting these correlations that have not yet been identified. Future studies assessing maternal behavior prospectively can determine whether selected anomalous behaviors examined at 4-months can predict attachment at one year. Maternal behaviors were coded dyadically in relation to infant behavior; however, infant behavior was not directly and independently assessed. To better understand the impact of anomalous maternal behavior on infant attachment disorganization, further investigations might examine infant variables more directly. Assessing the ratio of infant distress to anomalous maternal responses to infant distress, for example, might elucidate the degree to which disrupted caregiving behavior results in infant distress and dysregulation, distinguishing disorganized from organized dyads. Coding such a ratio might also reveal the extent to which infant behavior influences maternal behavior. Adaptive maternal behaviors were initially identified and used in coding and obtaining global ratings of disruptive affective communication. However, coders did not achieve reliability on these variables due to the extensive range of behaviors assessed and the unwieldy task of achieving reliability on these behaviors. To gain a more comprehensive view of the interactive context in which attachment disorganization arises, however, future studies might incorporate and assess the role that adaptive and reparative maternal behaviors play in this process.

This study was based on a two and a half minute observation of mother-infant pairs within the lab. While other studies have found consistency between maternal and infant behavior in the lab and at home (see Ainsworth et. al. 1978, Lyons-Ruth, 1999a, Schuengold et. al., 1999), as well as consistency between maternal behavior across time (see Kelly, 2004), future studies aimed at replicating the current findings can determine whether identified patterns of anomalous caregiving behavior consistently predict attachment disorganization in other 4-month samples.

The early 4-month detection of at-risk dyads offers the hope of providing earlier intervention, and the prevention of adverse developmental outcomes. Studies have looked at the impact of several forms of intervention on attachment outcomes, including didactic approaches aimed at increasing maternal sensitivity, responsivity and infant engagement; psychodynamic approaches aimed at addressing trauma histories and altering maternal representations of attachment; and case management approaches aimed at improving social support. Research has shown that interventions aimed at improving maternal sensitivity, and promoting more adaptative parent behaviors implemented from 6-months onward, either alone or in combination with other approaches, were most successful in preventing disorganized attachment status (see Bakersman-Kranenburg, van Ijzendoorn & Juffer, 2005).

Based on findings from the present investigation, interventions aimed at helping parents better tolerate infant distress, respond more adaptively and sensitively to infant distress, better modulate their aggressive urges, and allow for more infant agency should be expected to reduce indices of infant disorganization. Although trauma histories were unknown, it is suspected, based on the literature and on clinical observations of mother-

infant interactions, that mothers of disorganized infants in the current sample are struggling with unresolved loss or trauma, hostile-helpless internal working models of attachment, and fearful and disorganized mental states. Programs aimed to help teach mothers to attend to their child and to follow infant initiatives have resulted in more adaptive parenting behaviors. Such interventions are also suspected to reduce a mother's preoccupation with or vulnerability toward a frightening inner world (Bakersman-Kranenburg, van Ijzendoorn & Juffer, 2005). Intervention programs might also be aimed at helping mothers process their own traumas through Trauma-Focused CBT, improving their reflective function through reflective parenting training (see Slade, 2005), or using video-assisted parent-infant feedback (see Beebe, 2003, 2005, 2006) to improve their capacity to read infant cues, and to become better aware of their own behavior, and of the impact of their behavior on their infant.

APPENDIX A

Table A1.

Derivation of Selected Anomalous Maternal Behaviors: The Modified Ambiance–Selected Affective Errors, 4 Months (M-AMBIANCE), Miller, 2010

Selected Affective Error	Related Source
Failure to Initiate Responsive Behavior to Infant Cue	
1. *Does not attempt to soothe distressed infant** (Bronfman et al., 1999), or *in any way acknowledge or comment on infant's vocal or physical expression of distress* (Kelly, 2004).	
2. Does not acknowledge or respond contingently to infant's affectively positive or neutral cues for engagement or communication	Does not respond to infant vocalization (Bronfman et al., 1999), or vocal cue for attention (Kelly, 2004).
Inappropriate Response to Infant Cue	
3. *Interferes with infant's attempts to self-regulate* (Beebe, 2000, Kelly, 2004).	
4. Overrides infant's positive and neutral cues and signals with own agenda, or *directs infant to new activity while infant is clearly engaged* (Beebe, 2003), or *persists with activity when infant shows disinterest, fatigue, or desire to do something else* (Kelly, 2004).	Ignores or interferes with infant's bid for agency (Kelly, 2004).
5. Overrides infant's distress signals with own agenda, directs distressed infant to new activity, or persists with activity in the face of infant distress.	Ignores cue that an activity is not liked, has continued too long, or is too difficult for infant (Bronfman et al. 1999)

(table continues)

Selected Affective Error	Related Source
Inappropriate Response to Infant Cue	
6. *Responds to infant's distress, negative affect, dampened or subdues state with positive affect* (Beebe, 2003; Kelly, 2004), *or laughter** (Bronfman et al. 1999).	
7. *Responds to infant's distress, negative affect, dampened or subdues state with heightened stimulation* (Bronfman et al. 1999).	
8. Responds to infant disengagement distress or neutral or positive cues *with disapproval** (Bronfman et. al., 1999), disgust, *criticism** (Bronfman et. al. 1999) *threats** (Bronfman et. al; Hesse & Main, 1990), or *mockery** (Bronfman et. al. 1999).	
9. Responds to infant disengagement or distress with *pleading* (Bronfman et. al. 1999), begging, or *role reversal* (Bronfman et. al., 1999; Main & Hesse, 1992; Sroufe et al.,1985).	

Note. * *Item was observed three times more often among mothers of 18-month old disorganized infants in Lyons-Ruth et al., (1999b) study.*

APPENDIX B

Table B1.

Modifications to Global Rating Scale for Measuring Level of Maternal Disrupted Affective Communication (Miller, Kelly, Bronfman, & Lyons-Ruth)

Scale for Measuring Degree of Disrupted Communication (Kelly, Bronfman, Lyons-Ruth, 2004)	*Modified Global Rating Scale for Measuring Level of Maternal Disrupted Affective Communication based on 9 Select Behaviors (Miller, Kelly, Bronfman, Lyons-Ruth, 2010)*
1. No evidence of disrupted communication. The caregiver consistently engages infant in a manner that is sensitive and responsive to the infant's signals. Tolerates and accepts infant's affective states. Uses sympathetic voice tone, facial mirroring, and/or vocal rhythm matching Flexibly moves with infant between states of more distress and less distress. Sees infant's perspective and supports it. Supports infant's attempts to self-regulate. Responds sensitively and contingently to infant's cues, especially	*1. No evidence of disrupted communication*. The caregiver consistently engages infant in a manner that is sensitive and responsive to the infant's signals**.** The caregiver sees infant's perspective and supports it, tolerates and accepts **full range** of infant's affective states, and flexibly moves with infant between states of more distress and less distress. Facial mirroring, vocal rhythm matching, and a sympathetic voice tone **are highly evident. The sharing of joint pleasure is likely to be the dominant feature of the infant-caregiver interaction, along with ongoing "moments of meeting" or connecting.**
2. Mild evidence of insensitive, but not disrupted communication. The caregiver is generally sensitive	2. *Mild evidence of insensitive, but not disrupted communication.* The caregiver is generally

(table continues)

to the infant's signals around distress but may occasionally miss some cues. Tolerates and accepts infant's affective states. Uses sympathetic voice tone, facial mirroring, and/or vocal rhythm matching. For the most part, moves smoothly with infant between states of more distress and less distress. Sees infant's perspective and supports it. Rarely if ever interferes with infant's attempts to self-regulate. Primarily responds sensitively and contingently to infant's cues, especially around distress. May occasionally miss opportunities to interact contingently when infant is in a non-distressed state.

3. Some evidence of insensitive, but not disrupted communication. In addition to missing some signals from the infant, the caregiver occasionally demonstrates non-optimal behaviors. Nonetheless, even when present, non-optimal behaviors are present to a relatively mild degree. Responds to most of infant's signals when non-distressed. Consistently responds to infant's distress with attempts to comfort and soothe. Interactive errors are consistently met with efforts to repair. Mild Interactive errors are counterbalanced with ameliorating interactions (e.g., facial mirroring; vocal rhythm matching; supporting infant's attempts

sensitive to the infant's signals, especially around distress, but may occasionally miss some cues. **For example, the caregiver may, on occasion, interfere with infant's attempts to self-regulate or override the infant's signals and cues.** Yet, for the most part, the caregiver sees infant's perspective and supports it, tolerating and accepting the range of the infant's affective states, and moving smoothly with infant between states of more distress and less distress. **Minor errors in communication, are readily repaired. Joint pleasure is evident, as are "moments of meeting", and a positive tone dominates the interaction.**

3. Some evidence of insensitive, but not disrupted communication. In addition to missing some signals from the infant, the caregiver occasionally demonstrates non-optimal behaviors. **These may include interfering with infant's attempts to self-regulate, overriding the infant's signals and cues, not responding contingently to positive or neutral cues, and responding to infant distress with distraction or increased stimulation.** Nonetheless, even when present, non-optimal behaviors are present to a relatively mild degree. **Non-optimal behaviors are also**

(table continues)

to self-regulate, such as the infant's gazing away; making positive or sensitive attributions towards the infant; or demonstrating other evidence of sensitivity or reciprocity. May have a little difficulty tolerating negative affect. May give brief indications of needing to be the focus of infant's attention. May try to engage infant's attention by being directive or mildly controlling. May occasionally interfere with infant's attempts to self-regulate, but shortly thereafter recognizes and capitulates to infant's regulatory needs.	**either acknowledged and repaired, or off-set by positive and adaptive behaviors, such as** facial mirroring, vocal rhythm matching, **a sympathetic voice tone, recognizing and/or joining infant's perspective.** Though caregiver may evidence a little difficulty tolerating negative affect **or disengagement, caregiver responds to most of infant's signals when non-distressed.**
4. Non-optimal but not disrupted communication. This caregiver may have more difficulty coping and responding to infant's negative affects. There is evidence of insensitive behaviors, and, at times, non-optimal levels of responsiveness, yet there is a consistent, non-hostile, predictable style of interacting with the infant with ameliorating behaviors. Style of interacting with the infant is consistent and predictable. Does not respond appropriately to some of infant's signals when non-distressed. Interactive errors are not always repaired. May have difficulty tolerating negative affect. May sometimes prioritize own needs over infant's needs. Occasionally interferes with infant's attempts to self-regulate, but eventually capitulates to infant's regulatory needs. Interactions may	4. *Non-optimal but not disrupted communication.* This caregiver may not show high awareness or **attunement to infant's cues and signals. The caregiver may display increased** difficulty coping and responding to infant's negative affects, **disengagement, or self-regulatory behavior.** There is evidence of insensitive behaviors, and, at times, non-optimal levels of responsiveness, **including interfering with infant's attempts to self-regulate, overriding the infant's signals and cues, not responding contingently to positive or neutral cues, and responding to infant distress with distraction or increased stimulation. Caregiver may sometimes prioritize own needs over infant's**

(table continues)

appear arrhythmic in non-distressed situations. Interactive errors are counterbalanced by ameliorating behaviors, although at times they may be carried out in a somewhat awkward, asynchronous manner manner. May give brief indication of need for infant to focus on him/her. Is more prone to responding to distressed infant by using distraction, games, singing, etc...rather than using self (e.g., facial mirroring).	**needs,** or give brief indication of need for infant to focus on him/her. Interactive errors are not always repaired, though they may be counterbalanced by ameliorating behaviors. Ameliorating behaviors, however, may be carried out in a somewhat awkward, asynchronous manner. Despite this, there remains a consistent, non-hostile, predictable style of interacting with the infant**.**
5.Disrupted Communication. There is clear evidence of disrupted affective communication. The caregiver displays persistent mixed signals, persistent errors in responding to infants needs, including intrusive and/or negative behaviors. The caregiver's attempts to engage infant are not flexible in terms of responding to the infant's needs, especially when the infant is distressed. While the caregiver appears to be trying to interact appropriately, he or she has difficulty diverting from own needs and/or cannot seem to understand/interpret infant's signals. Has difficulty seeing and supporting the infant's perspective. Interactions appear arrhythmic at times, with delayed, inappropriate, or absence of response to infant's signals. Fails to recognize infant's needs or interferes with infant's efforts to self-regulate.	5. *Disrupted Communication*. There is clear evidence of disrupted affective communication. While the caregiver appears to be trying to interact appropriately, he or she has difficulty diverting from own needs **or perspective**, has difficulty seeing and supporting the infant's perspective, and cannot seem to accurately understand/interpret infant's signals. Caregiver displays persistent errors in responding to infants **cues and signals, include persistently interfering with infant's attempts to self-regulate, persistently overriding the infant's signals and cues, not responding contingently to positive or neutral cues,** demonstrating delayed responsiveness, **and/or persistently responding to infant distress with**

(table continues)

Caregiver expresses feeling distressed in response to infant's distress rather than consistently providing "containment" of infant's distress. May respond in a role-reversing manner, needing to be focus of attention. Most, but not all, have difficulty providing adequate comfort to the infant, or interacting infant in an intrusive, overstimulating manner. Has difficulty repairing interactive errors. Most have some difficulty using affective communication to soothe distressed infant (i.e., facial mirroring, vocal rhythm matching). Many rely mostly or completely on games and distraction during interactions. May respond more appropriately when infant is calm. Some ameliorating interactions may occur between caregiver and infant.	**distraction, increased stimulation, or positive affect.** While caregiver may respond more appropriately when infant is calm, caregiver may become distressed in response to infant's distress rather than providing "containment" of infant's distress, and may have difficulty soothing distressed infant and repairing interactive errors. **Although little or no overt hostility is displayed, there may be a sense of not enough availability of caregiver to the infant, or little assistance to infant in coping with a difficult situation.** Some ameliorating interactions may occur between caregiver and infant.
6. Highly Disrupted Communication. Disrupted communication predominates as evidenced by persistently controlling, intrusive, negative, or role reversing behavior in response to infant. The caregiver's responses frequently do not match the infant's signaling. Demonstrates an inability to tolerate direct expression of upset or distress from the infant, which may result in anger, withdrawal, or mocking ("what, you don't love mommy anymore"). May display physically intrusive behavior or uses harsh voice tone. Interferes with	6. *Highly Disrupted Communication.* Disrupted communication predominates as evidenced by caregiver's marked difficulty seeing and supporting infant's perspective, and persistent misattunement and inappropriate responding to infant cues and needs**. Responses to the infant appear to lack sensitivity and coordination,** in that they do not to match the infant's signaling. **Caregiver persistently interferes with infant's attempts to self-**

(table continues)

infant's efforts to self-regulate. Has marked difficulty seeing and supporting infant's perspective during interactions. Has difficulty diverting from own style or needs which may be exacerbated around infant distress. Interactions seem arrhythmic, misattuned, with delayed, inappropriate or lack of response to infant's signals. Quality of interactions are lacking with regard to facial mirroring, vocal rhythm matching, and/or affective attunement. Affective response to the infant may include indirect or "masked" expressions of negative affect, a lack of affect, or inauthentic affect. May present contradictory affective signals to infant. Behavior may include being fearful, frightening or using unusual voice quality with infant. Style of interaction may not be predictable Has difficulty providing comfort and containment either physically and/or verbally. Despite these behaviors, there are some attempts, although ineffective, to address infant's needs.	**regulate, persistently overrides the infant's signals and cues, and lacks contingent responding to positive or neutral cues.** Caregiver has difficulty diverting from own style or needs which may be exacerbated around infant distress **or disengagement. Caregiver may demonstrate an inability to tolerate disengagement or any expression of negative affect, the presence of which may elicit increased stimulation, distraction, anger, aggression, escalating intrusiveness, directive behavior, and/or pleading.** Caregiver shows recurrent difficulty providing comfort and containment either physically and/or verbally. Affective response to the infant may include indirect or "masked" expressions of negative affect, a lack of affect, or inauthentic affect. Style of interaction may not be predictable. Despite these behaviors, there are some attempts, although ineffective, to address infant's needs.
7. *Highly Disrupted Communication with few or no ameliorating behaviors*. Disrupted communication predominates with almost no ameliorating behaviors. The caregiver is highly unresponsive, ineffective, or inappropriate in relation to the needs of the infant. Not only do the caregiver's needs take	7. *Highly Disrupted Communication with few or no ameliorating behaviors.* Disrupted communication predominates with almost no ameliorating behaviors. **Affective misattunement is a pervasive quality during**

(table continues)

priority, but also the infant's needs are not attended to in any significant manner. There is persistent evidence of mixed affective signals, intrusive behavior, withdrawal, hostility, lack of boundaries, role reversal, and/or disorientation, with little ameliorating contact.	**the interaction.** The caregiver is highly unresponsive, ineffective, or inappropriate in relation to the needs of the infant. Not only do the caregiver's needs take priority, but also the infant's needs are not attended to in any significant manner. **Caregiver appears unable to take the infant's perspective and unable to provide verbal or physical comfort or containment to the infant. Caregiver may demonstrate an inability to tolerate any direct expression of negative affect or disengagement, the presence of which elicits anger, aggression, escalating intrusive or directive behavior, or withdrawal. Affective responses to the infant include persistent direct or indirect expressions of irritation, negative affect, a lack of affect, or inauthentic affect, as well as overt aggression/hostility.**

Note. Highlighted text indicates modified concepts to Kelly, Bronfman & Lyons-Ruth's (2004) *Scale for Measuring Degree of Disrupted Communication* at the level specified. While 65% of the original concepts were maintained at each level of coding, adjustments were made to be make the scale more relevant and descriptive to the 9 selected anomalous maternal behaviors being coded in the present study (i.e., *no response to distress, no response to neutral or positive cues, disrupts self-regulation, overrides positive or neutral cues, distracts or overrides during distress, positive during distress, stimulates during distress, aggressive response, pleading or role reversal)*. Additional modifications included rewording or reordering different constructs, and incorporating added adaptive behaviors that were observed by the present investigator.

APPENDIX C

Table C1.

Descriptive Statistics for Total Anomalous Maternal Behavior across Entire Sample (N=75) and Infant Attachment Categories

	Total Frequency of Anomalous Behavior				
	N	Mean	Std Deviation	Minimum	Maximum
Overall	75	27.1	11.9	9	57
Avoidant	3	36.3	14.9	24	53
Secure	40	27.1	11.7	12	55
Resistant	15	23.3	12.0	13	56
Disorganized	17	29.1	11.6	9	57
Insecure	35	27.2	12.3	9	57
Organized	58	29.1	11.6	12	56

Note. No mean differences in *total scores* were found for the above comparisons: Secure versus Insecure, Disorganized versus Non Disorganized, or Disorganized versus Secure at $p<.05$.

Table C2.

Descriptive Statistics for Global Rating (1-7) of Level of Maternal Disrupted Affective Communication across Entire Sample and Infant Attachment Categories

	Global Maternal Rating				
	N	Mean	Minimum	Maximum	Std Deviation
Overall	75	4.25	2	7	1.36
Avoidant	3	5.00	4	6	1.00
Secure	40	4.13	2	7	1.48
Resistant	15	4.06	3	6	1.16
Disorganized	17	4.55	2	7	1.29
Insecure	35	4.38	2	7	1.22
Organized	58	4.16	2	7	1.38

Note. No mean differences in *global ratings* were found for the above comparisons: Secure versus Insecure, Disorganized versus Non Disorganized, or Disorganized versus Secure at $p<.05$.

Table C3.

Crosstabulation of Anomalous Maternal Response to Infant Distress Ever by Attachment Classification and Across Entire Sample (N=75)

	Anomalous Maternal Response to Infant Distress Ever			
	No	%	Yes	%
Overall (N=75)	35	46.7%	40	53.3%
Avoidant (n=3)	0	0	3	100.0%
Secure (n=40)	23	57.5%	17	**42.5%**
Resistant (n=15)	8	53.0%	7	46.7%
Disorganized (n=17)	4	23.5%	13	**76.5%**
Insecure (n = 35)	12	34.2%	23	**65.7%**
Organized (n = 58)	31	41.3%	27	**46.5%**

Note. Highlighted cells were found to be significantly different, specifically Secure versus non-Secure; Disorganized versus non-Disorganized, and Disorganized versus Secure.

$p<.05$.

Table C4.

Crosstabulation of Aggressive Maternal Response Ever to Infant Distress, Disengagement or Neutral/Positive Cues by Attachment Classification (N=75)

	Aggressive Maternal Response Ever			
	No	%	Yes	%
Overall (N=75)	53	70.7%	22	29.3%
Avoidant (n=3)	2	66.7%	1	33.3%
Secure (n=40)	32	80.0%	8	**20.0%**
Resistant (n=15)	11	73.0%	4	26.7%
Disorganized (n=17)	8	47.1%	9	**52.9%**
Insecure (n = 35)	21	60.0%	14	**40.0%**
Organized (n = 58)	45	72.4%	13	**22.4%**

Note. Highlighted cells were found to be statistically different from other cells, specifically Secure versus non-Secure, Disorganized versus non-Disorganized, and Secure versus Disorganized.

$p<.05$.

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