

2009

**FROM MATERNAL SENSITIVITY TO MATERNAL INTERACTIVE
BEHAVIOUR: EXPLORING THE DEVELOPMENT OF ATTACHMENT
IN INFANTS OF ADULT AND ADOLESCENT MOTHERS**

Tara E. Morley

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**FROM MATERNAL SENSITIVITY TO MATERNAL INTERACTIVE
BEHAVIOUR:
EXPLORING THE DEVELOPMENT OF ATTACHMENT IN INFANTS OF
ADULT AND ADOLESCENT MOTHERS**

(Spine title: Attachment in Infants of Adult and Adolescent Mothers)

(Thesis format: Monograph)

by

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Graduate Program in Psychology

**A thesis submitted in partial fulfillment
of the requirements for the degree of**

Master of Science

School of Graduate and Postdoctoral Studies

The University of Western Ontario

London, Ontario, Canada

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Abstract

This study explored the maternal contribution to attachment relationships for both adult and adolescent mothers. Past research has focused on the relationship between maternal sensitivity – responding appropriately and promptly to infant signals – and attachment security. However, recent research has identified the need for a multi-dimensional assessment of the maternal contribution to attachment relationships (Raval et al., 2001). Domains of conceptually related aspects of maternal interactive behaviour were created as part of this study. This multi-dimensional description was then applied to describe the behaviour of 49 adult and 49 adolescent mothers during interactions with their infants. Results indicated differences in the association between maternal interactive behaviour and the quality of the attachment relationship for adult and adolescent mothers. Additionally, these analyses revealed that distinct domains of maternal interaction had differing degrees of association with the attachment relationship. Implications for clinical interventions and suggestions for future research are also discussed.

Keywords: Attachment, Infant Development, High-Risk, Maternal Sensitivity, Adolescent Mothers

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From Maternal Sensitivity to Maternal Interactive Behaviour:

Exploring the Development of Attachment in Infants of Adult and Adolescent Mothers

An Overview of Attachment and Maternal Sensitivity

Attachment was first described by John Bowlby (1969) as, “a lasting psychological connectedness between human beings” (p.154). This concept is central to the theory of attachment, a descriptive framework for understanding the origins and development of interpersonal relationships among human beings. Some of the first empirical research on the impact of early relationships involved the study of orphans (Skeels, 1938 as cited in Skeels, 1966; Skeels, 1949 as cited in Skeels, 1966). It was discovered that children who were moved from orphanages to institutions for mentally retarded adults, were often “adopted” and cared for individually by one of the adult patients. Children who developed such relationships showed increased intellectual functioning, and were more likely to eventually leave the institution and integrate well into society than those who remained in orphanages and were not adopted. Stemming from these early findings, John Bowlby’s interest in mother-infant relationships drew him first to the study of delinquent and maltreated children. His first empirical paper discussed the role of inconsistent caregiving and a chaotic upbringing in the lives of juvenile thieves (Bowlby, 1944). By the late 1950’s, Bowlby had gathered extensive theoretical and empirical work to substantiate his ideas on the importance of developing attachment relationships early in life (Bowlby, 1944, 1951, 1953, 1958). One of Bowlby’s major conclusions was that, “a warm, intimate and continuous relationship with his mother (or permanent mother substitute)” is an essential element of a child’s successful development (Bowlby, 1951, p.183).

Mary Ainsworth, a developmental psychologist, expanded on Bowlby's work through naturalistic observations of mothers and infants in both Uganda and the United States. Ainsworth conducted extensive home observations of mother-infant dyads, where she observed substantial systematic variability in the quality of interactions between mothers and their infants (Ainsworth, Bell, & Stayton, 1972). Ainsworth developed a structured laboratory procedure to further explore these differing patterns of mother-infant interaction in a stressful context (Ainsworth, Blehar, Waters, & Wall, 1978). The procedure consisted of an initial episode of play between mother and infant, followed by the introduction of a stranger and two separation and subsequent reunion episodes with the mother. Through this assessment, eventually known as the *Strange Situation Procedure* (SSP), Ainsworth identified three distinct patterns of interaction: Secure, Avoidant and Resistant (Ainsworth et al., 1978). Infants classified as Secure used their mother as a *secure base* from which to explore their environment and showed diminished exploratory behaviour during separations from her. Ainsworth described secure base behaviour as the ability to play and explore comfortably, having developed confidence that the mother is monitoring these behaviours, and will provide protection or comfort in times of danger or stress (Ainsworth, 1982). Upon reunion with their mother, Secure infants greeted her positively and signaled their need for comfort when distressed. Alternatively, infants classified as Avoidant showed little evidence of using their mother as a Secure base when exploring the environment. During separations, these infants showed minimal distress and ignored their mother, and her attempts to engage them, upon her return. Finally, infants classified as Resistant showed a pre-occupation with their mother and limited interest engaging in exploratory behaviour, even in her presence.

Separations proved extremely distressing for these infants, however their behaviours upon reunion showed ambivalence - they engaged in efforts to make contact with their mother, while simultaneously resisting her efforts to provide comfort (Ainsworth et al., 1978, Ainsworth, Bell, & Stayton, 1971). Research following Ainsworth's original observations found associations between these attachment patterns and various developmental outcomes, including self-reliance, social competence, emotion regulation and psychopathology (Carlson & Sroufe, 1995; Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005; Thompson, 2008) as well as experiences in future peer and romantic relationships (Creasey, 2002; Simpson, Collins, Tran, & Haydon, 2007; Senchak & Leonard, 1992). Secure attachment has consistently been associated with the most favourable developmental outcomes in these areas.

While these three patterns adequately classified most attachment relationships in community samples, many dyads from high-risk groups were found to be unclassifiable (Goldberg, 2000a). As a result, a fourth category, Disorganization, was developed to accommodate such previously unclassifiable dyads (Main & Solomon, 1986). An infant identified as Disorganized in the Strange Situation Procedure displays anomalous and atypical behaviours, such as freezing or inexplicable repetitive movements, during interactions and reunions with their mother (Hesse & Main, 1990). Disorganized attachment has been associated with worse developmental outcomes than other attachment styles, including later depression, anxiety, and externalizing behavioural problems (Carlson, 1998; Dozier, Stovall-McClough, & Albus, 2008; Sroufe et al., 2005; van IJzendoorn, Scheungel, & Bakersman-Kranenburg, 1999).

The work of Bowlby and Ainsworth established attachment theory as a useful framework for exploring the nature and developmental consequences of early mother-infant relationships. However, an important question remained: What was the mechanism through which these different attachment styles developed? Their observations led both Bowlby and Ainsworth to propose that a caregiver's pattern of interaction with their infant was instrumental in shaping the attachment relationship. Ainsworth's empirical work was focused on the more specific hypothesis that maternal interaction reflected in sensitivity to infant needs and signals was the main developmental determinant of the quality of the attachment relationship.

Bell and Ainsworth (1972) tested this hypothesis by analyzing infant crying and maternal responsiveness during home observations. They found that infants of mothers who were highly responsive during the first six months of life cried less often and engaged in more sophisticated communications (e.g. vocalizations and gestures) over the following six months than infants with less responsive mothers. These findings suggested that maternal sensitivity and responsiveness to infant needs and signals had an influence on later attachment-related behaviors. This was a controversial and important finding at the time, as previous theorists had argued that high responsiveness to infant signals would be expected to reinforce and increase the likelihood of such negative behaviour (Ainsworth et al., 1978; Bretherton, 1992). Bell and Ainsworth also found that maternal responsiveness to infant crying was reflective of a more general sensitivity and responsiveness to infant signals.

To capture this more general sensitivity, Ainsworth and her colleagues (1971) developed rating scales based on their observations to reflect various aspects of maternal

responsiveness to infant cues. Four scales were derived reflecting different dimensions of maternal behaviour: sensitivity versus insensitivity, acceptance versus rejection, cooperation versus interference and accessibility versus ignoring. They found the three latter scales were highly correlated with sensitivity versus insensitivity, and therefore collapsed all four into one broad measure of sensitivity (Ainsworth et al., 1971).

Ainsworth et al. described a mother high on the sensitivity dimension as being able to see things from her infant's point of view, consistently being alert to infant signals and communications, and responding promptly and appropriately to infant cues when necessary. Empirical application of this scale to describe maternal interactive behaviour indicated that it was strongly related to attachment security ($r = .78$, Ainsworth et al., 1978; Ainsworth et al., 1971). Consistent with theoretical predictions, mothers in Secure relationships with their infants were the most sensitive in responding to infant signals. Conversely, mothers of infants in Avoidant relationships were slow to respond to signals of distress, showed discomfort with overall contact and were generally more rejecting of their infants. Finally, mothers of infants classified as Resistant were inconsistently responsive; they showed general insensitivity to infant signals but were less rejecting than mothers of Avoidant children (Ainsworth, 1979; Ainsworth et al., 1971; Ainsworth et al., 1978). Based on her theoretical developments and these empirical findings, Ainsworth reinforced her previous assertion that maternal sensitivity was instrumental to the development of Secure attachment relationships:

The most important aspect of maternal behaviour commonly associated with the security-anxiety dimension of infant attachment is manifested in different specific ways in different situations, but in each it emerges as sensitive responsiveness to infant signals and communications (Ainsworth et al., 1978, p.152).

The Current Role of Maternal Sensitivity

Mary Ainsworth's early research findings substantiated her theory that maternal sensitivity is the direct developmental predictor of attachment security (Ainsworth et al., 1971; Ainsworth et al., 1978). However, subsequent studies have been unable to replicate the strong empirical associations between sensitivity and attachment that she reported. Although Ainsworth's rating scales have since been demonstrated to predict the quality of the mother-infant attachment relationship, the strength of this association is a matter of debate, as the results of empirical assessments of have been highly variable (Atkinson et al., 2000; De Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987; Nievar & Becker, 2008).

In their meta-analysis examining maternal and infant predictors of attachment relationships, Goldsmith and Alansky (1987) analyzed thirteen studies that measured the association of maternal interactive behaviour with assessments of attachment using the Strange Situation Procedure (SSP). They found a weak relationship between maternal sensitivity and attachment security combined across all studies ($r = .16$), a value considerably lower than had been reported in Ainsworth's original study ($r = .78$) or might be expected on the basis of attachment theory (Ainsworth et al., 1978). However, this analysis did not differentiate studies on the basis of how they defined maternal sensitivity. Rather, they included studies using a variety of methodologies ranging from assessments of maternal sensitivity using Ainsworth's scales, to those using maternal looking and vocalizations (Goldsmith & Alansky, 1987). De Wolff and van IJzendoorn (1997) set out to conduct a similar meta-analysis, but this time grouping studies based on similar methods used to describe sensitivity. The authors enlisted expert sorters to group

studies based on those that measured sensitivity by Ainsworth's definition, "the ability to respond appropriately and promptly to the signals of the infant" (De Wolff & van IJzendoorn, 1997, p. 584), and those measuring other closely associated behaviour. They found that studies of non-clinical populations using this definition produced a medium effect when using maternal sensitivity to predict attachment security ($r = .24$). This was in contrast to the small combined effect size ($r = .17$) found when all studies were used in the same analysis. These findings emphasized the importance of how maternal sensitivity is defined when exploring its role in the development of attachment relationships. Additionally, these authors discovered several other aspects of the mother-infant interaction, such as synchronous and mutually enjoyable interactions, that were also strongly associated with attachment security. Thus, they concluded that while sensitivity is an important aspect of the maternal contribution to attachment, other aspects of the interaction may have similar, or greater, influence on the quality of the attachment relationship.

Atkinson et al. (2000) conducted another, more recent review of studies looking at the relationship between maternal sensitivity and attachment in attempt to identify the most sound measures for assessing maternal sensitivity. In a comprehensive review of the available literature, they collected information from forty-one studies with 44 samples and 2243 dyads. Inclusion criteria were strictly set to ensure homogeneity of the constructs being assessed. All studies used either the Strange Situation Procedure or the *Attachment Q-Sort* (AQS), an observational measure of attachment security, to assess attachment in children between 12 and 36 months of age. Additionally, they only included studies that involved assessment of maternal sensitivity in an interaction other

than that in which the quality of the attachment relationship was evaluated. These inclusion criteria differed in many cases from those of De Wolff and van IJzendoorn (1997), and thus resulted in an overlap of only 23 studies between the two meta-analyses. However, despite methodological differences, the mean effect size calculated by Atkinson et al. ($r = .27$) was comparable to that found by De Wolff and van IJzendoorn ($r = .24$). More specifically, the relationship between maternal sensitivity and attachment security was similar in both studies. Atkinson et al. went on to identify specific methodologies that consistently resulted in the largest effect sizes. Their results suggested that studies relying primarily on interviewing methods or the *Maternal Behaviour Q-Sort* (MBQS)/divided attention task (Pederson et al., 1990; Pederson & Moran, 1995) were consistently associated with the strongest effect sizes for predicting attachment security from maternal sensitivity. The MBQS/divided attention task is a measure completed following observations of mother-infant interactions in the home. Observers sort cards into nine piles reflecting how characteristic they are of a mother's interaction with her infant. The most common measure derived from the MBQS is the global sensitivity score, which represents how similar the interactions of the observed mother are to those of a theoretically, prototypically sensitive mother. The divided attention aspect involves the mother completing a questionnaire while simultaneously having to monitor the needs of her child. Atkinson and his colleagues suggest that assessing a mothers' ability to regulate attention and integrate information related to her infant under these modestly stressful conditions is a strength of this measure. The authors concluded that while interviewing techniques have demonstrated similar outcomes, they deserve further

research attention, and the MBQS/divided attention task should be considered the most sound measure of maternal sensitivity to date.

Thus, although the strength of association between maternal sensitivity and attachment security is somewhat weaker than what may be predicted by Mary Ainsworth and attachment theory (Ainsworth et al., 1978), the relationship between these two constructs has been well established through empirical findings. However, most of the studies presented in this review have utilized correlational research designs to establish this association. Consequently, these studies were unable to discriminate between the possibilities that: maternal interactions were influencing infant attachment classification; the attachment relationship was impacting maternal behaviour; or a third unidentified variable was responsible for these results. Alternatively, clinical interventions aimed at improving the quality of the attachment relationship provide a more appropriate method for assessing the causal mechanisms underlying this association. That is, improvements in maternal and caregiver sensitivity as a result of clinical interventions have led to increases in attachment security (Bakersman-Kranenburg, van IJzendoorn, & Juffer, 2003; Berlin, Zeanah, & Lieberman, 2008; Hoffman, Marvin, Cooper, & Powell, 2006; Howes, Galinsky, & Kontos, 1998; Moran, Pederson, & Krupka, 2005). This provides compelling evidence that maternal care-giving behaviour contributes to attachment security. Additionally, several studies have established an association between maternal characteristics prior to the birth of her first child and infant attachment classification at one year (Fonagy, Steel, & Steel, 1991; Main, 2000). For example, a mother's own experiences and state-of-mind regarding previous relationships have been associated with the quality of her attachment relationship with her own child (Fonagy et al., 1991). Such

findings also support the importance of maternal contributions to the quality of the attachment relationship.

Maternal Sensitivity as a Mediator of Adult Attachment Status

Following the establishment of maternal sensitivity as a predictor of infant attachment, a mediational model was proposed whereby maternal sensitivity mediates the relationship between adult mental representations of attachment and infant attachment classification. Adult mental representations of attachment refer to the qualitative aspects of describing relationships and attachment-related experiences, such as coherency and monitoring, and have been found to predict the quality of the mother-infant attachment relationship (Crawford & Benoit, 2009). However, a meta-analysis of studies assessing this mediational association found that maternal sensitivity accounted for only 23% of the relationship between adult and infant attachment (van IJzendoorn, 1995). van IJzendoorn coined the term *transmission gap* to describe the remaining unexplained variance in this model and encouraged researchers to discover ways of “closing the gap” in an effort to further understand how adult attachment classification affects infant attachment status.

Pederson and colleagues (Pederson, Gleason, Moran, & Bento, 1998) proposed that, “An explanation of the weakness of the statistical support for the mediational model should first consider the adequacy of the assessment of maternal sensitivity” (p. 930). They utilized the MBQS/divided attention task to assess the role of maternal sensitivity as a mediator between adult attachment classification and infant attachment status. Pederson and his colleagues also noted that only three of the studies employed in the van IJzendoorn et al. (1995) meta-analysis had assessed all three aspects of the mediational model on the same participants. In an effort to increase the power of their exploration of

the model, they assessed maternal representations of attachment, maternal sensitivity, and the quality of the attachment relationship using the same participants. They found that using the MBQS resulted in a substantially stronger relationship between maternal sensitivity and attachment security ($r = .51$) than evidenced in previous meta-analyses (De Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987). However, in spite of these methodological enhancements, increases in the association between maternal sensitivity and infant attachment did not add to the strength of the mediational model: sensitivity still accounted for less than 25% of the relationship between maternal state of mind and infant attachment. They concluded that sensitivity, as currently defined by attachment theory, represents only one of several mechanisms through which maternal state of mind influences the attachment relationship. They proposed that a broader conceptualization of maternal interactions that influence the developing attachment relationship be adopted; distinct aspects of maternal interactive behaviour should be considered, in addition to maternal sensitivity, when assessing the maternal contribution to attachment relationships. The current study will explore this component of the mediational model in attempt to identify other aspects of maternal interactive behaviour that may be important for the developing attachment relationship.

De-Constructing the Global Measure of Sensitivity

In another attempt to increase the predictability of the mediational model, Raval et al. (2001) created a more refined definition of sensitivity. They predicted that while most mothers would respond to obvious signals from their infants, a tendency to respond to more subtle signals would distinguish between mothers in distinct attachment relationships. Confirming expectations, they found that although mothers of Secure

infants were more responsive overall than mothers of non-Secure infants, there was a more pronounced difference in responses to less clear, more ambiguous signals; mothers of Secure infants were much more likely to respond to these more subtle behaviours. They found that this refined measure of sensitivity narrowed the gap in the model slightly, since maternal sensitivity accounted for 35% of the association between maternal attachment status and infant attachment security, but a great deal of variation still remained unexplained. Similarly to Pederson et al. (1998), they concluded that it would be beneficial to consider multiple distinct domains of maternal interactive behaviour that may influence the developing attachment relationship, rather than just using the overall construct of maternal sensitivity.

Given this repeated conclusion that maternal sensitivity is an important, but not exclusive, predictor of the mother-infant attachment relationship (De Wolff & van IJzendoorn, 1997; Ravel et al., 2001; Pederson et al., 1998), the current research set out to explore the role of dimensions of the quality of mother-infant interaction, beyond the traditional measures of maternal sensitivity, in the development of attachment relationships. As so concisely asserted by De Wolff and van IJzendoorn: "Sensitivity has lost its privileged position as the only important causal factor" of the attachment relationship (1997, p. 585).

Variation in the Interactive Behaviour of Mothers in High-Risk and Low-Risk Dyads

In re-conceptualizing the current understanding of maternal sensitivity, it is also important to identify environmental factors that may affect how maternal interactive behaviour influences the developing attachment relationship. Ainsworth's empirical and theoretical work was based on middle-class samples, however much of the current

research on attachment focuses on higher-risk populations. One high-risk group that has received recent attention in attachment research is adolescent mothers, who tend to be of lower socio-economic status (SES) than adult mothers, and are identified as high-risk for numerous reasons (Bailey, Waters, Pederson, & Moran, 1999; Jaffee, Caspi, Moffitt, Belsky, & Silva, 2001). For example, mothers who give birth as teenagers typically grew up in high-risk environments during their own childhood (Cairns, Cairns, Xie, Leung, & Hearne, 1998; Camp, 1995), have lower levels of education, and higher rates of psychological problems than mothers who have children in adulthood (Coley & Chase-Lansdale, 1998; Corcoran, 1998). Subsequently, infants of adolescent mothers are at increased risk for multiple adverse outcomes in early childhood, including behaviour and impulse control problems, in addition to low cognitive abilities and academic achievement (Jaffee et al., 2001). Additionally, these children are also more likely to be classified as being in Insecure or Disorganized attachment relationships than infants of adult mothers (Broussrad, 1995; Lamb, Hopps, & Elster, 1987). There are several potential explanations for these differing distributions of attachment relationships among infants of adolescent and adult mothers. For example, contextual factors, such as a chaotic, stressful or inconsistent family environment, may interfere with the beneficial effects of high quality mother-infant interactions. De Wolff and van IJzendoorn (1997) looked at the role of different family environments in their meta-analysis on the association between maternal sensitivity and infant attachment. They found a stronger relationship between maternal sensitivity and attachment security in the 18 middle class samples ($r = .27$) than the 8 lower-class samples ($r = .15$) and concluded that the development of attachment relationships is more complicated in high-risk dyads that

interact under unstable social conditions. Their findings emphasize the importance of considering the interaction of social context with maternal interactions when assessing its association with infant attachment.

There is also evidence that mothers in high-risk groups engage in qualitatively different behaviours toward their infants than mothers from lower risk populations. Much of this research has shown that not only are higher levels of insensitivity more common among mothers in high-risk dyads, but there is also greater variability in the content of their interactions (Bailey et al., 1999; Bailey et al., 2007). These findings are consistent with Ainsworth's original conceptualization of variability in maternal behaviour: that is, as a group, mothers who are sensitive show much less variability in their interactions than mothers who are insensitive (Ainsworth et al., 1971). In one recent example of such research, Bailey et al. (1999) used both a community sample and a sample of adolescent mothers to study the interactions of mothers and their infants. They applied a q-factor analysis to identify groups of dyads within each sample that displayed similar patterns of interaction. Their analysis of the adult mothers was consistent with Ainsworth's observations; one factor reflecting maternal sensitivity emerged to describe the behavior of all adult mothers. Analysis of the adolescent sample, however, revealed that these mothers were characterized by more negative caretaking behaviours, and three factors were necessary to describe these patterns of interaction: ignoring versus sensitively interacting, accepting versus hostile rejecting, and interfering. These results are similar to patterns of interaction identified within samples of depressed mothers (Oldershaw, Walters, & Hall, 1989), suggesting they may be reflective of high-risk populations in general. Moreover, this multi-dimensionality of their interactions may help to explain the

weak associations between attachment security and maternal sensitivity when assessed as a single variable in high-risk populations (Nievar & Becker, 2008). Domains of maternal interactive behaviour created as an objective of the current study should provide a more accurate representation of the interactive behaviour of mothers in high-risk groups.

Origins of Disorganization

Assessing multiple dimensions of maternal interaction may also be useful in exploring the suggestion that the origins of Disorganized attachment differ for infants of adolescent and adult mothers. Extant theory suggests that Organized and Disorganized attachment result from differing aspects of maternal interaction, that is, Disorganized relationships are not a result of low levels of maternal sensitivity. This widely-accepted account suggests that maternal behaviour experienced by the child as *atypical, frightened, or frightening* (ie. sudden looming over infant, failure to respond to clear signals, fear grimaces etc.) is largely responsible for the development of Disorganized attachment relationships (Hesse & Main, 1990). Hesse and Main explain that these behaviours are a source of alarm to the child, and create simultaneous needs to approach, and take flight from, the caregiver during times of stress. These conflicting emotional experiences result in the anomalous and atypical behaviours that characterize Disorganized attachment in the SSP. However, recent studies have found that low levels of maternal sensitivity are associated with Disorganization in high-risk samples (Bailey et al., 2007; Carlson, 1998; Moran, Forbes, Evans, Tarabulsky, & Madigan, 2008; van IJzendoorn et al., 1999). This would suggest that the determinants of infant Organized and Disorganized attachment, at least in high-risk populations, are not necessarily orthogonal constructs, and may originate from similar aspects of the mother-infant interaction.

Bailey and colleagues (2007) explored the development of attachment in infants of adolescent mothers. Consistent with previous research (Bailey et al., 1999), they found that three factors were necessary to describe the interactive behavior of these young mothers with their infants. They found that low maternal sensitivity and one of these factors, a disengaged pattern of interaction in the home, were associated with infant Disorganization, confirming suggestions that sensitivity may play a role in the origins of Disorganized attachment. In order to better understand these findings, the authors suggest that these analyses be replicated in a low-risk community sample, to identify potential differences in the development of attachment relationships between high-risk and low-risk groups.

To further explore the origins of Disorganization, Moran and colleagues (2008) assessed both atypical maternal behavior and levels of maternal sensitivity in mothers from the same sample of adolescent mothers. Using hierarchical regression analyses they found that atypical maternal behavior was a significant predictor of infant Disorganization, and that maternal sensitivity added significantly to this model. They also found that atypical maternal behavior added significantly to the prediction of infant attachment security from maternal sensitivity. These findings provide the most direct support to date for the role of insensitivity in predicting Disorganization. This suggests that the maternal contributions to Organized and Disorganized attachment may be best conceptualized as a single developmental factor reflecting levels of both maternal sensitivity and atypical behaviour, as opposed to representing orthogonal constructs with differing origins. Moran et al. (2008) propose that a finer description of maternal behavior be developed, potentially using sub-scales or dimensions, to more clearly

capture the range of behaviour contributing to the development of Disorganized attachment relationships.

For a theoretical account of these findings, a *threshold approach* to understanding the development of Disorganized attachment across various environmental contexts has been proposed by Bernier and Meins (2008). They suggest that children have different susceptibilities to developing Disorganized attachment relationships with their mothers, based on a combination of characteristics innate to the child in addition to socio-environmental factors. More specifically, genetics, temperament and the presence of other important attachment figures are all theorized to determine the level of a child's threshold. They also suggest that the socio-economic environment in which a child develops can both indirectly and directly affect this threshold. For example, various risk factors associated with low socio-economic status, such as levels of parenting stress, may differentially predispose an attachment figure to maladaptive interactions with their child that are associated with the development of Disorganized attachment relationships. In addition, a sub-optimal environment as a consequence of these stressors may directly lower a child's threshold, making him more vulnerable to low quality parental interactive behaviour. For example, a history of high levels of parenting stress may increase a child's susceptibility to low quality maternal interactions through anxious or fearful reactions to negative maternal emotions. Such resulting differences in threshold levels can be used to explain variation in the association between maternal sensitivity and Disorganized attachment relationships between high-risk and low-risk dyads. Lower thresholds in children from high-risk groups may potentiate the impact of maternal insensitivity on developing Disorganized attachment relationships. Children in non-clinical, middle class

samples will often experience fewer stressors than those in higher-risk groups, resulting in higher thresholds and, thus, more extreme parental behaviour necessary to lead to the development of a Disorganized attachment relationship. Bernier and Meins suggest further research on the antecedents of Disorganization may assist in refining this threshold model. In particular, they recommend that insensitivity be assessed in relation to attachment Disorganization not only in high-risk groups, but in low-risk samples as well, to further understand the role of social context in this association.

While these recent empirical and theoretical findings have implicated low levels of maternal sensitivity in the development of Disorganized attachment in high-risk samples, such findings have yet to be replicated in studies of populations not identified as at-risk (Moran et al., 2008). The current study will utilize a similar sample of adolescent mothers as was assessed in the previously mentioned studies (Bailey et al., 2007; Moran et al., 2008), in addition to a sample of adult mothers, to draw comparisons between the development of attachment relationships in high-risk and low-risk populations. Replicating similar analyses in a low-risk community sample will help to determine if these associations result from an interaction between maternal sensitivity and the social context, or whether maternal sensitivity may be an informative measure of predicting infant Disorganization across various socio-economic environments. Additionally, a multi-dimensional description of maternal interactive behaviour will be utilized to describe and further understand differences in the origins of Disorganized attachment relationships within and between these two groups.

Purpose of the Current Study

The current study was designed to further explore the role of maternal interactive behaviour in the developing attachment relationship. As established by the review presented here, current findings suggest that assessing maternal behaviour as a single global factor reflecting sensitivity may fail to capture the full range of variation in the quality of a mother's interaction with her infant. Conceptually distinct aspects of maternal interaction may have differing degrees and qualities of influence on the developing attachment relationship (De Wolff & van IJzendoorn, 1997; Raval et al., 2001). Thus, one objective of the current thesis was to develop an alternative assessment of the quality of maternal interaction to that of global sensitivity, based on domains of interactive behaviour. These domains were created based on items of the MBQS, a widely validated measure of global sensitivity (Atkinson, et al., 2000; Goldberg, 2000b). First, this was expected to generate a more detailed, multi-dimensional description of the interactive behaviour of mothers in different attachment classifications than what can be inferred from a single score representing global sensitivity. Second, such domain scores also provide a qualitatively distinct characterization of mother-infant interaction in that they do not involve a transformation of the direct observations of mother-infant interactions. As mentioned previously, the global sensitivity score derived from the MBQS, represents how similar the observed mothers' interactions are to those of a theoretically prototypically sensitive mother. Measures reflecting this theoretical representation of maternal sensitivity are important for certain purposes, such as assessing the theory that high maternal sensitivity in mother-infant interactions is associated with Secure attachment relationships; however, they do not reflect the content

of a mother's interactions with her child (e.g., Mothers with different patterns of interaction can receive very similar sensitivity scores). Given that maternal sensitivity accounts for less variation in the quality of the attachment relationship than would be expected based on attachment theory (Goldsmith & Alansky, 1987; De Wolff & van IJzendoorn, 1997), it is important to identify other aspects of maternal interactions that may be influencing the developing attachment relationship. Thus, an important objective of this thesis was to assess variation in the content of maternal interactions that was not a reflection of the theoretical construct of sensitivity. Multi-dimensional descriptions of the content of maternal interactive behaviour were used to identify other aspects of the interaction that may have similar, or greater, influence on the quality of the attachment relationship than that of global sensitivity.

A second objective of this study was to assess the association between maternal interactive behaviour and the quality of the attachment relationship for mothers in both high-risk and low-risk populations. That is, a sample of adolescent mothers, a group commonly identified as at-risk (Jaffee et al., 2001), was compared with a community sample of adult mothers. Parallel analyses were run for both groups to assess the association of both maternal sensitivity and domains of interactive behaviour with the quality of the attachment relationship. As described previously, research has established an association between high levels of maternal sensitivity and infant attachment security (De Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987), however, this association is typically weaker in groups of lower socio-economic status than it is in middle-class community samples (De Wolff & van IJzendoorn, 1997; van IJzendoorn et al., 1999). Therefore, it was expected that sensitivity and the domains of interactive

behaviour would differentiate between mothers in Secure and non-Secure relationships in both groups, but it was predicted that this association would be stronger in the adult sample. Additionally, widely-accepted theory suggests that maternal sensitivity is associated only with attachment Security, and not Disorganization, however, recent research indicates otherwise. More specifically, recent empirical evidence suggests that high levels of maternal insensitivity may also play a role in the development of infant Disorganized attachment (Bernier & Meins, 2008; Moran et al., 2008). However, research available in this area has focused on the development of Disorganization in high-risk samples only, and similar associations have yet to be identified in low-risk groups (Moran et al., 2008). Consequently, it was expected that low levels of maternal sensitivity and domains of interactive behaviour would be related to Disorganized infant attachment in the high-risk, but not the low-risk, sample.

To further understand differences in the origins of attachment relationships for adult and adolescent mothers, levels of parenting stress were also examined, which have been implicated in decreasing parental sensitivity in high-risk groups (Bernier & Meins, 2008). The associations of maternal sensitivity and domains of interactive behaviour with parenting stress were analyzed for both adult and adolescent mothers. It was expected that low quality maternal interactions, as measured by maternal sensitivity and domains of interactive behaviour, would be associated with high levels of parenting stress in both groups. However, based on the higher number of stressors (Jaffee et al., 2001) and greater variability in mother-infant interactions characteristic of high-risk dyads (Bailey et al., 1999; Bailey et al., 2007), this association was expected to be stronger for the adolescent mothers. Alternatively, elevated levels of parenting stress among mothers from high-risk

groups may impede the development of Secure attachment relationships through mechanisms other than maternal sensitivity. That is, they may reflect a chaotic or stressful environment that interferes with the association between high quality maternal interactions and infant attachment security (Davis & Cummings, 1994; De Wolff & van IJzendoorn, 1997). For example, aspects of low socio-economic environments, such as repeated separations from the mother or inconsistent caregiving, may interfere with the association between high quality maternal interaction and the developing attachment relationship (DeWolff & van IJzendoorn, 1997). Consequently, levels of parenting stress were also compared between adult and adolescent mothers to identify variation that may contribute to differing origins of the quality of attachment relationships between these two groups. It was expected that stress levels would be higher among adolescent mothers than adult mothers.

A related and final purpose of this study was to add to the current understanding of the origins of Disorganized attachment for infants of adult and adolescent mothers. As previously discussed, recent research has suggested that the interactive behavior of mothers in high-risk groups differs both quantitatively and qualitatively from that of mothers in low-risk populations (Bailey et al., 1999; DeWolff & van IJzendoorn, 1997; Jaffee et al., 2001). Such divergence in the quality of maternal interactions may help account for variation in the association between maternal sensitivity and attachment Disorganization between these two groups (Bailey et al., 1999). More specifically, more extreme insensitivity or lower quality interactions characteristic of mothers from high-risk groups may increase infant susceptibility to developing Disorganized relationships (Bernier & Meins, 2008; van IJzendoorn et al., 1999). However, further research is

necessary to establish empirical support for variation in the quality of maternal interactions between high and low-risk dyads (Bernier & Meins, 2008; Moran et al., 2008). Consequently, comparing the content of mother-infant interactions may assist in understanding variation in the maternal contribution to Disorganization between adult and adolescent mothers. It was expected that adolescent mothers in Disorganized relationships would be characterized by lower quality interactions, as assessed by sensitivity and the content domains of interactive behaviour, than adult mothers in Disorganized relationships.

Methods

Participants

Adult Mothers

Forty-nine adult mothers were recruited during their post-partum stay at a London, Ontario hospital after delivery of their first child.¹ Participants agreed to take part in a study on relationship development conducted by the Child Development Centre at the University of Western Ontario.

Demographic information was obtained from mothers during home visits when the infant was 12 months of age. All mothers were over the age of 20 at the time of delivery, and ranged in age from 20.02 to 36.30 years ($M = 30.01$, $SD = 4.50$) at the time of birth. All infants were born at full-term birth weight with no medical complications

¹ As part of this study, 35 adolescent mothers under the age of 20 years at the time of delivery were also recruited. Recruitment stopped after 35 mothers were retained, since recruitment for a new study of adolescent mothers ($n = 100$) from a different funding agency began. Differing distributions of demographics and outcomes on the measures of interest prevented the combination of these two adolescent groups into one sample. As a result, the larger sample was chosen as a comparison group for the current study.

and an uneventful delivery. All mothers were Caucasian, and at the time of the 12-month home visit, 91.8% were married or in common-law relationships, and 8.2% were single. Average annual household income was recorded on a scale from 1 (<\$5,000) to 8 (>\$60,000). Income ranged from 2 to 8, with an average of 5.76, which corresponds to \$30,000 to \$40,000 annually. Mothers highest level of education ranged from 11 to 21 years ($M = 14.51$, $SD = 2.17$). These mothers were also included as part of a sample analyzed in another published paper (Bailey et al., 1999).

Adolescent Mothers

One hundred adolescent mothers who were under the age of 20 years at the time of delivery, and their first-born infants, were recruited during their post-partum stay at a London, Ontario hospital. Participants agreed to participate in a longitudinal intervention study conducted by the Child Development Centre at the University of Western Ontario. Eighty one mothers were Caucasian, five were Native American, five were Middle Eastern, four were Latin American, four were Asian and one participant did not report this information. All infants were born at full-term birth weight with no medical complications and an uneventful delivery. Before the first assessment, the dyads were randomly divided into an intervention group and a control group. For the purpose of the present study, only the control group ($n = 50$) was examined². The entire sample was used in analysis in another published paper (Bailey et al., 2007) and a sub-set of this sample, including mothers from both the intervention and control group, was used in another published article (Moran et al., 2008).

² All information and analyses presented in the remainder of this study are based on control participants only to maintain consistency between the adult and adolescent samples

Demographic information was obtained from mothers when infants were six months of age, and was updated throughout the course of the study. Mothers ranged in age from 16.02 to 19.88 ($M = 18.48$, $SD = 1.00$) years at the time of birth. Annual income was measured on a scale from 1 ($< \$5,000$) to 8 ($> \$60,000$) in Canadian dollars. Average annual household income ranged from 1 to 8, with an average of 3.30 ($SD = 1.40$), which corresponds to between \$10,000 and \$19,000 annually. In terms of marital status, 53.7% of mothers were single, 24.4% were living together but not married, and 22% were married. At the time of the 12-month visit, 28% of mothers were not working, 46% were students, 12.8% were working in some capacity and 5.1% were working part-time and going to school part time. Mother's highest level of education ranged from 8 to 14 years ($M = 11.15$, $SD = 1.31$). One dyad was dropped from analysis due to incomplete data.

Materials

Maternal Behaviour Q-Sort (MBQS)

The MBQS is a measure of maternal interactive behaviour in the home. It consists of 90 items on individual index cards that provide descriptions of a mother's interactions with her infant. The items of the MBQS represent various aspects of maternal interactive behaviour, including affect, attentiveness, interactive style and communication skills. Sample items include, "Responds to baby's signals" and "Scolds and criticizes baby". Q-Sort methodology is used by experienced sorters to arrange the cards into nine piles of ten cards each, ranging from pile 1 (*Least like the mother*) to 9 (*Most like the mother*). Each item is assigned a score based on which pile it was placed in. The most commonly used measure extracted from the MBQS is global sensitivity, which was used as a measure of maternal sensitivity in the current study. This represents the correlation

between the scores of the observers Q-sort with those of a theoretically constructed sort of a prototypically sensitive mother. The higher the correlation derived from the MBQS, the more sensitive the mother is determined to be.

Inter-observer reliability was calculated using Intraclass Correlations (*ICC*) for cases where both home visitors completed the MBQS (see bottom of Table 1), showing high agreement between observers. This resulted in 13 dyads in the adult sample and 19 dyads in the adolescent sample. In all cases coded for reliability, an aggregate score of both observers Q-Sorts was used in analyses.

Domains of the Maternal Behaviour Q-Sort.

Rationally derived domains of the MBQS were also created as part of this study. These domains were designed to provide a more detailed description of maternal behaviour during mother-infant interactions than the single sensitivity score derived from the MBQS. Additionally, since the sensitivity score derived from the MBQS represents how closely a mother's interactions relate to those of a proto-typically sensitive mother, they do not directly reflect the content of the interaction. More specifically, due to the nature of correlations, mothers who receive very similar sensitivity scores could have engaged in very different interactions with their infants. For example, two mothers could share the same amount of variation in their interactions with that of the prototypically sensitive mother, but that variation could be represented through different items, reflecting different aspects of the interaction in each case. In such a case, these mothers would share very similar sensitivity scores despite engaging in very different behaviours with their infants. In contrast, domain scores represent the direct content of a mother's

interactions with her infant, as opposed to how closely her behaviour relates to that of a theoretically derived prototypically sensitive mother.

Experienced sorters separated the 90 items of the MBQS into distinct groups based on conceptually related items. That is, sorters went through each item and placed it in a group with other items that represented similar aspects of the mother-infant interaction. Following this, a brief description of the construct represented by the items in each group was created. Items were then re-evaluated to ensure they accurately represented the overall content of the interaction portrayed by that group, and those that were inconsistent with the description were either sorted into a different group or not used. This process resulted in the inclusion of 76 items, sorted into 9 domains, with 4 to 12 items in each group. Cronbach's alpha (α) was used as a measure of internal consistency of the items within each domain. Alphas for all domains were acceptable (above .60) to good (above .80), except for the Facilitation of Exploration and Learning domain, which was below the acceptable range (below .60). See Table 2 for a list of the number of items and internal consistency values for each domain. Additionally, a list of all items within each domain, and those that were not included in any domain, can be found in Appendix A.

Table 1

Interrater Reliability for Maternal Sensitivity and Domains of Interactive Behaviour

Domains of Maternal Interactive Behaviour	Intraclass Correlations	
	Adult Mothers	Adolescent Mothers
Awareness	.61	.91
Response Effectiveness	.59	.90
Positive Affect	.75	.93
Rejection	.78	.90
Synchrony	.90	.92
Controlling/Interfering	.92	.92
Exploration and Learning	.54	.87
Comfort with Contact	.77	.91
Engagement	.71	.86
Sensitivity	.96	.94

Note: Values of .75 and higher indicate excellent interrater agreement; .60 - .74 indicates good agreement; .40 - .59 is considered fair to moderate agreement; below .40 is poor agreement

Table 2

Internal Consistency and Number of Items for Domains of Interactive Behaviour

Domain of Interactive Behaviour	Total Number of Items	Cronbach's Alpha	
		Adult Mothers	Adult Mothers
Awareness	12	.93	.96
Response Effectiveness	10	.89	.95
Positive Affect	7	.88	.94
Rejection	8	.87	.94
Synchrony	11	.92	.96
Controlling/Interfering	12	.88	.93
Exploration and Learning	7	.55	.50
Comfort with Contact	5	.84	.64
Engagement	4	.80	.87

Note. Cronbachs Alpha values greater than .80 are considered good and values greater than .60, but below .80, are considered acceptable (Gardner & Tremblay, 2007)

Following this process, detailed descriptions of the quality of maternal interactive behaviour represented through each domain were created. Descriptions were based on the items within each domain, and indicate how mothers who were high, or low, on each domain were interacting with their infant. Abbreviated versions of these descriptions are provided in the following paragraphs, however the full descriptions can be found in Appendix B.

Awareness. A mother high on this domain is constantly alert to her baby's cues, regardless of competing tasks or demands; she may not respond to the baby, but she clearly demonstrates her acknowledgement of his signals. A mother low on this domain demonstrates lapses in awareness, and is oblivious to her baby's signals towards her.

Response Effectiveness. A mother high on this domain consistently responds effectively to all signals, obvious and subtle, in such a way that satisfies the baby. A mom that is low on this domain either does not respond to her baby's signals, or when she does, her interventions are not appropriate as evidenced her baby's response.

Positive Affect. A mother high on this domain is outwardly expressive of her positive feelings toward her baby, whereas a mother low on this domain is characterized by a lack of affection and positive expression. A mother low on this domain is not necessarily hostile or rejecting towards her baby (see Rejection domain), rather, she is characterized by a lack of animation and positive expression in their interaction.

Rejection. A mother high on this domain actively rejects by expressing irritation, annoyance, or anger at her baby's overtures toward her. She is quick to criticize, punish and belittle her baby or his actions. She focuses on negative aspect of the interaction, often distorting the meaning of her baby's behavior, and overlooking positive signals from him. A mother low on this domain accepts the baby, and does not express feelings of irritation and frustration towards him.

Synchrony. A mother high on this domain is able to adapt her behavior to match the baby's current interests in their interactions. Their encounters are neither abruptly initiated nor terminated; the mother smoothly notes the introduction and completion of their activities. A mother low on this domain does not engage in harmonious interaction

with the baby even if she is attempting to do so. Her behaviours are often unmatched and out of tune with her baby.

Controlling/Interfering. A mother high on this domain shows little respect for her baby; she acts in accordance with her own agenda despite the fact that her baby's wishes are not in accordance with her own. These mothers will often ignore the baby's protests against her interventions and continue at their own pace. A mother low on this domain seems to support, rather than control, the interactions and interferes as little as possible, or only when absolutely necessary.

Facilitation of Exploration and Learning. A mother high on this domain structures the environment and interactions to promote learning and development of exploratory behaviours. She promotes and initiates interactions for her baby outside of the dyadic relationship, but her involvement does not necessarily have an intrusive quality. A mother low on this domain is often uncomfortable with her baby's exploration and does not encourage independent exploration of the environment.

Comfort with Physical Contact. A mother high on this domain shows ease with close proximity and contact, and welcomes intimate overtures from her baby. She uses close bodily contact during times of distress to soothe her baby. A mother low on this domain is awkward and uncomfortable during intimate encounters, and often uses objects to mediate interactions.

Engagement. A mother high on this domain seeks out social encounters with her baby, eliciting his attention and using vocalizations throughout their interactions. A mother low on this domain does not often initiate interactions and conversations with her baby.

Domain scores for each mother were computed based on the Q-sort completed by the home visitor, and represent the average score of all items within that domain.³

Pearson correlation coefficients were used to assess associations among the domains.

Correlations ranged from .20 to .88 among the adult sample (see Table 3) and from .26 to .93 for the adolescent sample (see Table 4). Additionally, correlations between domains and global sensitivity were generally quite large, and ranged from -.96 to .96 (see Table 5).

Inter-observer reliability was calculated using Intraclass Correlations (*ICC*) for cases where both home visitors completed the MBQS. This resulted in 13 dyads in the adult sample and 19 dyads in the adolescent sample. Reliability was generally high, and ranged from fair to excellent (see Table 1). In all cases coded for reliability, an aggregate score of both observers Q-Sort's was used in analyses.

³ Several items were reverse coded to compute domain scores, as is noted in the list in Appendix B

Table 3

Correlations Among Domains for Adult Mothers

Domains of Behaviour	1	2	3	4	5	6	7	8	9
1.Awareness	-	.88***	-.84***	.80***	.84***	-.74***	.38***	.71***	.81***
2.Response Effectiveness		-	-.85***	.74***	.88***	-.77***	.40***	.66***	.66***
3.Rejection			-	-.82***	-.86***	.86***	-.38**	-.69***	-.72***
4.Positive Affect				-	.78***	-.78***	.36**	.80***	.82***
5.Synchrony					-	-.88***	.32**	.71***	.68***
6.Controlling /Interfering						-	-.32**	-.69***	-.63***
7.Exploration and Learning							-	.20	.33**
8.Comfort with Contact								-	.69***
9.Engagement									-

Note. Values represent Pearson correlation coefficients

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

Table 4

Correlations Among Domains for Adolescent Mothers

Domains of Behaviour	1	2	3	4	5	6	7	8	9
1.Awareness	-	.93***	-.87***	.83***	.92***	-.84***	.36***	.76***	.89***
2.Response Effectiveness		-	-.91***	.82***	.92***	-.86***	.48**	.72***	.81***
3.Rejecting			-	-.88***	-.90***	.88***	-.54***	-.78***	-.84***
4.Positive Affect				-	.85***	-.82***	.41**	.82***	.89***
5.Synchrony					-	-.92***	.34*	.77***	.84***
6.Controlling /Interfering						-	-.29*	-.83***	-.78***
7.Exploration and Learning							-	.26	.32*
8.Comfort with Contact								-	.76***
9.Engagement									-

Note. Values represent Pearson correlation coefficients

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

Table 5

Correlations Between Domains and Sensitivity for Adult and Adolescent Mothers

Domains of Behaviour	Sensitivity	
	Adult Mothers	Adolescent Mothers
Awareness	.93***	.95***
Response Effectiveness	.87***	.96***
Positive Affect	.85***	.91***
Rejection	-.89***	-.96***
Synchrony	.91***	.96***
Controlling /Interfering	-.88***	-.93***
Exploration and Learning	.45**	.42**
Comfort with Contact	.75***	.84***
Engagement	.80***	.89***

Note. Values represent Pearson correlation coefficients; Correlation among these constructs are expected to be high due to overlapping items between each domain and global sensitivity

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

Parenting Stress Index

The *Parenting Stress Index: Long Form* (PSI, Abidin, 1983) is a self-report inventory completed by parents. It measures stress related to parenting, relationships with spouse, family and friends, feelings of competence, social isolation and general health. It is composed of 101 Likert-scale items ranging from 1 (*Strongly Agree*) to 5 (*Strongly*

Disagree). This measure generates a total score which reflects overall levels of stress for the mother. Higher scores are reflective of higher levels of stress.

Strange Situation Procedure (SSP)

Attachment relationships were measured using the standardized Strange Situation Procedure (Ainsworth et al., 1978). Infants participated in this procedure at 12 months of age, which consisted of an initial episode of play between mother and infant, followed by the introduction of a stranger and two separation and subsequent reunion episodes with the mother. Both separations lasted 3 minutes; however they were interrupted if the infant cried for longer than 30 seconds. The infant's behaviour on reunion with the mother is of most interest to coders. This procedure was videotaped, and attachment classifications were determined by trained coders. As standardized coding dictates, the SSP was coded twice; once for an Organized attachment classification and a second time for Disorganization. The initial coding results in one of three attachment classifications: Secure, Avoidant or Resistant. The second coding generates a score for Disorganization ranging from 1 (*No Disorganization*) to 9 (*High Disorganization*). A dichotomous definition of Disorganization was used in all analyses, with infants who receive a score of 6 or higher being categorized as Disorganized. When an infant receives a Disorganization score of 5, it is up to the coder to determine whether they should be classified as Disorganized or not. Disorganized infants receive this as their primary classification, and their organized strategy from the initial coding as their secondary classification. Infants with a Disorganization score below 5 are not considered Disorganized, and are always classified only by their original classification (ie. Avoidant, Secure or Resistant).

An interrater reliability analysis using the Kappa statistic was performed to determine consistency among raters. Inter-observer reliability was calculated for 13 dyads in the adult sample. Independent coders agreed 92% of the time for the 3-way (secondary) classification ($Kappa = .83, p < .01$) and 85% of the time for the 4-way (primary) classification ($Kappa = .70, p < .001$). For 12 dyads in the adolescent sample, independent coders agreed 83% of the time for the 3-way classification ($Kappa = .68, p < .01$) and 83% of the time for the 4-way classification ($Kappa = .68, p < .05$). In situations of coder disagreement, a consensus sort of the two coders, often obtained through consultation with a third coder, was used in all analyses.

Procedures

Home Visit

All mother-infant dyads were visited in their home by trained researchers when infants were 12 months of age, as part of two larger studies funded by the Ontario Mental Health Foundation (OMHF)⁴ and Health and Welfare Canada and the Social Sciences and Humanities Research Council of Canada⁵. The visits began with mothers reading a letter of information (see Appendixes C and D) and giving written consent to participate (see Appendixes E and F for a copy of the consent forms). Mothers were then observed in approximately five minute interactions helping their infant with a toy that was challenging for their developmental level. Next, while one home visitor conducted a developmental assessment of the infant, the second visitor assisted the mother in completing a description of her child's attachment related behaviours. Following this, the

⁴ Adult mothers

⁵ Adolescent mothers

mother was observed in a divided-attention task, where she was interviewed about experiences with her baby and other family members, while simultaneously monitoring her baby's activities. Throughout these interactions, visitors made running notes on infant and mother characteristics and behavior. Home visits took an average of two to three hours to complete. Mothers were then left with a set of questionnaires which they filled out on their own, including the Parenting Stress Index (PSI, Abidin, 1983). Following this visit, one or both of the visitors used their notes and observations to complete the Maternal Behaviour Q-Sort (Pederson & Moran, 1995) based on their observations of the entire visit.

Lab Visit

Within one month of this visit, infants were videotaped in the Strange Situation Procedure at the University of Western Ontario. The procedures followed those outlined by Ainsworth et al. (1978). The Strange Situation Procedure took approximately 20 - 30 minutes to complete. Attachment classifications were later assigned by trained coders who were blind to all other measures.

Results

Distributions of primary⁶ and secondary⁷ attachment classifications for adult and adolescent mothers are presented in Table 6a. Key distinctions between the two groups include a higher prevalence of Disorganized relationships among adolescent mothers when using primary classifications (see top half of Table 6a) and higher rates of non-Secure relationships among these mothers when Disorganized dyads were re-categorized

⁶ Disorganized dyads were classified as a separate group

⁷ Disorganized dyads were classified by their secondary, Organized classification

according to their secondary classification (see bottom half of Table 6a). Additionally, cell sizes for dyads with a primary classification of Avoidant or Resistant were very small, or empty, so further analyses combined these two classifications into one Insecure attachment group. Descriptive statistics for all maternal measures for adult and adolescent mothers are provided in Table 6b. Adult mothers displayed overall higher scores on positive aspects of maternal interactions and lower scores on negative aspects for both the domains of interactive behaviour and global sensitivity. Additionally, adult mothers reported lower levels of overall stress.

Table 6a

Distributions of Attachment Classifications for Adult and Adolescent Mothers

Group	Primary Attachment Classification				Total N (%)
	Secure N (%)	Avoidant N (%)	Resistant N (%)	Disorganized N (%)	
Adult Mothers	31 (63%)	3 (6%)	2 (4%)	13 (26%)	49 (100%)
Adolescent Mothers	15 (31%)	6 (12%)	-	28 (57%)	49 (100%)

Group	Secondary Attachment Classification			Total N (%)
	Secure N (%)	Avoidant N (%)	Resistant N (%)	
Adult Mothers	34 (69.39%)	10 (20.41%)	5 (10.20%)	49 (100%)
Adolescent Mothers	19 (38.78%)	21 (42.86%)	9 (18.37%)	49 (100%)

Note: Attachment classifications were measured using the Strange Situation Procedure; No dyads from the adolescent sample were assigned a primary classification of Resistant

Table 6b

Descriptive Statistics Across Measures for Adult and Adolescent Mothers

Measures	Group			
	Adult Mothers		Adolescent Mothers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Global Sensitivity (MBQS)	.51	.49	.09	.63
Domains of Maternal Interactive Behaviour				
Awareness	6.33	1.80	5.11	2.02
Response Effectiveness	6.36	1.66	5.36	2.11
Positive Affect	6.36	1.67	4.90	2.08
Rejection	2.98	1.52	4.40	2.09
Synchrony	6.30	1.67	5.05	1.98
Controlling/Interfering	3.80	1.31	4.82	1.72
Exploration and Learning	5.57	.88	5.74	.88
Comfort with Contact	6.11	1.54	5.45	1.61
Engagement	6.37	1.81	5.07	2.05
Parenting Stress Index	197.30	33.40	220.28	33.96

Note. Global Sensitivity scores range from -1 to + 1; Domain scores range from 1 to 9; Parenting Stress

Index Scores range from 101 to 505

Variation in Maternal Sensitivity Across Attachment Relationships

Analyses began by assessing the association of global sensitivity with both attachment classification and parenting stress. Univariate Analyses of Variance (ANOVA) were used to examine variation in maternal sensitivity across attachment classifications. Post-hoc comparisons between groups were assessed using a Bonferroni correction. Additionally, the strength of the association between maternal sensitivity and parenting stress was measured using a Pearson correlation coefficient.

Adult Mothers

ANOVAs indicated there was significant variation in sensitivity across mothers in different secondary, but not primary, attachment relationships (see Table 7). That is, differences in maternal sensitivity across attachment classifications were apparent only when mothers in Disorganized relationships were categorized according to their alternate, Organized classifications. However, post-hoc comparisons found no significant differences between specific groups. Further analyses were run using a dichotomous categorization of attachment to increase cell size in each group, and further explore potential differences among specific attachment categories. ANOVAs revealed that there were significant differences in sensitivity between mothers in Secure and non-Secure attachment relationships, but not between mothers in Disorganized and non-Disorganized relationships (see Table 8).

There were no significant associations between maternal sensitivity and overall parenting stress ($r = -.24, ns$).

Table 7

Variation in Maternal Sensitivity Across Attachment Classifications for Adult Mothers

	Primary Attachment Classifications			<i>F</i> (2,46)	Effect Size (η_p^2)
	Secure ^a	Insecure ^b	Disorganized ^c		
Sensitivity (<i>M</i> and <i>SD</i>)	.62 (0.35)	.14 (0.67)	.38 (0.65)	2.84	.11
Secondary Attachment Classification					
	Secure ^d	Avoidant ^e	Resistant ^f		
Sensitivity (<i>M</i> and <i>SD</i>)	.63 (0.34)	.23 (0.71)	.22 (0.66)	3.82*	.14

Note. Attachment classifications were measured using the Strange Situation Procedure; Global Sensitivity was measured using the Maternal Behaviour Q-Sort with possible scores ranging from -1 to 1; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a*n* = 31, ^b*n* = 5, ^c*n* = 13, ^d*n* = 34, ^e*n* = 10, ^f*n* = 5

**p* < .05

Table 8

Variation in Maternal Sensitivity Across Attachment Security and Disorganization for Adult Mothers

	Attachment Classification		<i>F</i> (1,47)	Effect Size (D_p^2)
	Secure ^a	Non-Secure ^b		
Sensitivity (<i>M</i> and <i>SD</i>)	.63 (0.34)	.23 (0.67)	7.80**	.14
	Non-Disorganized ^d			
	Disorganized ^c			
Sensitivity (<i>M</i> and <i>SD</i>)	.38 (0.65)	.55 (0.43)	1.26	.03

Note. Attachment classifications were measured using the Strange Situation Procedure; Global Sensitivity was measured using the Maternal Behaviour Q-Sort with possible scores ranging from -1 to 1; D_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a*n* = 34, ^b*n* = 15, ^c*n* = 13, ^d*n* = 36

** *p* < .01

Adolescent Mothers

ANOVAs indicated there was significant variation in maternal sensitivity between mothers in different primary, but not secondary, attachment relationships (see Table 9). That is, variation in sensitivity across attachment classifications was only evident when mothers in Disorganized relationships were categorized as a separate group. Post-hoc comparisons indicated that adolescent mothers in Disorganized relationships were significantly less sensitive than those in Secure and Insecure relationships. Further analyses were run using a dichotomous categorization of attachment to increase cell size in each group. Results indicated there was no significant variation in maternal sensitivity

between mothers in Secure and non-Secure relationships however, there was between mothers in Disorganized and Organized attachment relationships (see Table 10).

There were no significant associations between maternal sensitivity and overall parenting stress ($r = -.09, ns$).

Table 9

Variation in Maternal Sensitivity Across Attachment Classifications for Adolescent Mothers

	Primary Attachment Classifications			F (2,46)	Effect Size (η_p^2)
	Secure ^a	Insecure ^b	Disorganized ^c		
Sensitivity (M and SD)	.31 (0.62) _a	.68 (0.20) _a	-.15 (0.57) _b	7.16*	.24
	Secondary Attachment Classifications				
	Secure ^d	Avoidant ^e	Resistant ^f		
Sensitivity (M and SD)	.22 (0.64)	-.04 (0.60)	.14 (0.68)	.90	.04

Note. Attachment classifications were measured using the Strange Situation Procedure; Global Sensitivity was measured using the Maternal Behaviour Q-Sort with possible scores ranging from -1 to 1; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for; Subscripts denote significant ($p < .05$) mean differences from a post-hoc analysis using a bonferroni correction

^a $n = 15$, ^b $n = 6$, ^c $n = 28$, ^d $n = 19$, ^e $n = 21$, ^f $n = 9$

* $p < .05$

Table 10

Variation in Maternal Sensitivity Across Attachment Security and Disorganization for Adolescent Mothers

	Attachment Classification		F (1,47)	Effect Size (Ω_p^2)
	Secure ^a	Non-Secure ^b		
Sensitivity (<i>M</i> and <i>SD</i>)	.22 (.64)	.01 (.62)	1.26	.03
	Disorganized ^c	Non-Disorganized ^d		
Sensitivity (<i>M</i> and <i>SD</i>)	-.15 (.57)	.42 (.56)	12.22**	.21

Note. Attachment classifications were measured using the Strange Situation Procedure; Global Sensitivity was measured using the Maternal Behaviour Q-Sort with possible scores ranging from -1 to 1; Ω_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a*n* = 19, ^b*n* = 30, ^c*n* = 28, ^d*n* = 21

** *p* < .01

Summary

These findings indicate that variation in maternal sensitivity between attachment groups was evident when classifying adult mothers by their secondary classification (e.g. Disorganized dyads are classified by their alternate, Organized classification), and for adolescent mothers by their primary classification (e.g. Disorganized dyads are separated as a distinct group). Additionally, global sensitivity differed between adult mothers in Secure vs. non-Secure relationships, but for adolescent mothers, between those in Disorganized vs. Organized relationships. Finally, maternal sensitivity was not associated with parenting stress in either group.

Variation in the Content of Maternal Interaction Across Attachment Relationships

The preceding section identified different patterns in the association between maternal sensitivity and attachment classification for the adult and adolescent mothers. This next series of analyses used multiple domains of maternal interactive behaviour to more specifically examine variation in the content of interactions for mothers in different attachment relationships.

It is recommended that MANOVAs be used to look at the effect of a single independent variable (IV) on multiple dependant variables (DV) (Tabachnik & Fidell, 2007). Advantages of multivariate analyses over separate univariate analyses include comparing the effects of several DV's on one IV, and protection against inflated Type I error (Tabachnik & Fidell, 2007). However, limitations include decreased power, and consideration of several important assumptions necessary for conducting such analyses. For analyses run in the following two sections, a small sample size to dependant variable ratio presented a violation to a basic assumption necessary for running MANOVAs (Gardner & Tremblay, 2007).⁸ Consequently, separate univariate Analyses of Variance (ANOVA) were run to determine if there was significant variation in the interactive behaviour of mothers' in different attachment relationships. Post-hoc comparisons were run using a Bonferroni correction to identify which attachment groups significantly differed from one another.

Adult Mothers

ANOVAs using the primary attachment classification found no

⁸ If a cell has more dependant variables than cases, this cell becomes singular, and the assumption of homogeneity of covariance matrices cannot be tested (Tabachnik & Fidell, 2007)

significant variation in interactive behaviour across adult mothers in different attachment groups (see Table 11).

Table 11

Variation in the Interactive Behaviour of Adult Mothers Across Primary Attachment Classifications

Domains of Interactive Behaviour	Primary Attachment Classification			<i>F</i> (2,46)	Effect Size (η_p^2)
	Secure ^a <i>M</i> (<i>SD</i>)	Insecure ^b <i>M</i> (<i>SD</i>)	Disorganized ^c <i>M</i> (<i>SD</i>)		
Awareness	6.79 (1.41)	5.13 (2.20)	5.70 (2.19)	3.18	.12
Response Effectiveness	6.75 (1.36)	5.44 (2.00)	5.79 (2.01)	2.52	.10
Positive Affect	6.61 (1.08)	5.43 (2.76)	6.12 (2.18)	3.00	.05
Rejection	2.63 (1.11)	4.18 (2.17)	3.36 (1.88)	1.32	.12
Synchrony	6.67 (1.39)	5.56 (1.96)	5.70 (2.03)	2.19	.09
Control/Interfering	3.48 (0.99)	4.80 (1.38)	4.16 (1.72)	3.13	.12
Exploration/Learning	5.75 (0.89)	5.74 (1.24)	5.43 (0.71)	0.62	.03
Comfort/Contact	6.29 (1.30)	5.24 (2.33)	6.01 (1.74)	1.05	.04
Engagement	6.75 (1.26)	5.10 (3.25)	5.97 (2.10)	2.34	.09

Note: Domain scores range from 1 to 9; Attachment classifications were measured using the Strange Situation Procedure; D_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for; None of these analyses were significant at $p < .05$

^a $n = 31$, ^b $n = 5$, ^c $n = 13$

However, ANOVAs using the secondary attachment classification found significant variation in Awareness, Rejection, and Controlling/Interfering behaviour among mothers in different attachment classifications (see Table 12). Post-hoc analyses indicated that mothers in Avoidant relationships were more Rejecting and Controlling/Interfering in their interactions than mothers in Secure relationships.

Table 12

Variations in the Interactive Behaviour of Adult Mothers Across Secondary Attachment Classifications

Domains of Interactive Behaviour	Secondary Attachment Classification			<i>F</i> (2,46)	Effect Size (η_p^2)
	Secure ^a <i>M</i> (<i>SD</i>)	Avoidant ^b <i>M</i> (<i>SD</i>)	Resistant ^c <i>M</i> (<i>SD</i>)		
Awareness	6.78 (1.37)	5.30 (2.45)	5.30 (2.04)	3.98*	.15
Response Effectiveness	6.71 (1.37)	5.62 (1.98)	5.48 (2.38)	2.60	.10
Positive Affect	6.66 (1.05)	5.64 (2.59)	5.74 (2.40)	1.94	.08
Rejection	2.62 (1.07) _a	3.93 (2.20) _b	3.55 (1.87)	3.65*	.14
Synchrony	6.67 (1.33)	5.55 (2.11)	5.33 (2.29)	2.89	.11
Controlling/Interfering	3.45 (0.95) _a	4.73 (1.76) _b	4.32 (1.59)	4.79*	.17
Exploration/Learning	5.72 (0.87)	5.46 (0.70)	5.69 (1.32)	0.33	.01
Comfort/Contact	6.33 (1.25)	5.30 (2.20)	6.24 (1.61)	1.81	.07
Engagement	6.71 (1.21)	5.45 (2.85)	5.90 (2.34)	2.18	.09

Note: Domain scores range from 1 to 9; Attachment classifications were measured using the Strange Situation Procedure; Means in the same row with different subscripts were significantly different ($p < .05$) in a post-hoc analysis using a bonferroni correction; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a $n = 34$, ^b $n = 10$, ^c $n = 5$; * $p < .05$

There was no relationship between parenting stress and any of the domains of maternal interactive behaviour for adult mothers.

Summary. Differences in the interactive behaviour of adult mothers in different attachment relationships were only observed when mothers in Disorganized relationships were categorized by their secondary, Organized classification. Similar analyses performed categorizing Disorganized dyads as a separate group produced non-significant outcomes. Moreover, analyses of secondary attachment classifications revealed that certain aspects of the interaction varied across mothers in different attachment relationships, while others did not. Overall, patterns of interaction indicated that adult mothers in Secure relationships scored higher on positive domains, and lower on negative domains, than mothers in Avoidant relationships. Finally, parenting stress was not substantially related to any aspect of maternal interactive behaviour.

Adolescent Mothers

ANOVAs were run to determine if there was significant variation in maternal interactive behaviour across primary relationship groups (see Table 13). There was significant variation in Awareness, Response Effectiveness, Rejection, Synchrony, Controlling/Interfering, and Comfort with Physical Contact between adolescent mothers in different primary attachment relationships. Post-hoc analyses indicated that those in Disorganized relationships engaged in lower quality interactions than mothers in other relationship groups. More specifically, adolescent mothers in Disorganized relationships had lower scores on Response Effectiveness and higher scores on Rejection than those in Insecure relationships, and lower scores on Awareness and Synchrony, and higher scores on Controlling/Interfering, than mothers in both Secure and Insecure relationships.

Table 13

Variation in the Interactive Behaviour of Adolescent Mothers Across Primary Attachment Classifications

Domains of Interactive Behaviour	Primary Attachment Classification			<i>F</i> (2,46)	Effect Size (η_p^2)
	Secure ^a <i>M</i> (<i>SD</i>)	Insecure ^b <i>M</i> (<i>SD</i>)	Disorganized ^c <i>M</i> (<i>SD</i>)		
Awareness	5.96 (1.91) _a	6.83 (0.96) _a	4.29 (1.85) _b	7.35**	.24
Response Effectiveness	5.91 (2.23)	7.54 (0.74) _a	4.60 (1.85) _b	6.93**	.23
Positive Affect	5.31 (2.40)	6.12 (0.95)	4.41 (1.97)	2.19	.09
Rejection	3.79 (2.19)	2.40 (0.56) _b	5.16 (1.89) _a	6.44**	.22
Synchrony	5.84 (1.79) _a	7.03 (0.74) _a	4.20 (1.80) _b	9.05***	.28
Controlling/Interfering	4.08 (1.58) _a	3.44 (1.06) _a	5.50 (1.60) _b	6.89**	.23
Exploration/Learning	5.57 (0.83)	6.39 (0.55)	5.69 (0.92)	2.09	.08
Comfort/Contact	5.96 (1.73)	6.43 (0.60)	4.97 (1.54)	3.45*	.13
Engagement	5.57 (2.24)	6.33 (1.13)	4.54 (1.95)	2.73	.11

Note. Domain scores range from 1 to 9; Attachment classifications were measured using the Strange Situation Procedure; Means in the same row with different subscripts were significantly different ($p < .05$) in a post-hoc analysis using a bonferroni correction; D_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a $n = 15$, ^b $n = 6$, ^c $n = 28$

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

Conversely, ANOVAs run to assess variation in maternal interactive behaviour across secondary attachment categories revealed no significant differences for the adolescent sample (see Table 14).

Table 14

Variation in the Interactive Behaviour of Adolescent Mothers Across Secondary Attachment Classifications

Domains of Interactive Behaviour	Secondary Attachment Classification			<i>F</i> (2,46)	Effect Size (η_p^2)
	Secure ^a <i>M</i> (<i>SD</i>)	Avoidant ^b <i>M</i> (<i>SD</i>)	Resistant ^c <i>M</i> (<i>SD</i>)		
Awareness	5.73 (1.86)	4.51 (1.97)	5.19 (2.28)	1.90	.08
Response Effectiveness	5.71 (2.20)	5.15 (1.98)	5.11 (2.36)	0.41	.02
Positive Affect	5.16 (2.28)	4.42 (1.77)	5.44 (2.33)	1.01	.04
Rejection	4.05 (2.18)	4.79 (2.13)	4.24 (1.88)	0.66	.03
Synchrony	5.43 (1.91)	4.68 (1.94)	5.12 (2.26)	0.71	.03
Controlling/Interfering	4.46 (1.87)	5.20 (1.57)	4.67 (1.72)	0.94	.04
Exploration/Learning	5.69 (0.85)	5.84 (0.99)	5.60 (0.71)	0.28	.01
Comfort with Contact	5.73 (1.76)	5.07 (1.29)	5.77 (1.92)	1.05	.04
Engagement	5.54 (2.21)	4.32 (1.85)	5.85 (1.68)	2.77	.11

Note: Domain scores range from 1 to 9; Attachment classifications were measured using the Strange Situation Procedure; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for; None of these analyses were significant at $p < .05$

^a $n = 19$, ^b $n = 21$, ^c $n = 9$

Additionally, there were no significant associations among parenting stress and any of the domains of maternal interactive behaviour for adolescent mothers.

Summary. Differences in maternal interactive behaviour for the adolescent sample were evident only when Disorganized dyads were categorized as a separate group. Overall, mothers in Disorganized relationships scored lower on positive domains and higher on negative domains than mothers in Avoidant and Secure relationships. However, while many aspects of the interaction reflected this pattern of findings, other domains did not successfully differentiate between mothers in different attachment groups. Additionally, levels of parenting stress were not substantially related to any aspect of maternal interactive behaviour.

Further analyses more closely examined variation in the interactive patterns of mothers in specific attachment relationships. Previous analyses have highlighted differences in the interactive behaviour of adolescent mothers in Disorganized relationships and adult mothers in Secure relationships, compared to mothers in all other attachment groups. The following two sets of analyses more specifically examined the interactive behaviour of mothers in Disorganized vs. non- Disorganized and Secure vs. non-Secure attachment relationships. Categorizing attachment in this way also increased the cell size of each category from previous analyses, and met the necessary conditions for running a more conservative Multivariate Analysis of Variance (MANOVA).

The Association of Maternal Interaction with Disorganized Attachment Relationships

Further analyses using one-way MANOVAs were conducted within each sample to identify patterns of behaviour characteristic of mothers in Disorganized attachment relationships relative to those in Organized classifications.

Adult Mothers

A descriptive portrayal of the interactive behaviour of adult mothers in Organized vs. Disorganized attachment relationships is presented in Table 15. A MANOVA indicated there were no significant differences in the interactive behaviour of adult mothers in these two groups, Roy's Largest Root = .10, $F(9,39) = .44$, *ns*, $\eta_p^2 = .09$ (*observed power* = .19).

Table 15

Variation in the Interactive Behaviour of Adult Mothers in Organized vs. Disorganized Attachment Classifications

Domains of Interactive Behaviour	Attachment Classification	
	Disorganized ^a <i>M (SD)</i>	Organized ^b <i>M (SD)</i>
Awareness	5.70 (2.19)	6.56 (1.61)
Response Effectiveness	5.79 (2.01)	6.56 (1.50)
Positive Affect	6.12 (2.18)	6.45 (1.43)
Rejection	3.36 (1.88)	2.84 (1.37)
Synchrony	5.70 (2.03)	6.52 (1.50)
Controlling/Interfering	4.16 (1.72)	3.67 (1.13)
Exploration and Learning	5.43 (.71)	5.75 (.92)
Comfort with Contact	6.01 (1.74)	6.15 (1.48)
Engagement	5.97 (2.10)	6.52 (1.70)

Note: Domain scores range from 1 to 9; Attachment classifications were measured using the Strange Situation Procedure; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for; None of these analyses were significant at $p < .05$

^a $n = 13$, ^b $n = 36$

Adolescent Mothers

A descriptive portrayal of the interactive behaviour of adolescent mothers in Organized vs. Disorganized attachment relationships is included in Table 16. A comparison of adolescent mothers in Disorganized relationships with those in Organized classifications using a MANOVA indicated significant variation in the interactive behaviour of these two groups at the multivariate level, Roys Largest Root = .71, $F(9,39) = 3.07$, $p < .01$, $\eta_p^2 = .42$ (*observed power* = .94).⁹ Multivariate assumptions for homogeneity of variance were met using Box's test of Equality of Covariance Matrices, Box's $M = 63.89$, $F(45, 6112.07) = 1.12$, *ns*. Univariate analyses were interpreted from here, and are presented in Table 16. Adolescent mothers in Disorganized relationships displayed substantially lower levels of Awareness, Response Effectiveness, Synchrony, Comfort with Physical Contact and Engagement, and substantially higher Rejection and Controlling/Interfering during mother-infant interactions, than mothers in Organized relationships.

Summary

For adolescent mothers, the quality of maternal interactive behaviour was significantly related to attachment Disorganization. That is, mothers in Disorganized relationships scored considerably lower on positive domains and higher on negative domains than mothers in Organized groups. Alternatively, for adult mothers, behaviour represented through these domains was not associated with Disorganized attachment

⁹ η_p^2 represents Partial Eta squared, a measure of effect size used in MANOVAs that represents the proportion of variance accounted for (Gardner & Tremblay, 2007; Tabachnick & Fidell, 2007)

relationships, however, non-significant differences were in the same direction for all domains as those for adolescent mothers.

Table 16

Variation in the Interactive Behaviour of Adolescent Mothers in Organized vs. Disorganized Attachment Classifications

Domains of Interactive Behaviour	Attachment Classification		<i>F</i> (1,47)	Effect Size (η_p^2)
	Disorganized ^a <i>M</i> (<i>SD</i>)	Organized ^b <i>M</i> (<i>SD</i>)		
Awareness	4.29 (1.85)	6.21 (1.72)	13.71**	.23
Response Effectiveness	4.60 (1.85)	6.38 (2.04)	10.21**	.18
Positive Affect	4.41 (1.97)	5.54 (2.09)	3.73	.07
Rejection	5.16 (1.89)	3.39 (1.96)	10.26**	.18
Synchrony	4.20 (1.80)	6.18 (1.64)	15.66***	.25
Controlling/Interfering	5.50 (1.60)	3.90 (1.45)	13.09**	.22
Exploration and Learning	5.69 (0.92)	5.80 (0.84)	0.21	.00
Comfort with Contact	4.97 (1.54)	6.10 (1.50)	6.57*	.12
Engagement	4.54 (1.95)	5.79 (1.99)	4.84*	.09

Multivariate F (9.39) = 3.01, $p < .01$

Note: Domain scores range from 1 to 9; Attachment classifications were measured using the Strange Situation Procedure; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a $n = 28$, ^b $n = 21$

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

The Association of Maternal Interaction with Organized Attachment Relationships

Similar analyses were conducted to clarify patterns of behaviour characteristic of mothers in Secure attachment relationships relative to those in all other attachment classifications.

Adult Mothers

A descriptive account of the interactive behaviour of adult mothers in Secure vs. non-Secure attachment relationships is included in Table 17. A MANOVA examining the association between a classification of Secure vs. all other attachment relationships on the nine domains of maternal interactive behaviour was not significant at the multivariate level, Roy's Largest Root = .29, $F(9,39) = 1.24$, *ns*, $\eta_p^2 = .22$, (*observed power* = .52). However, several analyses were significant at the univariate level. When a multivariate effect is not significant, it is usually recommended that the separate univariate analyses not be interpreted (Gardner & Tremblay, 2007). However, in the circumstance that a multivariate effect is not significant, but separate univariate analyses are, this may be a function of the decreased power of a multivariate analysis (Tabachnick & Fidell, 2007). It is suggested in this case, that significant univariate results be presented for the benefit of future research, with the acknowledgement that they should be interpreted with caution (Tabachnick & Fidell, 2007). Since the content of this study is largely exploratory, the latter approach will be taken here, and univariate results are presented in Table 17. Mothers in Secure relationships were significantly higher in Awareness, Response Effectiveness, Synchrony and Engagement and lower on Rejection and Controlling/Interfering than mothers in all other attachment relationships.

Table 17

Variation in the Interactive Behaviour of Adult Mothers in Secure vs. non-Secure Attachment Classifications

Domains of Interactive Behaviour	Attachment Classification		<i>F</i> (1,47)	Effect Size (η_p^2)
	Secure ^a <i>M</i> (<i>SD</i>)	Non-Secure ^b <i>M</i> (<i>SD</i>)		
Awareness	6.78 (1.37)	5.30 (2.25)	8.13**	.15
Response Effectiveness	6.71 (1.37)	5.57 (2.04)	5.29*	.10
Positive Affect	6.66 (1.05)	5.68 (2.44)	3.95	.08
Rejection	2.62 (1.07)	3.81 (2.04)	7.19*	.13
Synchrony	6.67 (1.33)	5.48 (2.09)	5.81*	.11
Controlling/Interfering	3.45 (.95)	4.59 (1.66)	9.32**	.17
Exploration and Learning	5.72 (.87)	5.54 (.91)	.47	.01
Comfort with Contact	6.33 (1.25)	5.61 (2.62)	2.32	.05
Engagement	6.71 (1.21)	5.60 (2.62)	4.21*	.08

Multivariate F (9.39) = 1.24, $p > .05$

Note: Domain scores range from 1 to 9; Security group includes both primary and secondary classifications of Secure from the Strange Situation Procedure; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a $n = 34$; ^b $n = 15$

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

Adolescent Mothers

A descriptive portrayal of the interactive behaviour of adolescent mothers in Secure vs. non-Secure attachment relationships is presented in Table 18. A MANOVA found no significant variation between adolescent mothers in Secure relationships and

those in other quality attachment relationships on the nine domains of interactive behaviour, Roy's Largest Root = .20, $F(9,39) = .87$, *ns*, $\eta_p^2 = .17$ (*observed power* = .36).

Table 18

Variation in the Interactive Behaviour of Adolescent Mothers in Secure vs. non-Secure Attachment Classifications

Domains of Interactive Behaviour	Attachment Classification	
	Secure ^a <i>M (SD)</i>	Non-Secure ^b <i>M (SD)</i>
Awareness	5.73 (1.86)	4.72 (2.05)
Response Effectiveness	5.71 (2.20)	5.14 (2.06)
Positive Affect	5.16 (2.28)	4.73 (1.97)
Rejection	4.05 (2.18)	4.63 (2.04)
Synchrony	5.43 (1.91)	4.81 (2.01)
Controlling/Interfering	4.46 (1.87)	5.04 (1.61)
Exploration and Learning	5.69 (.85)	5.77 (.92)
Comfort with Contact	5.73 (1.76)	5.28 (1.51)
Engagement	5.54 (4.78)	4.78 (1.91)

Multivariate F (9.39) = .87, p > .05

Note: Domain scores range from 1 to 9; Security group includes both primary and secondary classifications of Secure form the Strange Situation Procedure; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for; None of these analyses were significant at $p < .05$

^a $n = 19$, ^b $n = 30$

Summary

Adult mothers in Secure relationships were characterized by more positive, and fewer negative, aspects of the interaction than adult mothers in other attachment relationships. However, for adolescent mothers, behaviour represented through these domains was not significantly associated with Secure attachment relationships, although, non-significant differences in the means of Secure and non-Secure groups were in the same direction as adult mothers for almost all domains.

A Direct Comparison of Adult and Adolescent Mothers

To further explore differences in the development of Disorganized attachment relationships between high-risk and low-risk populations, analyses were run to directly compare the interactive behaviour of adult and adolescent mothers in Disorganized dyads.

A MANOVA was run using group (Adult or Adolescent) as the independent variable and the nine domains of interactive behaviour and sensitivity as the dependant variables, for mothers in Disorganized relationships only. This analysis was significant at the multivariate level, Roys Largest Root = .86, $F(10,30) = 2.57$, $p < .05$, $\eta^2 = .46$, (*observed power* = .88), and multivariate assumptions for homogeneity of variance were met using Box's test of equality of Covariance Matrices, Box's $M = 82.83$, $F(55, 1911.42) = .97$, *ns*. Univariate analyses were interpreted from here and are presented in Table 19. Adolescent mothers in Disorganized relationships displayed significantly lower levels of Sensitivity, Awareness, Positive Affect, Synchrony and Engagement and higher levels of Rejection and Controlling/Interfering than adult mothers in the same quality relationship.

Table 19

Comparisons of the Interactive Behaviour of Adult and Adolescent Mothers in Disorganized Attachment Classifications

Domains of Interactive Behaviour	Disorganized Attachment Classification		<i>F</i> (1,39)	Effect Size (η_p^2)
	Adult Mothers ^a <i>M</i> (<i>SD</i>)	Adolescent Mothers ^b <i>M</i> (<i>SD</i>)		
Awareness	5.70 (2.19)	4.29 (1.85)	4.57*	.11
Response Effectiveness	5.79 (2.01)	4.60 (1.85)	3.50	.08
Positive Affect	6.12 (2.18)	4.41 (1.97)	6.20*	.14
Rejection	3.36 (1.88)	5.16 (1.89)	8.17**	.17
Synchrony	5.70 (2.03)	4.20 (1.80)	5.69*	.13
Controlling/Interfering	4.16 (1.72)	5.50 (1.60)	6.01*	.13
Exploration/Learning	5.43 (0.71)	5.69 (0.92)	0.76	.02
Comfort with Contact	6.01 (1.74)	4.97 (1.54)	3.72	.09
Engagement	5.97 (2.10)	4.54 (1.95)	4.59*	.11
Sensitivity	.38 (0.65)	-.15 (0.57)	6.94*	.15

Multivariate F (10, 30) = 2.32, *p* < .05

Note: Domain scores range from 1 to 9; Sensitivity represents the global sensitivity score from the MBQS which ranges from -1 to 1; Attachment classifications were measured using the Strange Situation Procedure; η_p^2 refers to Partial Eta-squared, a measure of effect size that represents the proportion of variance accounted for

^a*n* = 13, ^b*n* = 28

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

Additionally, an ANOVA was also run to compare levels of parenting stress between adult ($n = 41$) and adolescent ($n = 43$) mothers in all relationship categories.¹⁰ Univariate assumptions for homogeneity of variance were met using Levene's test of equality of error variances, $F(1,82) = .03, ns$. Results revealed that adolescent mothers reported substantially more parenting stress ($M = 220.28, SD = 33.96$) than adult mothers ($M = 197.30, SD = 33.40$), $F(1, 83) = 9.76, p < .01, \eta_p^2 = .11$ (*observed power* = .87).

Summary

These analyses indicate that the interactions of adolescent mothers in Disorganized relationships were characterized by fewer positive, and more negative, aspects than were those of adult mothers in Disorganized relationships. Additionally, adolescent mothers reportedly experienced higher levels of parenting stress than adult mothers.

Discussion

This study was designed to further explore the role of maternal interactive behaviour in the developing attachment relationship.

Objectives and Hypotheses

One objective of this study was to develop an assessment that would provide a more descriptive and direct representation of the content of a mother's interactions with her infant from that of maternal sensitivity. It was anticipated that this would provide additional insights into the link between the quality of mother-infant interaction and the developing attachment relationship. Using the 90-items of the MBQS, nine rational

¹⁰ Sample sizes for this part of the analysis are noted in parentheses, as not all mothers completed the Parenting Stress Index

domains of conceptually related aspects of maternal interactive behaviour were created. This multi-dimensional description of the quality of maternal interaction was then applied in our analyses. It was found that patterns of interactive behaviour revealed by these domains were largely similar to the results obtained when using the traditional measure of maternal sensitivity associated with the Maternal Behaviour Q-sort. That is, both were associated with attachment Security in the adult sample and Disorganization in the adolescent sample. However, the domains provided a more detailed description and some accounted for slightly more variation in attachment classification than did global sensitivity. Additionally, assessing the content of the interaction in this manner revealed that certain aspects of maternal interactive behaviour were more strongly associated with the quality of the attachment relationship than others.

A second objective of this thesis was to assess variation in the association between maternal interaction and the quality of attachment relationships for adult and adolescent mothers. The hypothesis that maternal sensitivity and interactive behaviour would be associated with attachment Security in both samples was partially confirmed. That is, high quality interactions were associated with Secure attachment relationships in the adult, but not the adolescent, sample. A second hypothesis that associations between maternal interactive behaviour and attachment Disorganization would differ between groups was supported. More specifically, low quality interactions, as assessed by global sensitivity and the domains of interactive behaviour, were associated with Disorganized relationships for the adolescent mothers only. Evidence was not found for a third hypothesis that parenting stress would be associated with the quality of maternal interactions. That is, parenting stress was not associated with low maternal sensitivity or

decreased quality of interactive behaviour for either the adult or adolescent mothers. However, levels of reported parenting stress were highest among adolescent mothers, confirming expectations that adolescent mothers experience more stressors related to parenting than adult mothers do.

A final and related objective of this thesis was to assess differences in the origins of Disorganized attachment relationships between high-risk and low-risk groups. The expectation that different quality maternal interactions would be associated with Disorganization for adult and adolescent mothers was confirmed; the interactions of adolescent mothers in Disorganized relationships were characterized by substantially lower sensitivity and interactive quality in various domains than adult mothers in Disorganized relationships.

More detailed discussion of these findings, their implications and how they relate to current empirical and theoretical research is presented in the following sections.

Maternal Sensitivity and the Content of Interactive Behaviour Across Attachment Relationships

Variation in the distributions of attachment classifications between adolescent and adult mothers was consistent with is expected for samples of differing risk status (van IJzendoorn et al., 1999). That is, higher rates of Secure attachment relationships for the adult mothers, and a higher prevalence of Disorganized attachment in the adolescent group, was consistent with past findings from these populations.

Two distinct analytical approaches were used to assess variation in maternal interactive behaviour across different attachment classifications. Initially, variation was assessed between mothers in different primary attachment classifications, where mothers

in Disorganized relationships were categorized as a distinct group. In the second approach, all dyads were classified according to their Organized attachment classification. That is, mothers in Disorganized relationships were included in the Organized group assigned as their secondary attachment classification. Comparison of these two approaches revealed different patterns for adult and adolescent mothers. For the adult mothers, variation in the quality of maternal interaction across attachment relationships, whether assessed using global sensitivity or the content of the interactions, was only evident when categorizing Disorganized mothers by their alternate, Organized classification. This suggests the interactions of adult mothers in Disorganized attachment relationships are similar in nature and content to those of non-Disorganized mothers in the same Organized attachment classification. Alternatively, systematic variation in the interactive behaviour of adolescent mothers in different attachment relationships was only evident when Disorganized dyads were categorized separately. Thus, in sharp contrast with the adult mothers, adolescent mothers in Disorganized relationships formed a coherent group in terms of their interactions that was quantitatively distinct from mothers in all other attachment relationships.

These analyses also revealed that distinct aspects of the content of the interaction had differing degrees of association with the quality of the attachment relationship. Levels of Awareness, Rejection and Controlling/Interfering varied across attachment relationships for both adult and adolescent mothers. For adolescent mothers, levels of Response Effectiveness, Synchrony and Comfort with Physical Contact also varied across attachment classifications. Controlling/Interfering interaction accounted for the greatest variation across attachment classifications for the adult mothers, however the

same was true of Synchronous interactions for the adolescent mothers. Additionally, various aspects of the content of mother-infant interaction displayed somewhat stronger associations with attachment quality than the traditional measure of global sensitivity. That is, levels of Awareness, Synchrony and Controlling/Interfering behaviour for the adolescent mothers were associated with the most variation in attachment Disorganization. Similarly, Awareness and Controlling/Interfering behaviour were associated with the greatest variation in attachment Security for the adult mothers.

These analyses are consistent with recent proposals and empirical evidence that specific aspects of the interaction may be as strongly associated with the quality of the attachment relationship as global sensitivity (De Wolff & van IJzendoorn, 1997; Moran et al., 2008; Raval et al., 2001). More specifically, in their meta-analysis on the parental antecedents of infant attachment classifications, De Wolff and van IJzendoorn found that both *Mutuality* and *Synchrony* each accounted for slightly more variation in attachment classification than global sensitivity. They defined these aspects of the interaction as the “extent to which the interaction appeared to be reciprocal and mutually rewarding” and “number of positive exchanges where both mom and baby are attending to the same thing” respectively (1997, p. 574). These constructs bear a strong similarity to the Synchrony domain in the current study, and reinforce the importance of harmonious interactions in differentiating between mothers in different quality attachment relationships.

Previous findings by Raval et al. (2001) indicated that maternal responsiveness to subtle infant signals accounted for more variation in attachment security than responsiveness to more general signals. They suggested this results from higher

monitoring of infant activities among mothers in Secure relationships, which leads to their perceiving these less obvious signals more frequently than mothers who monitor less often. These conclusions are consistent with the current studies' finding that high levels of Awareness, characterized by acknowledgement of infant signals and accessibility to cues, are more strongly related to attachment quality than many other aspects of the interaction in both groups. These concepts are also supported by Atkinson et al.'s (2000) assertion that the effectiveness of the MBQS divided attention task is based on its measure of a mother's ability to monitor her infant during multiple task demands. Mothers high in Awareness in the current study were similarly defined by their ability to remain alert to infant cues regardless of competing demands for their attention.

Domains that did not distinguish between mothers across different attachment groups, such as Positive Affect, Facilitation of Exploration and Learning, and Engagement appear to be characteristic of mothers across relationship types, and thus, not substantive determinants of variation in the quality of attachment relationships. However, in the case of Facilitation of Exploration and Learning, this may have been a result of low internal consistency of the items comprising this domain. Low alpha values for this domain in both samples indicate that it may not accurately represent the construct it intended to measure. As a result, future research would benefit from a more accurate representation of the maternal interactions represented through this domain.

Associations of Interactive Behaviour with Organized Relationships for Adult and

Adolescent Mothers

More focused comparisons of mothers in Secure attachment relationships with those in all other classifications revealed variation in the association between maternal

interactions and attachment security for adult and adolescent mothers. That is, maternal interactions characterized by more positive aspects of the interaction were associated with Secure relationships in the adult sample, however, this association was not observed in the adolescent sample.

Primarily, for the adult mothers, high levels of maternal sensitivity were associated with Secure attachment relationships - a finding consistent with numerous studies and meta-analyses that have established this association in low-risk samples (Belsky & Fearon, 2008; De Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987; Pederson & Moran, 1995; Raval et al., 2001). Additionally, the content domains of Awareness, Response Effectiveness, Synchrony and Engagement were higher among adult mothers in Secure relationships than for adult mothers in non-Secure relationships, and levels of Rejection and Controlling/Interfering behaviour were significantly lower. Additionally, two of these domains, Controlling/Interfering and Awareness, appear to be associated with slightly more variation in attachment security than global sensitivity. These results in the adult sample will be further explored in the following section, however they should be interpreted with caution given a non-significant multivariate effect.

The strength of association between maternal sensitivity and attachment security falls short of explaining the large amount of variance in attachment security accounted for in Ainsworth's foundational empirical work. However, it is consistent with the results of more recent research and meta-analyses, supporting the conclusion that "sensitivity has lost its privileged position as the only important causal factor" of the attachment relationship (De Wolff & van IJzendoorn, 1997, p. 585). That is, our analyses

indicate that particular aspects of the content of maternal interaction account for a similar amount of variation in attachment security. Given previous findings implicating the importance of a mother's ability to monitor her infant, especially during competing task demands (Atkinson et al., 2000; Raval et al., 2001), it is not surprising that Awareness had one of the strongest associations with attachment security for adult mothers.

Bailey et al. (1999) used a very different approach, a q-factor analysis, to examine the role of maternal interactive behaviour in the development of Organized attachment relationships. The q-factor approach uses a similar analytic strategy to that of traditional factor analysis, however, the participants are entered as the unit of analysis and the sample is reduced to groups of mothers who engage in similar patterns of interactive behaviour. This statistical method of grouping mothers based on similar interactive patterns is in sharp contrast to the rational approach used in the present study, which identified a-priori categories to describe the content of a mother's interactive behaviour. However, even through different analytic procedures, the results of their study reinforce our own findings. That is, the aspects of the quality of maternal interaction identified by Bailey and her colleagues as most influential in the development of Insecure relationships parallel those revealed here. They found that ignoring and neglecting maternal styles of interaction, in addition to interfering and non-synchronous interactions, were associated with avoidant infant behaviour in the home. These aspects of the interaction are closely associated with those represented by low levels of Awareness and a high degree of Controlling/Interfering maternal behaviour during mother-infant interaction in the current study, which were similarly associated with Insecure attachment relationships. These

consistent findings using very different analytic strategies underscore the importance of these aspects of maternal interaction in the developing attachment relationship.

In contrast to the results of analyses of the adult sample, neither maternal sensitivity nor any aspects of the content of maternal interaction were significantly associated with attachment security in the adolescent sample, although, some non-significant trends were observed. These findings are consistent with previous research that has identified a weaker association between sensitive maternal interactions and attachment Security in high-risk groups, than what is typically observed in community samples (Davies & Cummings, 1994; De Wolff & van IJzendoorn, 1997). It has been suggested that the development of attachment relationships is more complex in high-risk populations, and the impact of sensitive maternal behaviour is moderated by various environmental characteristics. More specifically, problems that are prevalent among at-risk groups, such as marital discord (Frosch, Mangelsdorf, & McHale, 2000; Howes & Mark, 1989; Laurent, Kim, & Capaldi, 2008), substance-related problems (van IJzendoorn et al., 1999), and financial and parenting stress (Bernier & Meins, 2008), have been found to negatively impact the development of Secure attachment relationships. Factors such as these and others may negate the beneficial effects of maternal sensitivity, or moderate its influence, on the development of Secure attachment relationships for children born to teenage mothers.

Findings from the current study also indicated that low quality maternal interactions were not associated with high levels of parenting stress in either group. This is inconsistent with past research implicating the role of parenting-related stress in decreasing the quality of maternal interactive behaviour in high-risk groups (Bernier &

Meins, 2008; Pederson et al., 1990). However, other research has indicated that parenting stress may affect the developing attachment relationship through mechanisms other than maternal sensitivity. More specifically, high stress levels may reflect a chaotic and unstable environment that impedes the development of secure relationships, even when maternal sensitivity is relatively high (Cummings & Davis, 1996; Davis & Cummings, 1994; De Wolff & van IJzendoorn, 1997; Sagi, van IJzendoorn, Avezizer, Donnell, & Mayseless, 1994). This latter assertion may help explain the fact that high maternal sensitivity was not associated with Secure attachment relationships in the adolescent group. That is, high stress levels found among the adolescent mothers may reflect complicated home environments that negatively impact the association of maternal interactive behaviour with the quality of the attachment relationship. For example, several questions on the Parenting Stress Index are related to the quality of the marital relationship. Previous research has found that marital conflict may undermine a child's confidence in his mother's ability to provide a secure base during times of stress. This may lead to difficulty in developing a Secure attachment relationship, even when mothers are highly sensitive during mother-infant interactions (Davis & Cummings, 1994).

Additionally, past research has indicated that the weak association between maternal sensitivity and attachment security observed in high-risk samples may, in part, be a result of the measures currently used to assess the quality of mother-infant interactions (Bailey et al., 1999; Bailey et al., 2007). More specifically, a single measure of global sensitivity may fail to capture the range of variation in interactive behaviour characteristic of mothers in high-risk groups. Consequently, one purpose of the current study was to assess maternal behaviour using a multi-dimensional approach in attempt to

identify specific aspects of the interaction that may be associated with attachment security. However, domains of interactive behaviour still failed to identify any aspect of the interaction that was associated with attachment security in the adolescent sample. These results suggest that factors outside of those measured in the current study are contributing to the development of Secure relationships for infants of adolescent mothers.

Finally, several domains of interactive behaviour were unrelated to attachment security in relationships involving both adult and adolescent mothers. More specifically, levels of Positive Affect, Facilitation of Exploration and Learning and Comfort with Physical Contact did not vary across mothers in Secure and non-Secure attachment relationships.

Associations of Interactive Behaviour with Disorganized Relationships for Adult and Adolescent Mothers

The interactions of adolescent mothers in Disorganized relationships were of substantially lower quality than those not in Disorganized relationships. However, this was not true of the interactions of adult mothers in Disorganized relationships. More specifically, levels of Global Sensitivity and the content domains of Awareness, Response Effectiveness, Synchrony, Comfort with Physical Contact and Engagement were substantially lower among adolescent mothers in Disorganized relationships than they were among those in Organized groups, and levels of Rejection and Controlling/Interfering were significantly higher. Alternatively, neither maternal sensitivity nor any of the content domains of interactive behaviour distinguished between adult mothers in Organized and Disorganized attachment relationships. The association between these maternal characteristics and Disorganized relationships in the adolescent

sample presents a challenge to prevailing theory. This theory asserts that insensitive maternal interactions are not the basis of Disorganized attachment (Hesse & Main, 1990; Bakermans-Kranenburg et al., 2003) but, rather, that maternal behaviour experienced by the child as frightened or frightening is the primary developmental antecedent of Disorganized attachment relationships (Main & Hesse, 1990). Additionally, since the findings from the adult sample do not conflict with this latter assertion, the associations in the adolescent sample may reflect differences in the development of Disorganized attachment relationships between high-risk and low-risk groups.

Recent findings have similarly pointed to differences in the antecedents of Disorganized relationships between high-risk and low-risk groups (Bailey et al., 1999; Bernier & Meins, 2008; van IJzendoorn et al., 1999). Several recent studies and meta-analyses have implicated low levels of maternal sensitivity in the development of Disorganized attachment relationships in high-risk populations, however, similar findings have not been reported in low-risk groups (Carlson, 1998; Moran et al., 2008; van IJzendoorn et al., 1999). In one such study, Carlson (1998) examined the antecedents and consequences of Disorganized attachment relationships in a high-risk sample of economically disadvantaged mothers. The quality of maternal interactive behaviour was measured using Ainsworth's scales when infants were 6 months of age. Results indicated that low levels of maternal sensitivity and a high degree of interfering behaviour during these dyadic interactions were among the strongest predictors of Disorganized attachment at 12 months. Carlson concluded that these low quality early maternal interactions played an important role in the subsequent development of Disorganized attachment relationships. These conclusions are consistent with the current study's findings that

mothers in Disorganized relationships from the high-risk sample were characterized by low levels of maternal sensitivity, in addition to high amounts of Controlling/Interfering behaviour. Additionally, a recent meta-analysis assessing the effectiveness of various attachment-based interventions similarly found that those focusing on sensitivity were the most effective in reducing attachment Disorganization (Bakermans-Kranenburg et al., 2003). Subsequently, these empirical findings have implications for current theoretical explanations of how maternal interactions contribute to Disorganized relationships in high-risk groups (Bailey et al., 2007; Moran et al., 2008; van IJzendoorn et al., 1999).

Moran and colleagues (2008) examined maternal contributions to Disorganized attachment by assessing levels of both maternal insensitivity and atypical behaviour in the same sample of adolescent mothers. They found a strong association between atypical maternal behaviour and low levels of maternal sensitivity, and suggested they represent behaviour along a shared continuum, with atypical maternal behaviour representing the extreme end of maternal insensitivity. Such behaviour represented at the end of this continuum, whether identified as highly insensitive or atypical, was associated with Disorganized attachment relationships. Thus, they concluded that maternal factors traditionally conceptualized as underlying the development of Secure attachment relationships also contribute to the development of Disorganized attachment relationships in high-risk groups. The conclusions drawn by Moran and his colleagues are supported by the current study's findings that the quality of maternal interactions, as assessed by global sensitivity and domains of interactive behaviour, were associated with both Organized and Disorganized attachment relationships. This presents a challenge to

prevailing theory, which suggests the development of Organized and Disorganized attachment relationships result from orthogonal processes (Maine & Hesse, 1990).

Additionally, a q-factor analysis was previously applied to a similar sample of adolescent mothers to more closely examine the interactive behaviour characteristic of adolescent mothers in different attachment relationships (Bailey et al., 2007). In addition to high insensitivity, they found that a “disengaged” pattern of interaction in the home was associated with Disorganized attachment relationships. The disengaged pattern they identified was defined by a lack of attention to infant cues resulting from a failure to notice, or deliberately ignoring, infant signals while engaged in other activities. This description also represents a defining feature of Awareness in the current study, which accounted for significant variability in Disorganization for the adolescent mothers. Additionally, Awareness accounted for a similar amount of variation in attachment Disorganization as did maternal sensitivity, supporting the suggestion that it may be an important aspect of the maternal contribution to Disorganized attachment. Although some overlap of participants between their study and ours would account for some of this shared variation, such similar findings using very different methods of data analysis provide support for the importance of this aspect of the interaction in the developing attachment relationship. Bailey and her colleagues proposed that these high levels of disengagement, and the hostile and punitive behaviour characteristic of high insensitivity, present a challenge for infants to develop an organized attachment strategy, and thus contribute to the high rates of Disorganization found in this sample. More specifically, repeated experiences of their mother as disengaged and emotionally unavailable result in pervasive disruptions to the relationship that are evident across multiple contexts. Such

deficits in the dyadic relationship leave the infant without a source of comfort and reassurance during stressful experiences such as the Strange Situation Procedure.

Alternatively, in a review of the antecedents of Disorganized attachment relationships, van Ijzendoorn and colleagues (1999) suggest that the extreme insensitivity displayed by mothers in high-risk groups may be distressing to the child in the same way as mothers' frightening or atypical behaviour. In both cases, these maternal behaviours lead to an emotional conflict for the child when approaching the mother during times of stress, such as in the Strange Situation Procedure. van IJzendoorn et al. proposed that rather than reflecting the overall lack of an organized attachment strategy, this conflict results in a temporary breakdown of the child's typical strategy used to deal with negative emotions.

Thus, with various explanations proposed for the empirical association between low quality maternal interactions and attachment Disorganization in high-risk groups, further evidence is necessary to determine the mechanism through which this association occurs. However, findings from the present study support recent assertions that Main and Hesse's (1990) theoretical model may not adequately represent this association in high-risk dyads.

Variation in the Origins of Disorganization for Adult and Adolescent Mothers

Mothers in Disorganized attachment relationships were characterized by different patterns of interaction in the adolescent and adult samples. More specifically, adolescent mothers in Disorganized relationships represented a coherent group in terms of their interactive behaviour, characterized by lower quality interactions than mothers in all other attachment classifications. However, this was not true of the adult mothers in

Disorganized relationships, who did not display significantly lower quality interactions than mothers in other attachment groups. Additionally, direct comparison of the interactive quality of adult and adolescent mothers in Disorganized relationships revealed quantitatively distinct patterns of interaction. That is, adolescent mothers in Disorganized relationships displayed significantly lower Sensitivity, Awareness, Positive Affect, Synchrony and Engagement and substantially higher Rejection and Controlling/Interfering during mother-infant interactions than their adult counterparts.

Empirical evidence identifying characteristics of adolescent mothers that increase their children's vulnerability to adverse outcomes may help explain their low quality maternal interactive behaviour, and how it relates to Disorganized attachment relationships. A longitudinal study on the origins of adverse outcomes for children of teenage mothers proposed two explanations for such maladaptive developmental trajectories (Jaffe et al., 2001). Primarily, they suggested that social, economic and familial circumstances that occur as a consequence of being a teenage mother may jeopardize the environment a child grows up in, and contribute to poor developmental outcomes. For example, teenage mothers are more likely to experience socioeconomic disadvantages that negatively influence their parenting skills and complicate the environment they raise their children in. Alternatively, they proposed that social and psychological characteristics of the mother make her more likely to give birth as a teenager, and pass on these qualities to her child, leading to adverse outcomes throughout development. Thus, children of teenage mothers would be at higher risk for various developmental outcomes regardless of the age at which their mothers gave birth to them (ie. in adolescence or adulthood). They found support for both these hypotheses,

suggesting that both environmental factors and maternal characteristics need to be considered when assessing outcomes for children from this high-risk group. Similarly, the threshold model to developing Disorganized attachment relationships suggests that innate factors, in addition to risk factors characteristic of high-risk environments, may increase a child's susceptibility to developing a Disorganized attachment relationship (Bernier & Meins, 2008). They propose that this association occurs via two mechanisms. First, these maternal and environmental characteristics can influence maternal care-giving behaviour, resulting in the high-levels of insensitivity characteristic of adolescent mothers. In addition, these same qualities can also directly lower a child's threshold for developing Disorganized relationships, making him more susceptible to these high levels of maternal insensitivity and the subsequent development of Disorganized attachment relationships. These theories may help explain the low quality maternal interactions, and their association to Disorganization, for infants of adolescent mothers in the current study. Conversely, the absence of these risk factors in low-risk groups is associated not only with higher quality maternal interactions, but also lower infant susceptibility to negative maternal behaviour, and may act as a protective factor against the development of Disorganized attachment for children born to adult mothers.

Directions for Future Research

As with all research, the findings of this study must be interpreted within the context of its limitations. Perhaps most obviously, a larger sample size would have allowed for more rigorous statistical analyses. That is, greater power and increased cell size would have met the necessary assumptions for running MANOVAs in all analyses. Additionally, further comparisons could be made between each of the Insecure

attachment classifications, an objective that was not addressed in this study as a result of small cell sizes in each of these groups. As a consequence of these statistical issues, attachment research has often utilized a dichotomous definition of attachment security (ie. Secure vs. non-Secure or Disorganized vs. Organized), and less is known about the antecedents of each Insecure attachment relationship (Moran & Pederson, 1998).

However, the limited empirical work assessing differences in the interactive behaviour of mothers in each Insecure attachment classification has identified variation that is consistent with theoretical predictions. More specifically, mothers in resistant relationships tend to focus on fussy and difficult infant behaviour, and are inconsistent in their responsiveness to infant signals, while mothers in avoidant relationships are more consistently rejecting (Cassidy & Berlin, 1994; Pederson & Moran, 1998). An assessment of variation in the content of maternal interaction between mothers in these two Insecure relationships using the domains of interactive behaviour, may provide a more descriptive, empirically supported account of differences in the antecedents of these relationships.

Additionally, implications for prevailing theory drawn from the current findings would benefit from an analysis of the association between atypical or frightening maternal behaviour and Disorganized attachment in the adult sample. Although the findings of the current study point to the potential role of such behaviour in the development of Disorganized attachment for infants of the adult mothers, conclusions cannot be drawn without assessing this association. A relationship between these variables in the adult sample would provide further support for the threshold model of Disorganization, suggesting that more extreme maternal behaviour is necessary for the development of Disorganization in low-risk groups.

Implications for Research and Clinical Practice

The results of this study have important implications for attachment-based interventions. Past research, including several meta-analyses, have substantiated the success of clinical interventions focused on enhancing maternal sensitivity in increasing the likelihood of Secure attachment relationships (Bakermans-Kranenburg et al., 2003; Berlin, Zeanah, Lieberman, 2008; Moran et al., 2005). However, the current findings indicate that such interventions may also be beneficial for decreasing the prevalence of Disorganized attachment relationships in high-risk groups. This latter assertion conflicts with predominant theory that suggests frankly atypical or frightening maternal behaviour, as opposed to low quality, insensitive interactions, are at the root of Disorganized attachment relationships. While the current results indicate this may be true of lower-risk populations, they also suggest that deficits in sensitivity and the content of maternal interactive behaviour may in fact be promoting Disorganized attachment in high-risk groups. These conclusions are consistent with recent empirical findings implicating the role of enhanced maternal sensitivity in improving Disorganized attachment relationships (Bakermans-Kranenburg et al., 2003). Thus, interventions aimed at reducing or preventing Disorganized attachment in higher risk populations may benefit from focusing on enhancing the quality of maternal interactions, rather than simply eliminating atypical behaviour.

Moreover, rather than focusing on overall global sensitivity, the current findings suggest that certain aspects of the interaction may result in stronger outcomes for improving attachment relationships. That is, high levels of monitoring and awareness of infant activities, in addition to low levels of interference and disruptions during mother-

infant interactions, may be most beneficial in improving attachment relationships for both adult and adolescent mothers. However, replication of these findings for all domains is necessary for generalizing to other samples and confirming these implications.

Additionally, although several domains were associated with slightly more variation across attachment classifications than global sensitivity, there is still a large amount of variation that remains unexplained. Consequently, future research should continue to identify factors that may be moderating the effects of high maternal sensitivity and interactive behaviour, or otherwise impacting the developing attachment relationship.

The lack of association between maternal sensitivity and attachment security in the adolescent sample suggests that factors outside of those measured in the current study are influencing the development of Secure attachment relationships in this group. This is consistent with current theoretical and empirical findings implicating the role of a chaotic and stressful environment in complicating this association in high-risk dyads (Bernier & Meins, 2008; De Wolff & van IJzendoorn, 1997; Laurent et al., 2008). Consequently, interventions aimed at improving sensitivity and the quality of maternal interactive behaviour may not be sufficient for developing a Secure relationship in such high-risk environments. Rather, preventative efforts and early interventions should also focus on maintaining stability and consistency within the environment, decreasing parenting stress, and addressing other issues and challenges characteristic of high-risk dyads. Although research has begun to identify aspects of the environment that may negate the beneficial effects of high sensitivity (Davies & Cummings, 1994; De Wolff & van IJzendoorn, 1997; Sagi, van IJzendoorn, Aviezer, Donnell, & Mayseless, 1994), further research

identifying specific factors that are influencing this association for adolescent mothers is necessary to determine areas to target in such interventions.

Finally, the mediational model proposed to link maternal state of mind with the quality of the attachment relationship may benefit from application of the domains of interactive behaviour identified in the present analyses. Although maternal sensitivity has been theorized to mediate the association between maternal attachment status, or state of mind, and infant attachment classification, empirical findings indicate that it accounts for a relatively small amount of the variance in this association (van IJzendoorn, 1995). In the present analyses, several domains of maternal interactive behaviour displayed similarities in their association with the quality of the attachment relationship to that of maternal sensitivity. These findings suggest that specific aspects of maternal interaction, separate from maternal sensitivity, may also be important determinants of the attachment relationship. Thus, application of these domains to the mediational model may improve the variance accounted for in this association. In other words, other aspects of maternal interactive behaviour may account for more variation in the transmission of attachment than the global measure of sensitivity.

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Appendix A

Items for Domains of Maternal Interactive Behaviour

Awareness

- 64: Greets B when re-entering room¹¹
- 29: When B is distressed, M is able to identify the source
- 25 (R)¹²: Not skillful in dividing her attention between B and competing demands and therefore misses B's cues
- 22 (R): Appears to tune out and not notice bids for attention.
- 69: Notices when B is distressed (e.g., cries, fusses or whimpers)
- 4 (R): During interaction with visitor does not notice B.
- 27: Responds to B's distress and non-distress signals even when engaged in some other activity such as having a conversation with visitor
- 24: Arranges her location so she can perceive B's signals
- 72: Notices when B smiles and vocalizes
- 36: Interrupts activity that is likely to be dangerous
- 2: Monitors B's activities during visit.
- 65: Responds to B's signals

Response Effectiveness

- 3 (R): M's responses are unpredictable.
- 66 (R): Consistently unresponsive
- 26: Responds immediately to cries/whimpers

¹¹ "B" refers to baby

¹² (R) indicates that item was reverse coded

89: Interventions satisfy B

62: Interprets cues correctly as evidenced by B's response

20: Responds accurately to signals of distress.

33 (R): Repeated series of interventions in search of best method to satisfy B, resorts to trial and error

44: Realistic expectations regarding B's self-control of affect

67(R): Responds only to frequent, prolonged or intense distress

28: Offers an acceptable alternative to B to divert attention from inappropriate activity

Positive Affect

83 (R): Aloof when interacting with B

81: Spontaneously expresses positive feelings to B.

42 (R): Expressions of affection are limited to perfunctory, mechanical kisses, typically on the head

43: Is animated when interacting with B

45: Praises B

78: Plays social games with B.

57: Shows delight in interaction with B.

Rejection

61: Is irritated by demands of B for physical contact or proximity

80: Annoyed by B's uncooperative behaviour.

9: Ignores positive signals (vocalizations, smiles, reaches)

79: Distressed by B's demands.

90: Punitive or retaliatory during interactions with B

60: Scolds or criticizes B

86: Terminates physical contact before B is satisfied

88: Interactions with B are characterized by conflict

Synchrony

14 (R): Breaks off from B in mid-interaction to speak to visitor or attend to some other activity.

31(R): Redirects B's bids for proximity and/or contact without a transition period to facilitate smooth interactions

70 (R): Response delayed such that B cannot connect M's responses with the action that initiated it

34: Interactions revolve around B's tempo and current state

71: Builds on the focus of B's attention

68: Interactions appropriately vigorous and exciting as judged from B's responses

53: Slows pace down, waits for B's response during interactions

32 (R): Non-synchronous interactions with B, i.e., the timing of M's behaviour out of phase with B's behaviour

35: Well resolved interaction with B -- interaction ends when B is satisfied -- also consider the termination of ongoing interactions that B is enjoying

15 (R): Attempts to involve B in games or activities that are beyond B's current capability.

84 (R): Display of affect does not match B's display of affect (e.g., smiles when B is distressed)

Controlling/ Interfering

87: Actively opposes B's wishes

82: Physically restricts B's movements while in proximity.

59 (R): Lets B carry on with appropriate activity without interruption

16: During ongoing interactions, misses slow down or back off signals from B.

17: Content and pace of interaction set by M rather than according to B's responses.

55 (R): Respects B as an individual, i.e., able to accept B's behaviour even if it is not consistent with her wishes

54: Teases B to promote continued interaction/contact

85: Interactions with B are incomplete

7: Treats B as an inanimate object when moving her around or adjusting her posture.

1: Provides B with little opportunity to contribute to the interaction

52: Uses verbal prohibitions (e.g., "no or don't")

30: Interactions with B characterized by active physical manipulations

Facilitation of Exploration and Learning

58: Considers B's needs when structuring environment

75: Encourages independent exploration of environment.

74 (R): Anxious about B's exploration (e.g. hovers over B)

48: Points to and identifies interesting things in B's environment

39: Instructive during interactions with B

50: Creates interesting physical environment for B

11: Repeats words carefully and slowly to B as if teaching meaning or labeling an activity or object.

Comfort with Physical Contact

23: Provides B with unrestricted access to her

5 (R): Awkward and ill at ease during intimate interactions with B

76: Uses close bodily contact to soothe B.

46: Molds B to self when holding

41: (R) Interactions with B are object oriented (e.g. with toys, food)

Engagement

77: Vocalizes to B throughout the visit.

10: Speaks to B directly.

49: Seeks interactions with B

6: Supports interaction of B with visitor.

Items of the MBQS not used in any Domains

8: Gives signal or explanation to B when leaving the room

12: Naptimes are determined by M's convenience rather than the immediate needs of B

13: Uses sibling or television to keep B entertained

18: Home shows little evidence of presence of B

19: Places B in another room when B is in a bad mood or cranky

21: Overwhelmed by caretaking demands

37: Interferes with appropriate activity if it is likely to get B messy

38: Provides nutritional snacks

40: Encourages B's initiatives in feeding

47: Displays affection by touching, caressing

51: Provides age appropriate toys

56: Has lots of "shoulds" or mind sets about B's care, has rigid routines

63: Signals awareness of B's distress to B, but does not interfere

73: When irritated with B, disengages or distances herself from interaction with B

Appendix B

Descriptions of Domain of Maternal Interactive Behaviour

Awareness

This domain is assessing the mother's awareness of her baby and his needs. She may or may not respond to the baby, but she is clearly aware that he is signaling to her. If she does respond, her response is only used to note her awareness, differentiating this category from "Response Effectiveness", which measures the quality of the response. Signs of awareness include acknowledgement of the baby's signals, even when she is involved in other activities, and by efforts to position herself in order to facilitate accessibility to his cues. The success or appropriateness of mother's responses is not evaluated here. A mother high on this domain is constantly alert to her baby's cues, regardless of competing tasks or demands; she may not respond to him, but she clearly demonstrates her acknowledgement of his signals. A mother low on this domain demonstrates lapses in awareness and is oblivious to her baby's signals towards her.

Response Effectiveness

This domain is assessing the effectiveness of a mothers' response to her baby's signals. What is being evaluated here is the success of the mother's intervention as evidenced through her baby's responses. This domain captures the quality of the mother's response, including her consistency, accuracy and predictability in response to distress and non-distress signals. This domain goes beyond that of Awareness in assessing the actual responses to the baby's signals. A mother high on this domain consistently responds effectively to all signals, obvious and subtle, in such a way that satisfies the baby. A mother that is low on this domain either does not respond to her

baby's signals, or when she does, her interventions are not appropriate as evidenced by the baby's satisfaction with her response.

Positive Affect

This domain is assessing how the mothers affect influences her interactions with the baby. What is being evaluated is the Mothers' interest and delight in their interactions, and whether or not she communicates this to the child. Positive affect is evidenced through warmth, delight, and enjoyment of her baby and their interaction. These are clear indicators of the mother's love and adoration. The focus of this domain is on how the baby experiences the mother's affect - it captures the expression of positivity, delight and enjoyment. A mother high on this domain is outwardly expressive of her positive feelings toward the baby, whereas a mother low on this domain is characterized by a lack of affection and positive expression. A mother low on this domain is not necessarily hostile or rejecting toward her baby (see Rejection domain), rather, she is characterized by a lack of animation and positive expression in their interaction

Rejection

This domain is assessing the mother's degree of acceptance towards the baby and his behaviors. A mother high on this domain actively rejects by expressing irritation, annoyance, or anger at her baby's overtures toward her. She is quick to criticize, punish and belittle her baby or his actions. She focuses on negative aspect of the interaction, often distorting the meaning of her baby's behavior, and overlooking positive signals from him. A mother low on this domain accepts the baby, and does not express feelings of irritation and frustration towards him.

Synchrony

This domain is assessing the degree to which the Mother and baby are engaged in reciprocal interaction. What is being looked at is whether or not Mother's behaviors are contingent and appropriate to her baby's needs and signals. This includes whether the timing, pace and content of their interactions are related to the baby's mood, state and current interest. This domain also captures the mother's ability to smoothly transition between activities and interactions with her baby. A mother high on this domain is able to adapt her behavior to match the baby's current interests in their interactions. Their encounters are neither abruptly initiated nor terminated; the mother smoothly notes the introduction and completion of their activities. A mother low on this domain does not engage in harmonious interaction with her baby, even if she is attempting to do so; her behaviours are often unmatched and out of tune with his. This domain is not measuring whether the mother is actively attempting to control the baby's behavior, but focuses instead on how concordant her behaviours are with the baby's current state, needs and interests.

Controlling/Interfering

This domain is assessing the quality of the Mother's guidance of her baby's behavior. It looks at the extent to which the mother interferes with her baby's autonomy in their interactions. This domain is not looking at whether or not the mother's behaviours are out of tune with her baby's, but how active she is in interrupting the flow of their interactions. A mother high on this domain shows little respect for her baby; she acts in accordance with her own agenda despite the fact that her baby's wishes do not match her own. These mothers will often ignore the baby's protests against her

interventions and continue at their own pace. However, these mothers are not necessarily punitive or retaliatory in their interfering behaviours; they simply impose their wishes on the direction of interaction. A mother low on this domain seems to support, rather than control, the interactions and interferes as little as possible, or only when absolutely necessary. This mother allows her baby to participate in the interaction, without imposing verbal or physical descriptions in accordance with her own desires.

Facilitation of Exploration and Learning

This domain is assessing the degree to which the Mother encourages her baby's exploratory behaviours. The mother creates and encourages an environment conducive to learning and exploration. A mother high on this domain structures the environment and interactions to promote learning and development of exploratory behaviours. She promotes and initiates interactions for her baby outside of the dyadic relationship, but her involvement does not necessarily have an intrusive quality. A mother low on this domain is often uncomfortable with her baby's exploration and does not encourage independent exploration of the environment.

Comfort with Physical Contact

This domain focuses on the degree to which the Mother is comfortable engaging in physical contact with her baby. A mother high on this domain shows ease with close proximity and contact, and welcomes intimate overtures from her baby. She uses close bodily contact during times of distress to soothe him. A mother low on this domain is awkward and uncomfortable during intimate encounters, and often uses objects to mediate interactions

Engagement

This domain assesses the degree to which the mother actively engages her baby during interactions. A mother high on this domain seeks out social encounters with her baby, eliciting his attention and using vocalizations throughout their interactions. A mother low on this domain does not often initiate interactions and conversations with her baby.

Appendix C

Letter of Information for Adult Mothers



Parenting Experiences and Infant Social Development for Adolescent Mothers

Dear Parent:

We are conducting a study with young mothers and their infants to learn more about the demands and rewards for mothers and their babies over the first year. We need to observe adult mothers and their infants to help us understand infant social development in relation to differences in family circumstances. Information will be gathered at three occasions. When your infant is 12 months old, two researchers would like to visit you and your baby at home. Here we are interested in asking you questions about your experiences with your infant, the important sources of help and support for you and your observations of your infant's development over the first year. We are particularly interested in studying the relationship that develops between you and your infant. To do this we would like to do a simple assessment of your baby's development as a description of his or her progress. You will then be asked to play with your baby for about five minutes as a comparison to how the baby interacted with the visitor. We would like to videotape this part of the visit. We would also like you to fill out two questionnaires that describe the stresses and satisfactions of being a parent. These questionnaires will take about 25 minutes to complete. The entire visit should take no more than two hours.

Within two weeks of the home visit we would like to schedule a visit to the University. During this visit we will observe your baby's responses to toys in the new environment of the University room. We are interested in your baby's play behaviour both when you are with your baby and when you are away. We will ask you to leave your baby for two brief periods (no more than 3 minutes each) during this part of the University procedures. Of course, if your baby cries, and thus does not play when you are away, we will send you in before the full three minutes have passed. Following this we would again like you to play with your baby. The visit to the University will be videotaped and should take no longer than one hour.

For our last visit together we would like to interview you for about an hour to ask you about your early relationships with your parents, any experiences of major separation or loss, and your thoughts about how these experiences have affected you and your role as a parent. Some parents have found aspects of the interview saddening, because we are asking about events that may have been sad, or stressful. The interviewer will provide reassurance and support should you find the interview upsetting. The interview is audio taped and later transcribed. The audiotapes will be assigned numbers and later erased. Any identifying information such as names, ethnicity, schooling, place of birth will be changed in the transcripts to maintain confidentiality.

Our records will be confidential. Only those directly involved in the study will see the videotapes. Records of assessments and questionnaires will be given code numbers to maintain confidentiality. The family name will only be available only to members of our research group. Any reports of our research findings will be written so that it would be impossible to identify any person or family who participated.

Participation throughout this study is voluntary. If you agree to participate, you may withdraw at any time without jeopardy to your or your baby's future care.

There are no known risks associated with any of the study procedures. This study will not result in any direct benefit to yourself or to your baby, but may help to further our understanding of factors involved in child development. As a compensation for your time and inconvenience we will provide you with \$50.00 on completion of your involvement. This amount will be pro-rated if you withdraw from the study.

You will have the opportunity to receive results about the study if you so desire. Please do not hesitate to contact one of us should you have any questions.

Sincerely,

David R. Pederson, Ph.D
Associate Professor
Department of Psychology
University of Western Ontario

Appendix D

Letter of Information for Adolescent Mothers



Parenting Experiences and Infant Social Development for Adolescent Mothers

Dear Parent:

We are conducting a study with young mothers and their babies to learn more about the demands and rewards for mothers and babies over their first two years. We would like you and your baby to participate in this study. The study involves four parts.

In the first part, when your baby is about 6 months old, two researchers would like to visit you and your baby at home. Here we are interested in asking you questions about your experiences with your baby and your observations of your baby's development over the first 6 months. We are particularly interested in studying the relationship that develops between you and your baby. To do this we would like to do a simple assessment of your baby's development as a description of his or her progress. You will then be asked to play with your baby for about five minutes as a comparison to how the baby interacted with the visitor. We would like to videotape this part of the visit. We would also like you to fill out some questionnaires that describe the stresses and satisfactions of being a parent. These questionnaires will take about 25 minutes to complete. The entire visit should take about two hours.

Within two weeks of this visit, we would like to visit with you again to ask questions about your own childhood experiences, your early relationships with your

parents, any experiences of major separations or loss, and your thoughts about how these experiences have affected you and your role as a parent. This should take about an hour and can be done at a quiet time in your home or at the Child Development Centre. Some parents have found aspects of the interview saddening, because we are asking about events that may have been sad, or stressful. The interviewer will provide reassurance and support should you find the interview upsetting. The interview is audiotaped and later transcribed. The audiotapes will be assigned numbers and later erased. Any identifying information such as names, ethnicity, schooling, place of birth will be changed in the transcripts to maintain confidentiality.

The second part of the study involves a series of visits with you and your baby at home. The number of visits will vary but you can expect to have two to eight visits over a period of six months. Each visit will take about an hour. We would like to see how you and your baby play together and videotape a few minutes of the play. Since a major purpose of this study is to discover ways to enhance the pleasure that mothers and babies experience as they play together, we would like to discuss with some of you the way that you played with your baby and the things that your baby seemed to enjoy most during the play session.

The third part of the study will take place when your baby is about 12 months old. Two researchers will again visit you and your baby in the home and the procedures will be the same as at 6 months. Within two weeks of this home visit we would like to schedule a visit to the Child Development Centre at the University. During this visit we will observe your baby's responses to toys in this new setting. We are interested in your baby's play behaviour both when you are with your baby and when you are away. We

will ask you to leave your baby for two brief periods (no more than 3 minutes each) during this part of the procedures. Of course, if your baby cries, and thus does not play when you are away, we will send you in before the full three minutes have passed. Following this we would again like you to play with your baby. The visit to Child Development Centre will be videotaped and should take no longer than one hour.

The fourth part of the study will take place when your baby is about 24 months old. Once again, two visits are planned. The home visit and the visit to the Child Development Centre will be similar to those described at 6 and 12 months.

Our records will be confidential. All written, audio and videotaped records of assessments and questionnaires will be given code numbers to maintain confidentiality. Videotapes and transcripts of interviews may be used for training and professional development. Such use of the tapes will in most cases be limited to members of our research group but may sometimes include other research students and professionals with an interest in social development. The family names will be available only to members of our research group subject to provisions under the Child and Family Services Act. Any reports of our research findings will be written so that it would be impossible to identify any person or family who participated.

Participation throughout this study is voluntary and you may withdraw at any time. There are no known risks associated with any of the procedures. This study will not result in any direct benefit to yourself or to your baby, but may help to further our understanding of factors involved in child development. As a compensation for your time, you will receive \$25 for the two visits at 6 months, \$25 for the two visits at 12 months, and \$50 for the two visits at 24 months.

If you wish, you will have the opportunity to receive results about the study.
Should you have any questions, please do not hesitate to contact Sherry at the Child
Development Centre.

Sincerely,

William R. Avison, Ph.D.
Professor and Director
Centre for Health and Well-Being

David R. Pederson, Ph.D
Associate Professor
Child Development Centre