Digitized Theses   Digitized Special Collections

2009

EXPLORING THE ROOTS OF ATTACHMENT WITHIN THE FAMILY: EVIDENCE OF THE ROLE OF NON-SHARED SOCIAL EXPERIENCE

Kathleen A. O'Connor

Follow this and additional works at: https://ir.lib.uwo.ca/digitizedtheses

EXPLORING THE ROOTS OF ATTACHMENT WITHIN THE FAMILY: EVIDENCE
OF THE ROLE OF NON-SHARED SOCIAL EXPERIENCE

(Spine title: Exploring the Roots of Attachment Within the Family)

(Thesis format: Monograph)

by

Kathleen A. O'Connor

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

ABSTRACT

This study examined patterns of attachment shared between 50 mothers and their 2 children when each was 12 months old, and explored the extent to which maternal sensitivity, interactive behaviour, and sibling gender might account for concordance in sibling attachment relationships. Concordance was highest (62%) when based on 2-way secondary attachment classifications, and decreased when Disorganization was considered. Global sensitivity scores could not distinguish between the quality of maternal interaction with concordant-secure and non-concordant infants. Examining the content of maternal interaction suggested that, contrary to theoretical prediction, mothers of non-concordant infants interacted similarly with each, while mothers of concordant infants adopted a flexible style of interaction across siblings. This pattern also appeared in mothers' representations of each child's attachment relationship. Although sibling gender correspondence was unrelated to concordance, mothers of different-gendered siblings appeared more flexible in their representations and interactive behaviour. Implications for theory and clinical intervention are discussed.

Keywords: siblings, attachment, non-shared environment, maternal sensitivity, interactive behaviour, attachment representations, gender

Acknowledgements

First, I would like to thank my supervisor, Dr. Greg Moran, for his constant support and encouragement throughout this project. His wisdom, expertise, sense of humour, and willingness to challenge me made every stage of this process rewarding and enjoyable.

I would also like to thank all members of the Child Development Centre who contributed to this thesis in so many ways. In particular, thanks to Sandi Bento and Dr. Dave Pederson for countless hours spent coding, and for guiding me through many conceptual and methodological aspects of this project – their dedication to research is inspiring. I am extremely grateful for the support and friendship of Ya Xue and Tara Morley, who traveled around "the Circle" with me so many times over the past two years and always left me feeling on top. I also extend my gratitude to the families who participated in this research, making this project possible. It has been a privilege to learn from their experiences.

This project could not have been completed without the support of my family and friends, who were always prepared to lift my spirits and celebrate my successes. I would especially like to thank my parents, Mary and Gerry O'Connor, for their constant belief in me and for everything they have done to make my dreams possible.

Finally, I would like to thank my sweet little sister, Anna. No matter the geographical distance between us, our relationship has been, and always will be, a constant source of strength and joy in my life.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Introduction

The First Year of Life: Balancing Attachment and Exploration

Attachment, the "affectional tie that one person... forms to another specific individual" (Ainsworth, 1969, p. 971), describes and explains enduring, identifiable patterns of close relationships that exist from birth to death. Best understood from a biological or evolutionary perspective, attachment theory posits that because human infants are unable to survive without adult care, both infants and adults have been 'prewired' to behave in ways that increase the likelihood of infant survival (Goldberg, 2000). From birth, infants are predisposed to direct their behaviour towards maintaining and enhancing proximity to caregivers (i.e. any individual who has interacted with and responded to them over a prolonged period of time), and to evoke their investment and care, especially at times when survival is threatened. Adults, especially those who act as caregivers, are attuned to respond to infants' signals protectively and to monitor the infant's environment for danger (Goldberg, 2000). Thus, early attachment acts as a mechanism for security regulation, wherein security (including protection, comfort, soothing, and help) is sought by the attached infant and provided by the attachment figure (Bretherton, 1985; Cassidy, 2008).

Within the first year of life, infants' attachment behaviours develop beyond behavioural signals (e.g. crying, vocalizing) to include more active, flexible efforts to engage attachment figures, including clinging, approaching, following, and reaching (Marvin & Britner, 2008). The relationships that they experience with their caregiver during their first year direct them towards developing a goal-corrected relationship that balances two behavioural systems, attachment and exploration. Generally, infants

alternate between exploring the environment and maintaining proximity to their mothers, with the desire for exploration becoming stronger when the environment is very complex or novel, and the need for attachment quickly becoming activated when surroundings become too intense or strange (Ainsworth, Bell, & Stayton, 1971). Thus, these systems work in dynamic equilibrium to fulfill important species-specific survival functions, including needs for safety and security, knowledge of the environment, and the ability to adapt to environmental changes (Cassidy, 2008). The role of this goal-corrected partnership is of particular importance to the exploration of the social environment, which is thought to be the most significant, and potentially most threatening, realm to be explored by the developing child.

By their first birthday, infants may differ substantially with respect to the quality and strength of the attachment behaviours they exhibit when stressed, as well as the degree to which they are able to maintain the balance between attachment and exploration (Ainsworth, Bell, & Stayton, 1971; Cassidy, 2008). These differences are thought to arise primarily from variation in styles of mother-infant interaction throughout the first year of life. Maternal sensitivity, in particular, is a characteristic of dyadic interaction that is thought to be especially important in shaping infant attachment. This aspect of maternal behaviour is conceptualized as the degree to which a mother is able to tailor her interactions to her child in ways that promote "synchronous and harmonious interactions" suited to the child's unique temperament and behavioural style. For infants, sensitivity determines how quickly and appropriately their needs are met, the degree to which interactions with their caregiver are harmonious, and their confidence in how effectively they can control their own environment (Bretherton, 1992). Over time,

interactions with a consistently (in)sensitive caregiver are central in shaping the infant's responses to environmental circumstances and parenting strategies (Bokhorst et al., 2003).

At this early stage in development, the relationship that an infant shares with his caregiver can be classified as one of four patterns of attachment: secure, insecure (further divided into anxious-avoidant or anxious-ambivalent groups), or disorganized. These patterns are assessed using the Strange Situation Procedure (SSP; Ainsworth, Blehar, Waters, & Wall, 1978), a laboratory procedure involving increasingly intense stressors intended to activate the infant's attachment system. A secure infant is able to use his mother as a secure base for exploration, but also evidences a clear desire for contact, proximity, and interaction, especially when distressed. An anxious-avoidant infant appears to seek little or no contact, proximity, or interaction with his mother, particularly when upset, and seems to explore the environment independently without reference to her. An anxious-ambivalent infant is often overly fixated on his mother, and thus appears unable to explore the environment; however, when given the contact he seemingly desires, he resists (e.g. pushes away from her; Ainsworth et al., 1971; Main, 2000; Weinfield, Sroufe, Egeland, & Carlson, 2008).

Although these three patterns of attachment are qualitatively different, they all represent organized strategies designed to maintain access to the caregiver and involve a particular adaptation to the caregiver's interactive style (Barnett & Vondra, 1999). Accordingly, each has been linked with a pattern of maternal interaction associated with the quality of the attachment relationship over time. Mothers of secure infants generally respond sensitively to infant signals, and are more psychologically accessible, accepting,

and cooperative than mothers of infants who are insecurely attached. Mothers of anxious-avoidant infants tend to be rejecting, slow in responding to distress, rigid, interfering, and minimally expressive towards their children. Finally, mothers of anxious-ambivalent infants tend to respond inconsistently, behaving relatively insensitively but without the rejection that mothers of avoidant infants often display (Ainsworth et al., 1971; Goldberg, 2000; Weinfield et al., 2008).

Disorganized infants are unlike those with secure or insecure attachment relationships because they appear to have no established pattern for coping with their attachment needs, even when faced with only moderate levels of stress. It is thought that the inexplicable, odd, disoriented, or obviously conflicted behaviours (e.g. moving away from the parent while crying; rocking back and forth during an aborted approach to the parent) that they characteristically display in the SSP reflect an inability to cope with their attachment needs in the absence of an organized strategy for doing so. It is believed that infants in this category have been repeatedly faced with frightened or frightening parental behaviour, resulting in a "biologically-channeled paradox: the simultaneous needs to approach, and take flight from, the parent" (Hesse & Main, 2000, p. 1118). Although this classification was only identified relatively recently, it has been useful in describing children previously thought to be "unclassifiable" in terms of secure/insecure designations.

Even though patterns of attachment may be identified in infancy, they are reliably and meaningfully related to a range of outcomes that, in some instances, can be predicted prospectively (Sroufe, 2005). For instance, in a 30-year longitudinal study, children with secure attachment histories were rated higher on self-confidence, self-esteem, ego-

resiliency, and positive coping strategies at age 10; had closer and more reciprocal friendships in middle childhood; and were more frequently viewed as role models by their peers in adolescence as compared to those with insecure histories. Those with anxious histories, on the other hand, were often less self-reliant and required more support from authority figures in both preschool and middle childhood; had ongoing difficulty with interpersonal tasks and friendships; and were more likely to develop certain forms of psychopathology (e.g. anxiety) throughout childhood and adolescence. Disorganized attachment is thought to have the strongest association with poor developmental outcomes, which span the internalizing and externalizing disorders (see Lyons-Ruth & Jacobvitz, 2008) and extend to school underachievement and poor cognitive engagement (Moss & St.-Laurent, 2001). Research has shown that disorganization may be, by itself, a strong predictor of adolescent psychiatric symptoms, including dissociation, conduct disorder, and self-injury, even after family and life history variables are accounted for (Sroufe, 2005). Although the developmental process leading to childhood and adolescent outcomes is complex, early patterns of attachment are viewed as important components because they initiate pathways of development and are related to numerous key developmental functions, such as emotional regulation and social interaction (Sroufe, 2005).

Attachment Theory and Siblings

Traditionally, attachment has been conceptualized and researched as existing between one child and his/her mother. More often than not, however, it exists as part of a greater family structure that consists of several children and their common mother. The field has only recently recognized the limitations of restricting research to dyadic

assessment, emphasizing that although this level of analysis is characterized by complex laws and properties, a "triadic context" allows for a more integrated perspective that captures the interrelatedness and interconnectedness of attachment patterns at a broader family level (Kozlowska & Hanney, 2002). Thus, an increased emphasis on the study of attachment within families, including the relationships between siblings and their common mother, has recently emerged in the literature.

In terms of personality and behavioural styles, biologically-related siblings may be "as different from one another as are pairs of children selected randomly from the population" (Plomin & Daniels, 1987, p. 1), despite sharing an average of 50% of their segregating genes and much of their environment. Research in behavioural genetics suggests that these differences can largely be attributed to aspects of the non-shared environment, which are unique to each child during his or her upbringing (Plomin & Caspi, 1999). These non-shared factors include extra-familial influences, such as relationships with peers, teachers, and friends; as well as non-systemic influences, such as illness (Plomin, Chipuer, & Neiderhiser, 1994). They can also arise from factors within the family; for instance, research has shown that mothers may interact differently with their children on several dimensions of interactive behaviour, including maternal sensitivity (van IJzendoorn et al., 2000). These differences, as experienced by each child, have an important impact on his or her experience, and consequently on behaviour and development (Dunn, Stocker, & Plomin, 1991).

Despite emerging evidence for the importance of non-shared influences on attachment within families, only limited research has examined how this domain should be conceptualized and studied (Bokhorst et al., 2003). Indeed, until recently, attachment

theory has de-emphasized the impact of such individual differences on siblings' experiences and on attachment-related outcomes within families in general. Instead, it has posited that siblings should relate in similar ways to their common mother as long as two key aspects of the relationship remain constant from child to child: parental attachment representations; and, arising primarily from these representations, parental interactive style (van IJzendoorn et al., 2000; Bokhorst et al., 2003).

Attachment representations are complex internal working models of the world and of important individuals within it, including the self (Bretherton, 1985; Bretherton & Munholland, 2008). They develop as a function of one's experiences in relationships (especially those shared with attachment figures) and include impressions of others and the self, as well as the concepts and expectations that one holds for relationships (Goldberg, 2000). For instance, one's internal working model might include the belief that "attachment figure[s] give help and comfort when needed, and I am worthy of such support" (Bretherton, 1985, p. 12). These models begin to take shape in early life, as infants learn to assess the intentions and responses of attachment figures, form more sophisticated skills for understanding and coping with danger, and expand their cognitive-affective understanding (Bretherton & Munholland, 2008).

With increasing experience, new information is integrated or added into the various models one might hold about relationships. These representations form an internal working model (IWM) that is based on experiences in relationships over one's lifetime (Goldberg, 2000), and acts as a framework for experiences in future relationships by providing general rules for conceptualizing information related to attachment (Main, Kaplan, & Cassidy, 1985; van IJzendoorn, 1995). Although these representational models

are thought to be flexible to an extent, one's "state of mind" (i.e. the internal process determining what information should be integrated into one's thinking about relationships, as well as the style in which relevant thoughts and feelings are internalized) is thought to be stable overall once an individual reaches adulthood (George and Solomon, 2008).

As well as including concepts of attachment relationships, in general, IWMs also operate on a more specific level to influence how particular relationships in one's life are perceived, including those with one's own children. These "caregiving representations" (George & Solomon, 2008, p. 840) are thought to include the caregiver's own memories of his/her attachment history in the context of her past and current experiences with the child. Although these representations are thought to be unique to each child to a certain extent, they are also greatly influenced by overall state of mind (Moran & Pederson, 2000). For instance, previous research has shown that parents whose state of mind is classified as secure-autonomous (the adult classification parallel to secure attachment in infancy) are more likely able to formulate well-organized and coherent representations of their relationships with their infants and of themselves as attachment figures (Bretherton & Munholland, 2008). Moreover, research has shown that maternal state of mind is related to infant attachment security, with a meta-analysis reporting a large and stable overlap in the degree to which mothers are autonomous (i.e. secure) in their cognitive representations of attachment and the quality of attachment they shared with their child; that is, mothers classified as autonomous demonstrated a higher quality of attachment than those classified as non-autonomous (van IJzendoorn et al., 1995).

Clearly, mothers' cognitions are not directly accessible to their infants. According to attachment theory, both general elements of a mother's IWM, and the consequent relationship-specific representations arising from them, are expressed through her interactive style. That is, the quality of a mother's interactions serve to communicate her thoughts and feelings, conscious or otherwise, about relationships to the child (Atkinson et al., 2005). Consistent with this theory, research has found that parents with an autonomous state of mind seem able to more accurately perceive their child's attachment signals, responding more appropriately than parents classified as non-autonomous. In contrast, mothers with non-autonomous states of mind may view their child's attachment behaviour as a stimulus for negative attachment-related memories, and thus reject these advances from the child; emphasize their own attachment experiences, often responding inappropriately or excessively to compensate for their own histories; or be triggered by their infant to recall unresolved experiences of loss or trauma, perhaps exhibiting frightened/frightening behaviour in stressful situations (van IJzendoorn, 1995; Hesse, 2008).

As previously mentioned, sensitivity is an aspect of maternal interactive style that is thought to be particularly important in determining the quality of dyadic interaction; indeed, some view it as "the single most important determinant of infant attachment security" (Fearon et al., 2006, p. 1027), especially in relation to the patterns of organized attachment. As predicted, research has revealed strong associations between maternal sensitivity and infant attachment security (Pederson, Gleason, Moran, & Bento, 1998; de Wolff & van IJzendoorn, 1997; Atkinson et al., 2000). Responsive (i.e. more sensitive)

mothers tend to have securely attached infants, while the infants of less responsive (i.e. less sensitive) mothers are more likely to be insecurely attached.

With siblings, attachment theory suggests that mothers, guided by their relatively stable attachment representations, are likely to conceptualize their relationships with each of their children in similar ways. Consequently, they may behave in similarly sensitive ways towards each of their children. A mother with an autonomous state of mind would likely represent her relationships with each child accurately and appropriately, which presumably would lead her to adopt a sensitive style of interaction with each. This interactive style would take into account each sibling's unique personality and behavioural styles with the ultimate goal of meeting their needs for attachment and exploration. Consequently, it is likely that both children would develop secure attachment relationships with her. Conversely, a mother with a non-autonomous state of mind may perceive her relationship with each child less accurately. Consequently, her interactions may be less sensitive, and less focused on cultivating well-matched and appropriate interactions with each child; thus, the development of secure attachment relationships in these families would be compromised.

Research on the Attachment Patterns of Siblings with their Common Mother

Current research suggests, however, that the patterning and origins of the relationships shared by siblings and their common mother may be more variable and complex than attachment theory would predict. In an early study of patterns of interaction within families, Dunn, Plomin, & Nettles (1985) found considerable stability in mothers' affectionate, verbal, and controlling behaviours towards their two children when each was 12 months old; this consistency was expected based on theoretical prediction.

However, by the time each child was 24 months old, mothers displayed significant differences in controlling behaviour towards each child. Changes in maternal responsiveness from 12 to 24 months have also been found in several other studies, with discrepancies extending to physical, verbal, affectionate, and visual behaviour (Clarke-Stewart & Hevey, 1981). Although some research does suggest that mothers behave in similar ways towards each of their children, these studies often report only modest effect sizes. Taken together with the body of research documenting differences in maternal behaviour, these findings suggest that maternal interactive behaviour towards siblings may actually differ substantially (van IJzendoorn et al., 2000).

The straightforward predictions made by attachment theory regarding consistency in patterns of attachment within families are also not readily reconciled with the more complicated patterns found empirically. Several studies (Ward, Vaughn, & Robb, 1988; McCartney & Diggins, 1993, as cited in van IJzendoorn et al., 2000; Teti, Nakagawa, Das, & Wirth, 1991) examined the security of attachment relationships between siblings and their common mother when each child was 12 months old, determining the extent to which siblings' attachment classifications were concordant (i.e. the same; both are secure, insecure, or disorganized). Estimates of concordance in these studies varied somewhat – 57% (Ward et al., 1988), 54% (McCartney & Diggins, 1993, as cited in van IJzendoorn et al., 2000), and 64% (Teti et al., 1991) – but all indicate considerable non-concordance between the attachment relationships of siblings with their mother. van IJzendoorn et al. (2000) found significant, but again only modest, concordance (62%) when siblings' attachments were classified as secure or insecure, but reported that concordance was no longer significantly related when attachment patterns were further subcategorized.

Although these rates of concordance are generally statistically greater than chance, mis-matches are common and higher than expected from the perspective of traditional attachment theory. These findings suggest that current theories of attachment cannot adequately explain the mechanisms behind the transmission of attachment between siblings and their common mother.

It is noteworthy that concordance rates in studies of sibling attachment are strikingly similar to those observed in studies of attachment in twins and in biologically-unrelated infants who are raised together. In a study of the attachment relationships between twins and their common mother, Ricciuti (1992, as cited in van IJzendoorn et al., 2000) found 78% concordance in dizygotic twin pairs, and 66% in monozygotic pairs, suggesting that attachment security is not subject to genetic influence. O'Connor and Croft (2001), who assessed attachment security in preschool-aged twins, reported that monozygotic twins demonstrated a somewhat higher rate of concordance than dizygotic twins. In this study, concordance rates were consistent with a modest genetic influence, and with considerable influences of shared (32%) and non-shared (53%) environment. Similar rates of concordance were found in research on the attachment relationships of infants and their caregivers living on kibbutzim; here, the role of genetics was well-controlled as infants were not related to each other or to their caregivers (Sagi et al., 1995). Given that twins, siblings, and kibbutzim infants share their genes to varying extents, yet concordance rates for each group are similar, it is likely that the impact of genetic factors on attachment security is limited (Fearon et al., 2006; Bokhorst et al., 2003).

Gender, on the other hand, appears to be a potentially important factor in understanding sibling concordance. van IJzendoorn et al. (2000) found that concordant relationships were more likely when siblings were of the same gender (68%, versus 56% for siblings of different genders). This finding is theoretically unexpected and especially notable because gender differences are not generally found in attachment research (Benenson, 1996). Moreover, van IJzendoorn et al.'s (2000) reported that gender differences in concordance rates could not be explained by corresponding patterns of maternal sensitivity or attachment classification; that is, levels of maternal sensitivity were not significantly different across gender, nor were patterns of attachment, in spite of the fact that consistency of gender was associated with attachment concordance within siblings. van IJzendoon et al. (2000) suggest that a possible mechanism may arise from gender differences in maternal interactive behaviour outside the realm of sensitivity, as this construct is currently measured in attachment research. For instance, research has shown that maternal interactions with baby girls tend to revolve around sharing affective states, while interactions with boys are focused on promoting autonomy and efficacy (Robinson, Little, & Biringen, 1993). Further research is required to elucidate maternal interactive behaviours beyond sensitivity that are gender-dependent and that may impact the development of attachment relationships within families (de Wolff & van IJzendoorn, 1997).

Explanations for Non-concordance in Sibling Attachment Security

A wide range of explanations has been offered for the relatively high rate of non-concordance in sibling attachment relationships. Most importantly, there has been increased awareness that rates of non-concordance are unexpectedly high only if such

expectations are based on relatively straightforward pathways underlying attachment within families, as proposed by attachment theory. Thus, in a search for alternate possibilities, efforts to account for sibling concordance have recently focused on more subtle aspects of the relationship that are thought to be central in shaping attachment but whose mechanisms are poorly understood.

Despite the emphasis placed on maternal sensitivity by traditional attachment theory, its mediating role in the relationship between attachment representations and security has been described as "ephemeral, dependent upon particular descriptive methods and the population under study" (Bailey, Moran, Pederson, & Bento, 2007, p. 336). In a study of low-risk families, Pederson et al. (1998) found that maternal sensitivity accounted for less than 25% of the association between representational autonomy and attachment security. Similarly, van IJzendoorn's meta-analysis (1995) reported that, while the relationship between representations, sensitivity, and security was consistent with a meditational model, only 23% of the direct link between representations and attachment was mediated by sensitivity. On the other hand, Atkinson et al. (2005) found no evidence of a meditational model, even when sample features and methodological limitations were accounted for. Instead, this analysis found some evidence for a moderating role of sensitivity; that is, when mothers expressed a level of sensitivity that was unexpected given their state of mind, their own cognitive representations of attachment strategies were not transmitted to the infant, e.g. an non-autonomous mother who behaved sensitively would likely have a securely attached child. Taken together, these findings suggest that maternal sensitivity, as it is presently understood and measured, plays a complex role in establishing attachment security that

may not be consistent with theoretical mechanisms. Instead, some factor beyond current conceptualizations of maternal sensitivity may account for the association between state of mind and security. This trend has come to be known in attachment research as the "transmission gap" (van IJzendoorn, 1995); that is, the mechanism by which attachment representations are somehow translated into attachment security within a mother's relationship with her infant remains unclear.

Evidence of a parallel "transmission gap" is clearly present in sibling research, in which the relationship between concordance and sensitivity has proven surprising: Pederson, Moran, Neufeld Bailey, & Bento (1999), for example, found that maternal sensitivity pertaining to each child was correlated at a level of .57 for concordant pairs, while the correlation for non-concordant pairs was higher ($r = .66$). That is, despite mothers appearing similarly sensitive towards each child, siblings developed concordant attachments to their mothers in some families and non-concordant relationships in others. Further, van IJzendoorn et al. (2000) found that the theoretically-predicted association between maternal sensitivity and attachment security only appeared in families where both children demonstrated insecure relationships with their mother; in these families, mothers demonstrated relatively low levels of sensitivity towards each child and, as expected, both children were insecurely attached. Mothers of infants in secure relationships – irrespective of whether the other sibling was securely or insecurely attached – and of infants in insecure relationships whose siblings were securely attached did not differ in terms of sensitivity, but displayed relatively higher levels of sensitivity than mothers in insecure relationships with both children. Finally, as previously discussed, non-concordance rates, as determined by van IJzendoorn et al., were

substantially greater in families that included a boy and a girl rather than same-gendered siblings. No corresponding differences in maternal sensitivity were found, however. Again, empirical findings indicate that factors beyond maternal sensitivity, as it is currently conceptualized and assessed, may be important in determining sibling attachment concordance.

Another avenue for better understanding patterns of attachment in siblings pertains to testing the theoretical assumption of stability of maternal attachment representations over time. Attachment representations, while considered stable across much of the lifespan, are also thought to be open to change in the face of attachment-related stressful life events (Waters, Merrick, Treboux, Crowell, & Albersheim, 2000). For adults, one such event can be the birth of a child. Of particular importance in sibling studies is the possibility that the life-changing experience of having a child, and the simple yet substantial presence of that child when the second is born, may influence maternal attachment representations. Previous research has suggested that mothers may experience considerable attachment-related stress during pregnancy with a second child; for instance, if the firstborn child had a difficult temperament during infancy, she may be anxiously anticipating the same challenges with her second child (Touris, Kromelow, & Harding, 1995). These stressors may impact the mother's self-esteem, capacity for empathy, ego strength, sensitivity, and perception of childhood memories of her own parents and siblings (Belsky & Isabella, 1988). All of these factors could effect change to her attachment-related state of mind and, on a more targeted level, her representations of the relationships she shares with each child. Indeed, in a study of attachment patterns in firstborn children before and after the birth of a sibling, Touris et al. (1995) reported a

rate of change in attachment patterns of 60%, compared with a 35% in families that had

not experienced this event. The role of maternal representations of the attachment

relationship and their associated impact on attachment at critical points in a family's

history have never been tested empirically. Such factors are worthy of exploration,

especially in light of the weak empirical support for the importance of maternal

sensitivity in sibling attachment concordance.

Finally, some explanations for variation in concordance point to issues related to

methodology or research design. First, small sample sizes are often a problem in sibling

research because of the difficulty in maintaining contact with families over time, and in

accessing siblings when each is of the same age (e.g. 12 months). Yet, even studies that

have pooled results from several groups to increase sample size (e.g. van IJzendoorn et

al., 2000) have not been entirely successful in accounting for or explaining sibling

concordance. Second, there tends to be a variable time lag between children in a family

and between assessments that is typically not controlled in studies of attachment in

siblings. This time lag raises the possibility of significant life events intervening and

subsequently impacting important attachment-related variables that may not be assessed

or accounted for in research. For instance, studies have shown that families experiencing

circumstances such as the onset of maternal depression or employment, change in

residence or financial status, or the illness or death of a family member typically

demonstrate significantly more instability in patterns of attachment over time compared

to families who had not undergone significant life events (Bar-Haim, Sutton, Fox, &

Marvin, 2000). Furthermore, change in attachment patterns following these events has

been found to occur bi-directionally; dyads who changed from secure to insecure reported

approximately the same number of negative events as those who changed from insecure to secure patterns. Such factors, which may not be adequately incorporated in many studies, may well account for some instances of non-concordance in the relationships between mothers and their children.

Another potentially important research design issue pertains to the inclusion of disorganization as a pattern of attachment. Few studies of sibling attachment have included this category as a basis for calculating concordance; instead, concordance has often been determined according to the organized classification that best fits the infant's pattern of behaviour. Establishing concordance on these secondary classifications, however, may result in the loss of important information about attachment style, and similarity of these styles across siblings. For instance, two siblings might be classified as disorganized-secure and disorganized-insecure; if primary classifications are used, then these siblings are concordant, i.e. both are disorganized, but if secondary classifications are used, the opposite is true. The omission of disorganization in past research on sibling attachment may be particularly important because several studies included high-risk populations (e.g. Ward, Vaughn, & Robb, 1988) where rates of disorganization are known to be higher than the general population (Hesse & Main, 2000). The resultant pooling of children in disorganized relationships with those in organized relationships on the basis of their secondary (organized) classifications may have introduced a degree of representative heterogeneity into the groups used in data analysis.

The Present Study

This study utilized naturalistic and laboratory observations of mothers and their two children, when each was 12 months of age, to explore the possibility that several

variables discussed here might contribute to a better understanding of sibling attachment concordance. Attachment security was determined using the Strange Situation Procedure (Ainsworth et al., 1978), and included disorganization as a category upon which concordance rates are based. This classification has been omitted from many previous studies and allows here for an investigation of the extent to which rates of sibling attachment concordance may have been misrepresented in previous research.

This study also investigated the issue of maternal sensitivity and its puzzling relationship to concordance. Previous studies (including those producing the findings previously discussed) used a Q-sort measure (Maternal Behaviour Q-Set [MBQS], Pederson, Moran, Sitko, Campbell, Ghesquire, & Acton, 1990) based on naturalistic observations of mother-infant interaction in the home, which generates a global score representing the mother's degree of sensitivity towards her child. This study broke down this measure into nine rational domains, each described by a subset of the MBQS's 90 items: Awareness, Response Effectiveness, Positive Affect, Rejection, Synchrony, Controlling/Interfering, Facilitation of Exploration and Learning, Comfort with Physical Contact, and Engagement. These domain scores differ from the global sensitivity score in two main ways. First, they are intended to comprehensively describe detailed aspects of mothers' interactive behaviours, each revealing qualitatively different features of mother-infant interaction that could not be represented in a global score. Second, while the global score incorporates a theoretical notion of sensitivity, the domains allow for a description of the structure or content of the interaction that is uncontaminated by current concepts of sensitivity. Thus, these domains may provide more insight into whether there are specific behaviours driving concordance that may have been masked by a global measure.

Third, child-specific maternal attachment representations were compared between concordant and non-concordant groups. Mothers completed an Attachment Q-Set (AQS; Waters & Deane, 1985) when each child was a year old; traditionally, this sort is used as a measure of attachment security that, unlike the Strange Situation, is based on behavior in naturalistic settings and makes use of the mother as an informed and experienced observer of the child. However, some suggest that this measure may also be regarded as an reflection of attachment and child behaviour as perceived by the mother, where her observations of the child are structured through a framework of her own needs and preoccupations, her impression of the infant's temperament, and parental stress (Teti & McGourty, 1996; Tarabulsy, Avgoustis, Phillips, Pederson, & Moran, 1997; Tarabulsy et al., 2008). In this way, the AQS also allows for an understanding of the mother's representation of the attachment relationship she shares with each child; this dimension is not specifically assessed by the Adult Attachment Interview, a widely-used measure that focuses on childhood experiences and their impact on current functioning to assess attachment-related state of mind (Hesse, 2008). Because mothers' relationship-specific representations are thought to have an important impact on their interactive behavior with each child, maternal AQS scores for both siblings were examined to determine the impact of maternal perceptions of the attachment behaviours of each child on the concordance of siblings' attachment relationships.

Finally, this study further examined the gender effect found in the van IJzendoorn et al. (2000) study. As mentioned, gender differences are not commonly observed in attachment research (Benenson, 1996), making this finding worthy of additional investigation. Because no corresponding gender differences were found in maternal

sensitivity, comparative analyses were repeated using the rational domains described above. Ideally, this will further characterize dyads' interactions in a way that provides a view of how mothers may be behaving differently depending on their child's gender, and thus help to explain what may be driving differences in concordance rates.

Hypotheses

Much of this study is exploratory, especially because no previous research has examined the role of domains of maternal interactive behaviour or maternal attachment representations in sibling attachment concordance. Several preliminary hypotheses can be made, however:

1. Concordance rates will increase once disorganization is included as a pattern of infant attachment. This methodological adjustment will allow for an enhanced comparison of the similarities and differences in attachment styles across siblings.

2. Domains of maternal interactive behaviour will provide a more refined assessment of dyadic interaction as compared to the information provided by a single measure of global sensitivity. Because these domains characterize specific aspects of maternal behaviour, they will provide stronger associations with the quality of infant attachment than global sensitivity scores. Mothers of infants with concordant attachment relationships will demonstrate more similarity in the content of their interactions, as described by the domains, than mothers of siblings with non-concordant relationships, whose domain scores will reflect substantial differences in interactive behaviour.

3. Examining maternal attachment representations will further promote our understanding of the factors involved in concordance of sibling attachment

relationships. Mothers with similar AQS scores across siblings will be more likely to demonstrate concordant attachment relationships because their representations of these relationships will be consistent. Mothers with dissimilar AQS scores, on the other hand, will be more likely to experience non-concordant attachments with their children, as the representations guiding their relationships with each child will diverge.

4. Same-gendered siblings will be more likely to share concordant relationships with their mothers than those whose genders differ. Mothers of same-gendered siblings will interact more consistently than mothers whose children are different genders; the extent and nature of similarities and differences in patterns of maternal interaction across gender will be reflected in domain scores. Mothers may also be more consistent in their relational representations, as reflected in AQS scores, when siblings are of the same gender.

Method

Participants

Participants were 50 families who had been recruited from local hospitals shortly after the birth of a child to take part in studies on attachment through the Child Development Center at the University of Western Ontario. Following their participation in this initial study, these families were contacted by the Child Development Center as part of recruitment for ongoing studies and reported that they had had a subsequent child. Only two of these families declined to participate with their second-born child. Mothers were provided with a letter of information regarding the study (see Appendix A) and consented to their own involvement and to that of their children (see Appendix B). Participants were treated in compliance with the "Ethical Principles of Psychologists" (American Psychological Association, 1981) and the standards in place at the University of Western Ontario pertaining to research with human subjects (see Appendix C). Mothers gave permission for data collected during their initial participation to be used in the present study.

Data on the number of children in the family were available for 24 of the 50 participating families; of these, seventeen had 2 children, four had 3 children, and three had 4 children. Participating children were the two youngest in the family in 23 cases; in the remaining family, participants were the first- and third-born of three children. In the overall sample of 50 families, siblings included 12 girl-girl pairs, 10 boy-boy pairs, 8 girl-boy pairs, and 20 boy-girl pairs.

At the time of families' initial participation, infants' ages at the home visit ranged from 8 to 12 months. All infants were approximately 12 months old at the time of their

lab visit. When families were assessed for the second time, these children (i.e. first-born siblings) ranged in age from 22 to 69 months ($M = 42.98$ months, $SD = 11.61$), and second-born siblings' ages ranged from 12 to 20 months ($M = 14.32$ months, $SD = 1.80$). Spacing between siblings ranged from approximately 9 to 56 months ($M = 28.7$ months, $SD = 11.61$).

Most families were middle-class, with incomes ranging from $10,000-$20,000 to more than $80,000 ($M = $40,000-$50,000). Maternal age at the second phase of assessment ranged from 19 years to 40 years ($M = 31.3$ years, $SD = 5.10$). Paternal age, also at the second phase of assessment, ranged from 21 years to 45 years ($M = 33.5$ years, $SD = 5.36$). On average, both mothers' and fathers' highest level of education was some college or university (ranging from less than high school to a post-graduate degree).

Materials

Maternal Behaviour Q-Sort (MBQS; Pederson et al., 1990). This measure characterizes the sensitivity with which a mother interacts with her child. It consists of 90 items, which are sorted into nine piles of 10 items each to describe characteristics that are *most like the mother* to *least like the mother*. Values are assigned to each card depending on its placement within the piles. Each sort is then correlated with a criterion sort established by experts, who sorted the items to describe their concept of a prototypically sensitive mother. This correlation thus determines how closely a mother's behaviour is associated with the style demonstrated by the prototype. Thus, sensitivity scores can range from 1.0 (prototypically sensitive) to -1.0 (least sensitive).

Two versions of the MBQS were used in the present study. Version 2.0 was used to code mothers' interactions with 92 children (48 firstborn, 44 second-born). While this

study was in progress, Version 3.0 was completed and thus used in 8 cases (3 firstborn, 5 secondborn). The updated version includes many of the same items; however, some cards were removed or revised to better distinguish the interactions of mothers in anxious-ambivalent attachment relationships from mothers in other relationships. The earlier version was also revised to focus more on the baby's observed experience of the mother's behaviour, rather than on the inferred intentions or motivation behind a mother's behaviour. For instance, the item "knows a lot about her baby; is a good informant" was removed because it does not represent a clear reflection of the baby's experience of the mother. As with Version 2.0, the revised version represents the degree of similarity between the mother's interactions, as reflected in her sort, and the interactive style theoretically displayed by a prototypically sensitive mother. Furthermore, the sensitivity scores generated by Version 3.0 continue to represent the correlation between the mother's sort and that of the prototypically sensitive mother. Thus, both versions provide a metric of the degree of similarity of a mother's interaction to that of the prototypically sensitive mother.

Home visitors completed the MBQS following observations of the mother interacting with the first child (after the family's first assessment) and the second child (after the second assessment).

Domains of Maternal Interactive Behaviour. Although the MBQS was originally intended to assess global sensitivity, and is thus used most often for this purpose, this measure also allows for the assessment of other aspects of maternal behaviour that are considered distinct from the concept of sensitivity. For instance, items of the MBQS (that, when taken together, provide a measure of global sensitivity) can be grouped into

nine domains representing independent aspects of mothers' interactive behaviour with their infants. These domains are considered conceptually distinct from the measure of global sensitivity provided by the MBQS for several reasons: first, each deals with targeted, specific aspects of mothers' behaviour, instead of the overall quality of their interactions; second, whereas assessments of global sensitivity are based on theoretical concepts, these domains describe the content and structure of interactions independent of a theoretical basis.

To develop these domains, three experienced sorters arranged the 90 items of the MBQS, Version 3.0 (Pederson et al., 1990) into rational groups based on how closely items were conceptually related; that is, items were placed together if they were thought to be associated with similar aspects of maternal behaviour. The placement of each item was discussed to agreement, resulting in nine domains of maternal interactive behaviour that each describe conceptually distinct characteristics. This process was repeated for the MBQS Version 2.0. These domains and their general descriptions are presented in Appendix D. Domain items and Cronbach's alphas, which assessed the reliability of each domain's internal consistency, are presented in Appendix E (MBQS Version 2.0) and Appendix F (MBQS Version 3.0). Sixteen items from Version 2.0 and 13 items from Version 3.0 were excluded from the domains as they could not be placed in such a way that fit rationally with other items; excluded items from both versions are presented in Appendix G.

Domain scores were calculated by averaging the values assigned to each card in the MBQS sort for all items within a domain. Some items (as indicated in Appendices D and E) were reverse coded so that high scores on all domains represented high levels of

the behaviour being assessed. Domain scores could only be calculated for 38 of the 50

mother-firstborn dyads because raw data for their MBQS sorts were no longer available

by the time of the present study (i.e. their overall MBQS score was available, but data for

the specific placements of items in these sorts were unavailable; thus domain scores

could not be calculated).

Attachment Behavior Q-Sort, Version 3.0 (AQS Waters & Deane, 1985). The

AQS describes the security of the attachment relationship between an infant or young

child and his/her caregiver. This measure consists of 90 items (see Appendix H), each

describing an aspect of the child's behaviour. Items are separated into nine piles of 10

items to describe behaviours that are *most like* to *very unlike* the child. Attachment

security scores are then calculated by correlating the subject's sort with a criterion sort

describing a prototypically-secure child, as established by experts in the field. Thus, the

AQS provides a continuous security score that can range from 1.0 (prototypically secure)

to 1.0 (least secure). The validity of observer AQS security scores is well-documented

(Vaughn & Waters, 1990; Pederson & Moran, 1996; van IJzendoorn, Vereijken,

Bakermans-Kranenburg, & Riksen-Walraven, 2004). Both observer and maternal AQS

scores are meaningfully related to subsequent and concurrent measures of infant and

child attachment and socio-emotional development (Pederson & Moran, 1996; van

IJzendoorn et al., 2004).

As previously outlined, the AQS was originally developed as a measure of

attachment security that could be completed by mothers based on their daily experiences

with the child. In the present study, however, mothers' sorts were taken to reflect their

perceptions of the child's behavior, influenced by their overall framework for

conceptualizing their relationship with that child. Mothers completed an AQS for their firstborn child during their first home visit, and for their second-born child during their second home visit.

Strange Situation Procedure (SSP, Ainsworth, Bell, & Stayton, 1974). The SSP assesses the quality of the attachment relationship between an infant and his/her mother. It is a standardized laboratory observation procedure comprising eight increasingly stressful episodes involving the infant, his/her mother, and a female stranger. Episodes range from low-stress, where the mother and infant are left alone in a room together with several toys; to high-stress, where the baby is left alone in unfamiliar surroundings. Episodes are intended to last three minutes each, but were terminated if the infant became extremely distressed. SSPs are videotaped and coded on seven-point continuous scales of avoidance, resistance to comfort, proximity-seeking, and contact maintenance. Scores on these scales, along with qualitative observations of the infant in the procedure, are used to describe each dyad's attachment relationship as anxious-avoidant (A), secure (B), or anxious-ambivalent (C). Tapes are also coded for disorganization (D); this classification is assigned to children with a score of 5 or higher on a nine-point scale of disorganized/disoriented behaviour. For children classified as D, the ABC classification becomes an alternative or secondary classification that best describes their underlying organized strategy.

Both first- and second-born infants participated in a SSP with their mother when they were approximately one year old.

Reliability. As previously outlined, data pertaining to firstborn infants were collected during their participation in one of five studies conducted by the Child

Development Center at the University of Western Ontario. Within each of these studies, home visitors used a rotating schedule so that 25% of the maternal sensitivity sorts were checked for reliability. At that time, of course, it was impossible to determine which firstborn infants would go on to have a younger sibling and thus be drawn from their initial sample for inclusion in the present study. Consequently, only very few of the firstborn infants' MBQS data happened to be among those checked for reliability by the home visitors. Furthermore, because sorts were completed by home visitors and not from videotape, they could not be re-coded for reliability once the sample of firstborn infants was compiled. Therefore, in the present study, estimates of reliability for the MBQS and the domains of interactive behaviour were generated by averaging reliability across the overall samples from which older siblings had been drawn, and the sample of second-born siblings.

Pearson correlations were used to assess inter-rater reliability of global sensitivity scores; reliability ranged from $r = .73$ to $r = .96$ in the various samples, with an average inter-rater reliability of $r = .90$ (Garson, 2009) Item-by-item correlations determined inter-rater reliability of domain scores as they could account for reliability in the placement of items in the sort, which was used to calculate domain scores. Correlations ranged from $r = .58$ to $r = .71$, with an average of $r = .68$ across samples. According to conventional standards, inter-rater reliability for global sensitivity and domain scores was outstanding and substantial, respectively (Garson, 2009).

Because all SSPs had been videotaped, and were thus accessible for coding by multiple coders once the sample of firstborn infants for the present study had been determined, reliability of attachment classifications could be estimated for the dyads

included in this sample (i.e. as a unique sample of their own, independent of the samples from which they had been drawn). Twenty-two percent of SSPs were checked for reliability. When reliability was estimated using four-way attachment classifications (anxious-avoidant, secure, anxious-ambivalent, and disorganized), the percentage concordance between coders was 82% (Kappa = .75, $p < .01$). When reliability was estimated using three-way secondary attachment classifications, the percentage concordance between coders was 95% (Kappa = .93, $p < .01$). These Kappa values are considered substantial and outstanding, respectively (Garson, 2009).

Procedure

Previous Participation. Studies in which mothers and their firstborn children had initially participated varied in terms of specific methodology; however, there were two common elements. All dyads participated in a lab visit, which included the SSP, when the infant was approximately 12 months old. All families also received a home visit within 4 months of the lab visit, during which dyads engaged in videotaped play sessions and mothers completed an AQS following instruction from a home visitor. Visitors observed the mother and child throughout the visit, and completed an MBQS after the visit following a debriefing session with a third member of the research team (similar to the procedure for the second assessment described in detail below).

Home Visit – Second Assessment. Mothers were contacted by telephone to arrange a home visit for a time when their children were at home and awake. Visits lasted approximately two and a half hours, and were attended by the same two home visitors in all but one case. In addition to conducting the formal procedure described below, visitors also observed each child's attachment behaviours and the mother's responses to them

throughout the visit, making running notes on what occurred from the moment of arrival to the end of the visit (e.g. how the visitors were introduced to the children, how the children responded to the visit protocol).

Upon arriving, one observer administered a test of infant development to the younger child. Meanwhile, the other observer instructed and supervised the mother while she completed the AQS. The older child was provided with crayons and a colouring book, but otherwise was not engaged in any task by the visitors. As a result, the mother's attention was divided in several ways: she was required to complete the Q-sort while possibly responding to her older child, who was not entirely occupied, and also perhaps had to interact with her younger child if bids for her attention were made. Most often, the younger child completed his/her test before the mother completed the AQS, placing further demands on her attention. Observers maintained a generally passive role in entertaining the children to give the mother an opportunity to respond to them; however, in some cases, intervention was necessary.

After completing the AQS, the mother was asked to engage in a free-play session with her younger child for several minutes. Again, during this time, the older child was unoccupied, so mothers had to balance bids for attention from this child with the demands of the home visit procedure. Following this play session, an observer interviewed the mother about her experiences as a parent and about her perceptions of her children (e.g. similarities and differences between them). On some occasions, interviews had to be terminated prematurely due to time constraints. Three questionnaires and accompanying instructions were left with the mother following the visit for her to

complete on her own time; mothers were asked to return these by bringing them to the university for the second part of the study.

Following the visit, the observers (together or independently) engaged in a debriefing session with another member of the research group, who had not attended the visit. This was an opportunity for the observers to discuss the visit, the maternal and child behaviours noted throughout, and the dynamics of the relationships within the family. Observers then completed an MBQS pertaining to the mother's sensitivity towards the younger child, as well as another attachment measure for each child.

Lab Visit. Mothers and their second-born children attended the second part of the study, which took place at the university lab, within two weeks of the home visit. Dyads participated in the SSP, which was videotaped and coded to assess the quality of the attachment relationship.

Results

Preliminary Analyses

Prior to investigating the central hypotheses of this study, several analyses were conducted to determine the distribution of attachment classifications and concordance rates in this sample. Frequencies of attachment classifications for first- and second-born children were calculated in three ways, as shown in Table 1. First, frequencies were calculated by classifying infants as anxious-avoidant (A), secure (B), anxious-ambivalent (C), and disorganized (D). Second, because they occurred relatively infrequently, the two insecure categories (A and C) were collapsed and infants were classified as secure, insecure, and disorganized. Finally, frequencies were calculated by organizing infants according to their secondary, forced-choice classifications, providing a full depiction of the sample's distribution according to organized categories of attachment relationships. The distribution of classifications in this sample was consistent with that established in a meta-analysis of studies involving middle-class, nonclinical samples in North America (15% A, 62% B, and 9% C; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). The percentage of children in this sample classified as D, however, was notably higher (15% in van IJzendoorn et al., 1999).

Two-way contingency table analyses were conducted to evaluate the rates of concordance of attachment classifications across siblings. Separate analyses were performed according to each of the groupings outlined above; an additional analysis was also performed with infants divided into secure or insecure (anxious-avoidant and anxious-ambivalent) groups according to their secondary classifications. That is, infants whose primary classification was D were reclassified according to their secondary,

Table 1

Frequencies of Attachment Classifications for First- and Second-born Siblings

Four-way			Three-way			Secondary		
Class.	Freq.	%	Class.	Freq.	%	Class.	Freq.	%

First-born children

Class.	Freq.	%	Class.	Freq.	%	Class.	Freq.	%
A	8	16	Secure	24	48	A	12	24
B	24	48	Insecure	12	24	B	31	62
C	4	8	D	14	28	C	7	14
D	14	28						

Second-born children

Class.	Freq.	%	Class.	Freq.	%	Class.	Freq.	%
A	4	8	Secure	27	54	A	9	18
B	27	54	Insecure	9	18	B	32	64
C	5	10	D	14	28	C	9	18
D	14	28						

Note. Class. = attachment classification. A = anxious-avoidant; B = secure; C = anxious-resistant; D = disorganized; Insecure = anxious-avoidant and anxious-resistant groups combined.

organized patterns of attachment; following this, all infants were further separated into secure or insecure groups. Forty percent of siblings were concordant in their attachment relationships when classified according to four-way primary classifications; 48% were concordant when classified as secure, insecure, or disorganized; 50% were concordant according to three-way secondary classifications; and 62% were concordant when secondary classifications were further designated as secure or insecure. Attachment classifications of first- and second-born children were not significantly related, regardless of how classifications were grouped (see Tables 2-5).

Note that the categorization of disorganized relationships according to alternative or secondary classifications resulted, in fact, in a higher concordance of attachment relationships across siblings (Tables 4 and 5 vs. 2 and 3). This finding is consistent with the notion that secondary, alternate classifications are a true reflection of the organized character of the relationship, and that this designation is not rendered meaningless in relationships that appear disorganized. These preliminary analyses suggested, then, that it would be most appropriate in all subsequent analyses to group relationships by re-assigning disorganized dyads according to their secondary, organized classifications. In addition, the relatively small number of anxious-resistant dyads necessitated their combination with anxious-avoidant dyads to form a single insecure category. Thus, in all future analyses, the term "concordant relationship" will refer to sibling pairs whose relationships with their common mother are both secure or both insecure.

Global Sensitivity and Concordance in Sibling Attachment Relationships

Pearson product-moment correlation coefficients were computed to examine the association between the degree of global sensitivity demonstrated by mothers in

Table 2

Two-way Contingency Table for Four-way Primary Attachment Classifications of First- and Second-born Siblings

		Second-born sibling				
		A	B	C	D	Total
	A	0 (0.6)	6 (4.3)	1 (0.8)	1 (2.2)	8
		0%	12%	2.2	2%	(16%)
	B	2 (1.9)	13 (13)	2 (2.4)	7 (6.7)	24
Firstborn		4%	26%	4%	14%	(48%)
Sibling	C	0 (0.3)	1 (2.2)	2 (0.4)	1 (1.1)	4
		0%	2%	4%	2%	(8%)
	D	2 (1.1)	7 (7.6)	0 (1.4)	5 (3.9)	14
		4%	14%	0%	10%	28%
	Total	4	27	5	14	50
		8%	54%	10%	28%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values. A = anxious-avoidant; B = secure; C = anxious-resistant; D = disorganized. Pearson χ^2 (9) = 11.90, *ns*.

Table 3

Two-way Contingency Table for Three-way Primary Attachment Classifications of First-and Second-born Siblings

		Second-born sibling			
		Secure	Insecure	D	Total
	Secure	13 (13)	4 (4.3)	7 (6.7)	24
		26%	8%	14%	48%
Firstborn	Insecure	7 (6.5)	3 (2.2)	2 (3.4)	12
sibling		14%	6%	4%	24%
	D	7 (7.6)	2 (2.5)	5 (3.9)	14
		14%	4%	10%	28%
	Total	27	9	14	50
		54%	18%	28%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values.

Insecure = anxious-avoidant and anxious-ambivalent groups combined; D =

disorganized. Pearson χ^2 (4) = 1.40, *ns*.

Table 4

Two-way Contingency Table for Three-way Secondary Attachment Classifications of First- and Second-born Siblings

| | | Second-born sibling | | | |
		A	B	C	Total
	A	1 (2.2)	8 (7.7)	3 (2.2)	12
		2%	16%	6%	24%
Firstborn	B	5 (5.6)	22 (19.8)	4 (5.6)	31
sibling		10%	44%	8%	62%
	C	3 (1.3)	2 (4.5)	2 (1.3)	7
		6%	4%	4%	14%
	Total	9	32	9	50
		18%	64%	18%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values. A = anxious-avoidant; B = secure; C = anxious-resistant. Pearson χ^2 (4) = 5.92, *ns.*

Table 5

Two-way Contingency Table for Two-way Secondary Attachment Classifications of First-and Second-born Siblings

		Second-born sibling		
		Secure	Insecure	Total
	Secure	22 (19.8)	9 (11.2)	31
Firstborn		44%	18%	62%
sibling	Insecure	10 (12.2)	9 (6.8)	19
		20%	18%	38%
	Total	32	18	50
		64%	36%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values.

Insecure = anxious-avoidant and anxious-ambivalent groups combined. Pearson χ^2 (1) = 1.72, *ns*.

interaction with their first- and second-born children. Maternal sensitivity was significantly related across siblings in the overall sample ($r = .59, p < .01$), in families where siblings' attachments were concordant ($r = .59, p < .01$), and in families where siblings' attachments were non-concordant ($r = .54, p < .01$).

Differences in global sensitivity by birth order and infant attachment security were examined using a 2 (birth order) x 2 (secure/insecure secondary classification) analysis of variance (ANOVA). Descriptive statistics are provided in Table 6. There was no significant interaction between birth order and attachment security, but significant main effects were found for each (see Table 7). Mothers interacted more sensitively with their firstborn infants, and with infants classified as securely attached.

Next, the association of maternal sensitivity to birth order and sibling attachment concordance was examined with a 2 (birth order) x 4 (attachment concordance) ANOVA. Prior to this analysis being conducted, each child's attachment classification was examined along with the classification of his/her sibling to assign that child to one of four groups: S(S), in which that child and his sibling were both classified secure; S(s), in which that child was secure and his sibling was insecure; s(S), in which that child was insecure and his sibling was secure; and s(s), in which that child and his sibling were both classified insecure. Thus, this analysis would reveal whether maternal sensitivity varied not only as a function of the target infant's attachment status, but also in relation to his or her sibling's attachment status; furthermore, including birth order allowed for a comparison of whether patterns of sensitivity differ depending on whether the target child is the first- or second-born in the family. Descriptive statistics for each concordance group are shown in Table 8.

Table 6

Means and Standard Deviations of Global Sensitivity Scores for First- and Second-born Siblings by Two-way Secondary Attachment Classifications

	Sensitivity score M (SD)			Group size		
Attachment Security	First	Second	Total	First	Second	Total
Secure	.56 (.47)	.37 (.51)	.46 (.50)	31	32	63
Insecure	.30 (.64)	-.01 (.63)	.15 (.64)	19	18	37
Total	.46 (.55)	.24 (.58)	.35 (.57)	50	50	100

Note. First = firstborn; Second = second-born. Insecure = anxious-avoidant and anxious-ambivalent groups combined. Sensitivity scores range from -1.0 to 1.0.

Table 7

Analysis of Variance for Differences in Global Sensitivity Scores by Birth Order and Attachment Security

Source	$F(1, 96)$	p	η^2
Birth order (B)	4.53**	.04	.05
Attachment security (A)	7.76***	.01	.08
B x A	0.24	.63	.00

Note. N = 100 mother-infant dyads. η^2 refers to partial eta-squared, a measure of effect size that represents the proportion of variance accounted for. Attachment security represents two-way (secure/insecure) secondary attachment classifications.
**$p < .05$. ***$p < .01$.

Table 8

Means and Standard Deviations of Global Sensitivity Scores for First- and Second-born Siblings by Four-way Concordance Groups

Concordance	Sensitivity score M (SD)			Group size		
group	First	Second	Total	First	Second	Total
S (S)	.63 (.38)	.46 (.42)	.55 (.41)	22	22	44
S (s)	.38 (.63)	.16 (.65)	.27 (.63)	9	10	19
s (S)	.44 (.60)	.02 (.68)	.24 (.63)	10	9	19
s (s)	.13 (.67)	-.24 (.58)	.05 (.66)	9	9	18
Total	.46 (.55)	.24 (.58)	.35 (.57)	50	50	100

Note. First = firstborn; Second = second-born. S (S) represents securely attached infants with a securely attached sibling; S (s) represents securely attached infants with an insecurely attached sibling; s (S) represents insecurely attached infants with a securely attached sibling; s (s) represents insecurely attached infants with an insecurely attached sibling. Sensitivity scores range from -1.0 to 1.0.

This 2 x 4 ANOVA revealed no significant interaction between birth order and concordance group; however, there were significant main effects for each (see Table 9). Mothers interacted more sensitively with their firstborn children. To examine the main effect for concordance group, Tukey's tests were conducted to evaluate pair-wise differences among mean group sensitivity scores. Maternal sensitivity scores associated with the s(s) group were significantly lower ($p < .05$) than the other three groups, whose scores did not significantly differ. That is, mothers interacted less sensitively towards insecurely attached infants who also had an insecurely attached sibling, compared to mothers of securely attached infants, regardless of sibling attachment status, and mothers of insecurely attached infants with a securely attached sibling.

Finally, a 2 (secure/insecure secondary classification) x 2 (sibling attachment concordance) ANOVA was conducted to examine differences in maternal sensitivity by attachment security and sibling attachment concordance. Here, a two-way grouping of sibling attachment concordance was used instead of the four-way grouping outlined above to maintain a satisfactory number of dyads in each group. Descriptive statistics are shown in Table 10. The interaction was significant, indicating that the association between maternal sensitivity and attachment security differed depending on concordance group, and vice versa (see Table 11). The main effect for attachment security was significant, indicating that mothers interacted more sensitively with securely attached infants than with insecurely attached infants. The main effect for concordance group was not significant; mothers interacted no more sensitively towards infants whose attachment security was the same as their siblings' than they did towards infants whose attachment security differed from their siblings. Thus, while mothers interacted more sensitively

Table 9

Analysis of Variance for the Association of Birth Order and Attachment Concordance with Global Sensitivity

Source	df	F	p	η^2
Birth order (B)	1	4.19**	.04	.04
Concordance group (C)	3	4.11***	.01	.19
B x C	3	0.27	.85	.01
Error	92			

Note. N = 100 mother-infant dyads. Analysis is based on four-way groupings of sibling attachment concordance, as determined by siblings' two-way secondary attachment classifications. η^2 refers to partial eta-squared, a measure of effect size that represents the proportion of variance accounted for.

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

Table 10

Means and Standard Deviations of Global Sensitivity Scores for First- and Second-born Siblings by Attachment Security and Attachment Concordance

	Sensitivity score M (SD)			Group size		
Attachment Security	C	NC	Total	C	NC	Total
Secure	.55 (.41)	.27 (.63)	.46 (.50)	44	19	63
Insecure	.05 (.66)	.24 (.63)	.15 (.64)	18	19	37
Total	.40 (.54)	.25 (.62)	.34 (.57)	62	38	100

Note. Attachment security is based on two-way (secure/insecure) secondary attachment classification. Insecure = Anxious-avoidant and Anxious-resistant groups combined. C = concordant patterns of attachment across siblings; NC = non-concordant patterns of attachment across siblings. Sensitivity scores range from -1.0 to 1.0.

Table 11

Analysis of Variance for Differences in Global Sensitivity Scores by Attachment Security and Sibling Attachment Concordance

Source	*df*	*F*	η^2	*p*
Attachment security (A)	1	4.82**	.05	.03
Concordance group (C)	1	0.14	.00	.71
A x C	1	4.05**	.04	.05
Error	96			

Note. N = 100 mother-infant dyads. Attachment security is based on two-way

(secure/insecure) secondary attachment classifications. Concordance group is two-way

(concordant or non-concordant). η^2 refers to partial eta-squared, a measure of effect size

that represents the proportion of variance accounted for.

**$p < .05$.

towards their securely attached infants overall, the extent of the difference in sensitivity associated with secure versus insecure attachment depended on whether infants' attachment security was concordant with that of their siblings' (see Figure 1).

Domains of Maternal Interactive Behaviour and Sibling Attachment Concordance

Pearson product-moment correlations were used to determine the extent to which the nine domains of maternal interactive behaviour were associated across siblings in the overall sample. In general, maternal interactive content was similar across siblings on all domains except Facilitation of Exploration and Learning (see Table 12).

Dyads were then separated into concordant and non-concordant groups, depending on whether siblings' patterns of attachment were the same or different. Descriptive statistics for domain scores in concordant and non-concordant families are shown in Table 13. Again, Pearson product-moment correlations were used to determine the extent to which the content of maternal interaction was similar across siblings in concordant and non-concordant groups (see Table 14). In families where sibling attachments were concordant, maternal interactive behaviour was correlated on only three domains: Awareness, Comfort with Physical Contact, and Engagement. In families where sibling attachments were non-concordant, maternal interactive behaviour was correlated on all domains, with the exception of Facilitation of Exploration and Learning.

The domain score correlations that emerged in the above analysis were converted into Fisher's z-scores and compared to test whether the correlation of mothers' domain scores for first- and second-born children differed significantly between families where sibling attachment was concordant versus non-concordant. Two domains emerged as

Figure Caption

Figure 1. Differences in maternal global sensitivity scores by infant attachment security

and sibling attachment concordance.
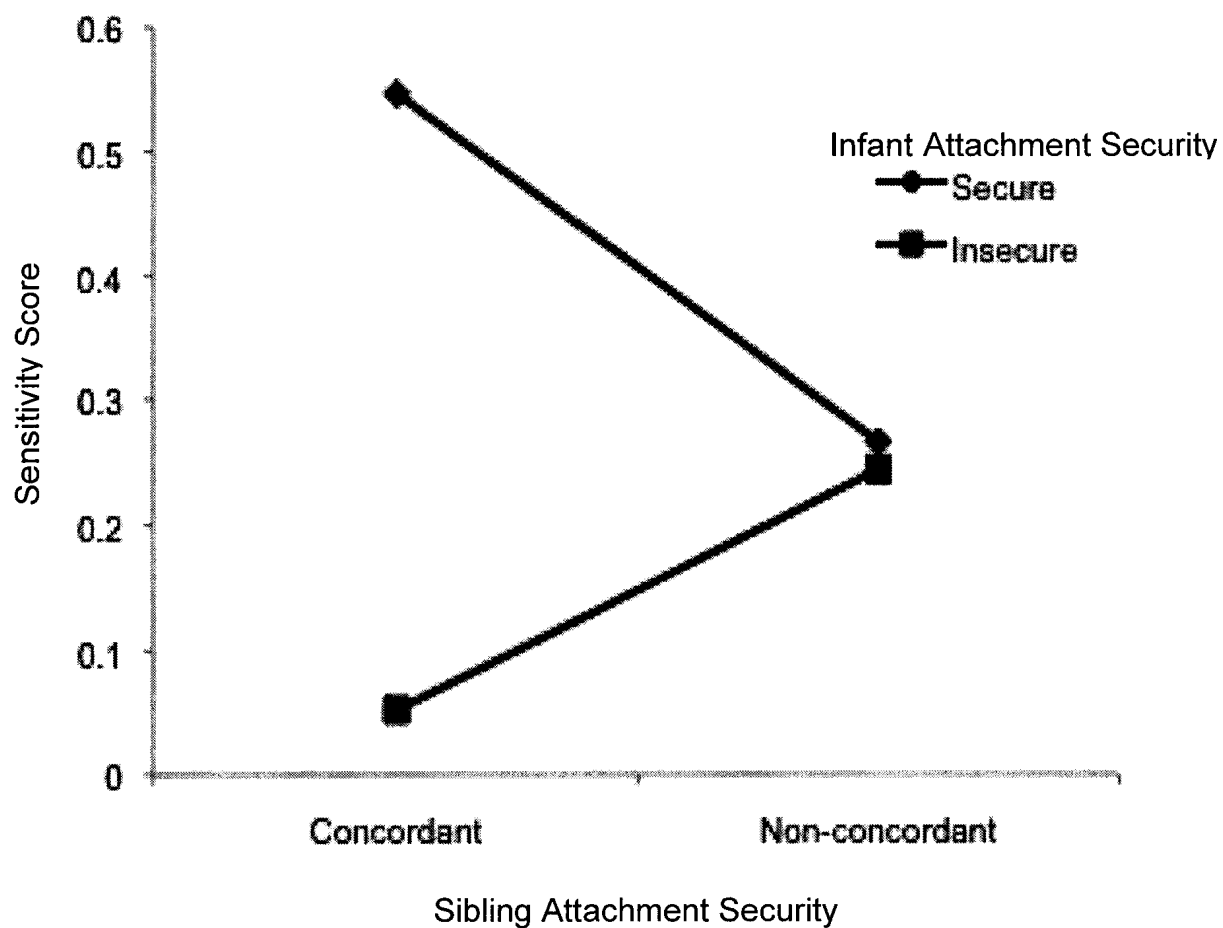
Note. *N*concordant/secure = 37 mother-infant dyads; *N*concordant/insecure = 15; *N*non-concordant/secure = 16, *N* = non-concordant/insecure = 17. Sensitivity scores range from 1.0 to -1.0. Attachment security is based on two-way (secure/insecure) secondary attachment classifications.

Table 12

Means, Standard Deviations, and Correlations Across Siblings on Domains of Maternal Interactive Behaviour

	Domain score M (SD)			
Domain	First	Second	Total	r
Awareness	5.98 (1.98)	5.31 (2.17)	5.66 (2.03)	.61***
Effectiveness	6.09 (2.05)	5.41 (2.39)	5.75 (2.19)	.48***
Pos. Affect	6.21 (1.82)	6.07 (1.93)	6.18 (1.85)	.54***
Rejection	5.98 (1.71)	6.15 (1.98)	6.13 (1.81)	.47***
Synchrony	5.90 (1.62)	5.49 (1.87)	5.72 (1.74)	.64***
Controlling	5.95 (1.36)	5.66 (1.48)	5.81 (1.46)	.48***
Learning	5.69 (1.39)	5.01 (1.26)	5.40 (1.31)	.31
Comfort	5.92 (1.95)	6.17 (2.48)	6.12 (2.19)	.52***
Engagement	5.95 (1.13)	5.64 (1.14)	5.75 (1.13)	.54***

Note. N = 38 sibling pairs. First = firstborn; Second = second-born. Domain scores range from 1 to 9.

***$p < .01$.

Table 13

Means and Standard Deviations of Scores on Domains of Maternal Interactive Behaviour for Concordant and Non-concordant Siblings

Domain score

M (SD)

Domain	Concordant		Non-concordant	
	First	Second	First	Second
Awareness	6.53 (1.87)	6.17 (1.71)	5.53 (1.99)	4.62 (2.29)
Effectiveness	6.50 (1.96)	6.04 (2.17)	5.76 (2.11)	4.90 (2.48)
Pos. Affect	6.63 (1.66)	6.75 (1.47)	5.87 (1.92)	5.53 (2.12)
Rejection	6.46 (1.49)	6.71 (1.55)	5.60 (1.83)	5.70 (2.21)
Synchrony	6.33 (1.50)	6.07 (1.53)	5.56 (1.68)	5.02 (2.02)
Controlling	6.40 (0.91)	6.08 (1.35)	6.51 (1.57)	5.33 (1.52)
Learning	6.03 (1.22)	5.13 (1.39)	5.42 (1.48)	4.91 (1.17)
Comfort	6.27 (2.09)	7.09 (1.91)	5.64 (1.84)	5.43 (2.68)
Engagement	6.24 (1.13)	6.03 (0.93)	5.71 (1.10)	5.32 (1.22)

Note. N = 38 sibling pairs. First = firstborn; Second = second-born. Domain scores range from 1 to 9.

Table 14

Correlations Across Siblings on Domains of Maternal Interactive Behaviour for Concordant and Non-Concordant Siblings

Domain	Concordant	Non-concordant	Z-score of difference between correlations
Awareness	.62***	.55***	.33
Effectiveness	.34	.53***	-0.68
Pos. Affect	.45	.54***	-0.32
Rejection	.08	.59***	-1.69*
Synchrony	.48	.68***	-0.86
Controlling	.07	.60***	-1.75*
Learning	.33	.28	0.17
Comfort	.51**	.52***	-0.02
Engagement	.58**	.46**	0.47

Note. N = 38 sibling pairs. Concordance is based on siblings' two-way (secure/insecure) secondary attachment classifications.

*p < .10. **p < .05. ***p < .01.

more highly correlated across siblings in non-concordant families: Rejection and Controlling/Interfering. It must be noted, however, that a Bonferroni correction was not applied here because of the exploratory nature of the present study. Because this correction is intended to control the familywise error rate and reduce the possibility of false positives, the results of this analysis must be interpreted with caution.

Three multivariate analyses of variance (MANOVAs) replicated the analyses examining global sensitivity, as outlined in the previous section, to examine differences in the content of maternal interaction across birth order, attachment security, and sibling attachment concordance. Pillai's trace, which represents the pooled effect variances, was used as a test statistic in all MANOVAs; although this statistic is less powerful than others, it is considered more robust and is recommended when sample sizes are relatively small, groups have unequal ns, and the homogenetity of variance-covariance assumption is violated (Tabachnick & Fidell, 2007).

The first MANOVA investigated the association of maternal interactive content to birth order and attachment security using a 2 (birth order) x 2 (secure/insecure secondary attachment classification) design. Box's Test of Equality of Covariance Matrices was used to determine whether the null hypothesis that covariance matrices were drawn from populations with identical covariance matrices could be rejected. This test was significant, $F(135, 9188.98) = 1.41$, $p < .001$, indicating that the null hypothesis could be rejected. The multivariate interaction and main effect for attachment security were not significant. However, the effect for birth order was significant, Pillai's Trace = .27, F (9, 73) = 3.06, $p < .01$, $\eta^2 = .28$. When this effect was examined further to determine which

domains differed by birth order, however, no significant differences emerged. Thus, differences between the content of maternal interaction with first- versus second-born siblings were seen when domain scores are combined linearly, but not when each domain was examined separately.

The second MANOVA examined the relationship of maternal interactive content to birth order and sibling attachment concordance using a 2 (birth order) x 4 (4-way concordance group) design. Box's Test was not significant, F (45, 3434.28) = 1.15, ns, indicating that the null hypothesis could not be rejected. The multivariate interaction and effect for concordance group were not significant, but the main effect for birth order was significant, Pillai's Trace = .28, F (9, 69) = 2.93, p <.01, η^2 = .28 . Again, however, when this main effect was examined further, no domains emerged as being significantly different across first- and second-born siblings.

A final MANOVA examined the association of maternal interactive content to sibling attachment concordance and attachment security using a 2 (2-way concordance group) x 2 (secure/insecure secondary classification) design. Box's test of Equality of Covariance Matrices was not significant, F(135, 7658.84) = 1.03, ns, indicating that the null hypothesis could not be rejected. The multivariate interaction and main effect for attachment security were not significant; however, the main effect for concordance group approached significance, Pillai's Trace = .19, F (9, 73) = 1.92, p < .06, η^2 = .19. This effect was investigated further by examining the associated univariate F-ratios.

In general, univariate F-ratios in a multivariate analysis should not be interpreted in the absence of a significant multivariate test (Gardner & Tremblay, 2007). It is possible, however, that the lack of a significant multivariate effect in these instances is

not due to the actual absence of an effect; instead, this outcome may occur because testing multiple dependent variables lowers the power of a multivariate analysis, causing significance to be lost (Tabachnick & Fidell, 2007). Thus, in these cases, and especially in exploratory research, it is recommended that the univariate results should be reported to inform and guide future research, although caution should be used in interpreting them (Tabachnick & Fidell, 2007). Accordingly, univariate F-ratios for the nearly-significant multivariate effect for concordance group were examined here. It appeared that mothers of siblings with concordant attachments were rated as significantly higher on seven domains: Awareness, Response Effectiveness, Positive Affect, Rejection, Synchrony, Comfort with Physical Contact, and Engagement (see Table 15).

Maternal Attachment Representations and Concordance in Sibling Attachment Relationships

Mothers' AQS scores, reflecting their perceptions of the attachment relationship shared with each of their children, were compared across siblings to determine if the extent to which they viewed their children as "prototypically secure" varied by birth order. Descriptive statistics are presented in Table 16. A paired-samples t-test indicated that there were no significant differences in AQS scores between first- and second-born siblings in the sample overall, $t(42) = .05$, *ns*. Furthermore, were there no differences when families were separated into concordant, $t(18) = .36$, *ns*, and non-concordant, $t(23) = -0.30$, *ns*, groups.

Pearson product-moment correlations were conducted to examine the association between mothers' representations of their relationships with each child (see Table 16).

Table 15

Comparison of Mean Levels of Maternal Interactive Content for Concordant and Non-concordant Siblings

	Concordance Group			
Domain of Interactive Behaviour	Concordant M (SD)	Non-concordant M (SD)	$F(1, 81)$	Effect size (η^2)
Awareness	6.12 (1.81)	4.96 (2.19)	6.84**	.08
Effectiveness	6.32 (2.00)	4.85 (2.20)	8.93***	.10
Affect	6.72 (1.57)	5.33 (1.95)	10.82***	.12
Rejection	6.65 (1.48)	5.31 (1.99)	10.38***	.11
Synchrony	6.10 (1.54)	5.12 (1.90)	5.46**	.06
Controlling	6.06 (1.34)	5.41 (1.59)	3.07	.04
Learning	5.62 (1.29)	5.04 (1.29)	3.61	.04
Comfort	6.67 (1.92)	5.26 (2.34)	8.08***	.09
Engagement	6.02 (1.09)	5.30 (1.13)	8.66***	.10

Note. F-ratios represent univariate effects related to a near-significant multivariate effect. N = 38 sibling pairs. Domain scores range from 1 to 9. η^2 refers to partial eta-squared, a measure of effect size that represents the proportion of variance accounted for. **$p < .05$. ***$p < .01$.

Table 16

Descriptive Statistics and Correlations Across Siblings for Maternal Attachment Q-Set Scores

| | AQS score | | | | |
| | M (SD) | | Group size | | |
Group	First	Second	First	Second	r
Overall	.38 (.21)	.38 (.21)	45	48	.46***
Concordant	.39 (.17)	.38 (.23)	21	23	.39
Non-concordant	.36 (.23)	.38 (.20)	24	25	.53**

Note. Concordance is based on siblings' two-way (secure/insecure) secondary attachment classifications. First = firstborn; Second = second-born. AQS scores range from -1.0 to 1.0.

***$p < .01$.

Overall, relationship-specific state of mind was associated across siblings. Mothers of siblings with non-concordant attachment relationships also demonstrated an association in their attachment representations regarding each child; mothers of siblings with concordant attachments, however, did not evidence such an association.

A 2 (birth order) x 4 (attachment concordance) ANOVA was conducted to determine whether maternal state of mind regarding each child varied by birth order and/or the attachment security of the child and his/her sibling. There was no significant interaction or main effects; maternal AQS scores did not differ significantly by birth order and/or sibling attachment concordance, $F(3, 85) = 0.95$, ns, $\eta^2 = .03$.

Gender and Concordance in Sibling Attachment Relationships

Two-way contingency table analyses evaluated patterns in sibling attachment concordance in families with same- and different-gendered children. Again, estimates of concordance were based on two-way (secure or insecure) secondary attachment classifications. The classifications of siblings in both gender-concordant and non-concordant groups were not related (see Tables 17 and 18). A two-way contingency table analysis also examined the frequency of sibling attachment concordance in same- and different-gendered groups; concordance was not related to correspondence in sibling gender (see Table 19).

Pearson product-moment correlations examined the degree to which mothers of same- and different-gendered siblings were similar in the overall sensitivity and content of their interactions with each child (see Table 20). In families with same-gendered siblings, mothers' global sensitivity and the content of their interactions on all domains of

Table 17

Two-way Contingency Table for Two-way Secondary Attachment Classifications of Same-gendered Siblings

		Second-born sibling		
		Secure	Insecure	Total
	Secure	9 (7.5)	2 (3.5)	11
Firstborn		41%	9%	50%
sibling	Insecure	6 (7.5)	5 (3.5)	11
		27%	23%	50%
	Total	15	7	22
		68%	32%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values.

Insecure = anxious-avoidant and anxious-ambivalent groups combined. Pearson χ^2 (1) = 1.89, *ns*.

Table 18

Two-way Contingency Table for Two-way Secondary Attachment Classifications of Different-gendered Siblings

		Second-born sibling		
		B	Not B	Total
Firstborn	B	13 (12.1)	7 (7.9)	20
		46%	25%	71%
sibling	Not B	4 (4.9)	4 (3.1)	8
		14%	14%	29%
	Total	17	11	28
		61%	39%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values.

Insecure = anxious-avoidant and anxious-ambivalent groups combined. Pearson χ^2 (1) = 0.54, *ns*.

Table 19

Two-way Contingency Table for Sibling Attachment Concordance in Same- and Different-gendered Siblings

| | | Concordance | | Total |
		C	NC	
Gender Correspondence	Same	12 (11)	10 (11)	22
		24%	5%	44%
	Different	13 (14)	15 (14)	28
		14%	30%	56%
	Total	25	25	50
		50%	50%	

Note. Expected values are presented in parentheses beside the observed values.

Concordance rates in percentages are presented below the observed/expected values. C = concordant; NC = non-concordant. Pearson χ^2 (1) = 0.33, *ns*.

Table 20

Correlations Between Global Sensitivity and Domains of Interactive Behaviour for Mothers of Same- and Different-gendered Siblings

Aspect of maternal interaction	Sibling gender correspondence		Z-score of difference between correlations
	Same	Different	
Global sensitivity	.62***	.57***	0.25
Awareness	.82***	.37	2.53***
Effectiveness	.73***	.23	2.26**
Affect	.65***	.52**	0.65
Rejection	.75***	.26	2.30***
Synchrony	.72***	.58***	0.79
Controlling	.54**	.46**	0.31
Learning	.61***	.10	1.99***
Comfort	.78***	.21	2.70**
Engagement	.63***	.45**	0.84

Note. N = 38 sibling pairs.

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

behaviour were significantly associated across domains. In families with different-gendered siblings, mothers' overall sensitivity was related across children; however, the content of their interactions was associated on only four of the nine domains: Positive Affect, Synchrony, Controlling/Interfering, and Engagement.

Correlations, again, were converted into Fisher's z-scores and compared to test whether the correlation of mothers' global sensitivity and domain score differed significantly between families where sibling gender was the same or different. Compared to mothers of different-gendered siblings, those with same-gendered children interacted more similarly across siblings on five domains of interactive behaviour: Awareness, Response Effectiveness, Rejection, Facilitation of Exploration and Learning, and Comfort with Physical Contact. Here, again, a Bonferroni correction was not applied because of the exploratory nature of this research; thus, these findings must be interpreted with caution.

A 2 (gender) x 2 (gender correspondence) x 2 (attachment concordance) MANOVA examined the association of global sensitivity and maternal interactive content to infant gender, the correspondence of his/her gender to that of his/her sibling's, and the concordance of their attachment relationships. Box's test was not significant, F (220, 6904.86) = 1.13, ns; the null hypothesis that covariance matrices were drawn from populations with identical covariance matrices could not be rejected. The effect for gender approached significance, Pillai's trace = .21, $F(10, 68) = 1.79, p < .08$. This finding suggests that mothers may differ in their interactive behaviour towards male versus female infants. The multivariate effect for attachment concordance also approached significance, Pillai's trace = .21, $F(10, 68) = 1.78, p < .08$.

Again, although these univariate F-ratios traditionally should not be interpreted in the presence of a non-significant multivariate effect, the near-significant effects for gender and attachment concordance were examined here because of the exploratory nature of the present study. None of the univariate F-ratios were significant, however, indicating that mothers did not interact differently with male versus female, or concordant versus non-concordant, siblings on any particular domain of interactive behaviour.

Mothers' relationship-specific attachment representations were also examined across gender to determine whether mothers perceived their relationships differently with each child depending on his/her gender and the gender of his/her sibling. There were no systematic differences in how mothers perceived their relationships with male versus female infants, $t(91) = 1.13$, ns. However, Pearson correlations indicated that mothers' representations were associated across siblings when infants were of the same gender ($r = .66$, $p < .01$), but not when they were different genders ($r = .34$, ns).

Several ANOVAs were conducted to determine whether maternal AQS scores varied by infant gender and the within-family context. A 2 (gender) x 2 (sibling gender correspondence) ANOVA examined whether representations varied according to the gender of the infant, and the gender correspondence of the sibling pair. No significant differences were found, $F(3, 89) = 0.43$, ns, $\eta^2 = .01$. Another ANOVA, using a 2 (birth order) x 2 (sibling gender correspondence) design, investigated whether there were differences in representations depending on sibling gender concordance and the order in which infants of each gender were born. No differences across first- and second-born

siblings in same- and different-gendered families were found, $F(1, 89) = .23$, *ns*, $\eta^2 = .003$.

Discussion

The purpose of this study was to explore the patterns of attachment shared between siblings and their common mother in a low-risk, community sample. This study also examined the extent to which several variables – maternal sensitivity, interactive behaviour, and attachment representations, as well as sibling gender – might account for similarities or differences in patterns of attachment across siblings.

A Return to the Study's Major Objectives and Hypotheses

The first objective of this study was to examine concordance in sibling attachment relationships; that is, the extent to which the attachment relationships that siblings share with their common mother are the same or different. Further, this study aimed to determine whether sibling patterns of attachment appeared more similar when disorganization was included as a pattern of infant attachment upon which estimates of concordance were based. It was hypothesized that including this category would reflect more similarity in patterns of attachment across siblings because comparisons could then be based on infants' primary (versus alternate, "best fitting") styles of attachment. This hypothesis, however, was not supported. When disorganization was included as a basis for comparison of attachment styles across siblings, rates of similarity were substantially lower than when estimates were based on secondary classifications.

Second, this study aimed to explore patterns of maternal sensitivity associated with variation in the quality of siblings' attachment relationships. Based on the theoretical and empirical link between maternal sensitivity and attachment security, it was predicted that interactions between mothers and their securely attached infants would be characterized as more sensitive than the interactions between mothers and their

insecurely attached infants. This hypothesis was not entirely supported. Mothers interacted more sensitively with securely attached infants – regardless of whether these infants had a securely- or insecurely-attached sibling – than with insecurely attached infants who also had an insecurely attached sibling. However, the sensitivity of mothers in interaction with securely attached infants was not different from the sensitivity displayed by mothers in interaction with insecurely attached infants who had a securely attached sibling. This finding suggested that maternal sensitivity, when viewed globally as a characteristic of dyadic interaction, cannot sufficiently account for the full within family variation in the quality of siblings' attachment relationships.

To further investigate other aspects of maternal interactive behaviour that might account for variation in sibling attachment relationships, this study assessed the content of maternal interactive behaviour to determine if specific aspects of mother-infant interactions varied systematically with similarities or differences in sibling attachment relationships. This feature of the present study represents a novel way of characterizing maternal behaviour, as the content of interaction is not typically a focus of traditional attachment theory or research. It was expected that the content of mothers' interactions across siblings would be similar when the quality of their attachment relationships was the same, and that content would diverge in families where siblings' attachment relationships were different. Results suggest, however, that the opposite is true. Mothers of infants who shared the same attachment relationships with her interacted in ways that differed markedly from child to child; that is, the content of their interactions with each was quite different. The interactive content of mothers whose children displayed different attachment relationships, however, was highly consistent across siblings. Clearly, just as

was the case when examining maternal sensitivity, variation in the content of maternal interaction appears to play a more complex role in accounting for sibling attachment concordance than would be predicted theoretically.

Third, this study investigated the extent to which mothers' mental representations of their relationships with each child were related to similarities or differences in the attachment relationships shared with their children. Attachment theory suggests that relationship-specific representations guide mothers' interactions with their children, which subsequently relate to attachment security; thus, it was expected that similarity in the mothers' perceptions of their relationship with each child would be associated with similarity in the quality of the attachment relationship across siblings. In fact, here too, the opposite was found: mothers of siblings who demonstrated different patterns of attachment perceived their relationship with each child similarity, whereas mothers whose children demonstrated the same patterns of attachment indicated that they viewed their relationship with each child differently.

Finally, this study sought to replicate the finding from previous research (van IJzendoorn et al., 2000) that siblings of the same gender are more likely to demonstrate a similar quality of attachment to their common mother than are siblings of different genders. This trend was not apparent in the current sample; attachment security was not related across siblings, regardless of whether gender was the same or different. Nevertheless, as much of the present study was exploratory, gender differences in maternal sensitivity, the content of maternal interactive behaviour, and relationship-specific attachment representations were still examined. It was expected that mothers of same-gendered infants would demonstrate similarity in both their interactive content and

in their representations of their relationships across siblings, whereas mothers of infants

of different genders would show more variability. These hypotheses were supported;

mothers of same-gendered siblings viewed their attachment relationships significantly

more similarly, and demonstrated more consistency in the content of their interactions,

than did mothers whose children were different genders.

Patterns of Concordance in Sibling Attachment Relationships

An overarching goal of this research was to extend findings from previous studies

suggesting that the patterning of attachment relationships shared between siblings and

their common mother is not as straightforward as predicted by attachment theory, which

posits a high degree of similarity. This study explored the correspondence between

siblings' attachment relationships in several ways; however, regardless of whether

siblings were compared according to their primary four-way (avoidant, secure,

ambivalent, or disorganized) or three-way (secure, insecure, or disorganized)

classifications, patterns of attachment were not related. When a four-way grouping was

used, concordance was consistent with previous research (40%, which is slightly less than

the estimate of 44% reported by van IJzendoorn et al. [2000]). When infants were

grouped according to three-way (avoidant, secure, and ambivalent) secondary attachment

classifications, concordance between siblings increased to 50%, although significant

associations were still not found. This rate is consistent with estimates from previous

research that also grouped siblings according to three-way secondary classifications (e.g.

57%, in Ward, Vaughn, & Robb, 1988; and 49% in van IJzendoorn et al.) and found no

significant associations in patterns of attachment (van IJzendoorn et al.). When siblings

were categorized according to two-way (secure or insecure) classifications, concordance

further increased to 62%. This rate is identical to that reported by van IJzendoorn et al.; however, unlike van IJzendoorn et al.'s study, no significant association between siblings was found. It is noteworthy that the van IJzendoorn et al. study combined samples from three different research groups, one of which included all but four families involved in the present study, suggesting that perhaps the lack of a significant association between siblings' two-way secondary classifications is due to factors such as sample size rather than a true absence of relationship.

Initially, it was hypothesized that basing estimates of concordance on siblings' primary attachment classifications, including disorganizaton, would increase the similarity in patterns of attachment across siblings. In this low-risk sample, however, it appeared that incorporating disorganization actually resulted in siblings appearing more dissimilar in their attachment relationships. Rather, secondary classifications (i.e. the best-fitting "organized strategy" underlying the relationships of infants categorized as disorganized) appeared to provide a better indication of coherence in patterns of attachment across siblings. This finding supports the notion that disorganization is a characteristic of the attachment relationship that is orthogonal to the organized strategies, arising from experiential origins that are distinct from the continuum of maternal sensitivity associated with attachment security (Main & Hesse, 1990; Moran, Forbes, Evans, Tarabulsy, & Madigan, 2008). Further, these results indicate that, despite an infant's disorganized status, his secondary classification is still a valid and coherent characterization of the fundamental strategy that underlies his attachment relationship.

Even when classifying attachment security such that concordance across siblings was at its highest (i.e. 62%, using two-way secondary classifications), fully 38% of

siblings in this sample shared different attachment relationships with their common mother; this number increased further still depending on how siblings' attachment relationships were grouped. Evidently, these results are not in support of a straightforward interpretation of traditional attachment theory, which would predict much higher rates of concordance when two children are in relationships with the same mother. Indeed, there appears to be a significant amount of dissimilarity in sibling relationships that is unexpected and cannot be easily accounted for by way of a simple rendition of attachment theory.

As previously outlined, theory predicts that children should experience the same quality of attachment with their common mother when two factors remain constant: her attachment representations, and her interactive style, which arises in part from these representations. Findings from this research strongly suggest that a straightforward pathway between these elements of the attachment relationship does not exist, particularly within a triadic context. However, examining how each diverges from theoretical prediction, as discussed below, may provide important insight into how and why non-concordance in sibling attachment relationships appears to exist in a substantial proportion of families.

Using Maternal Sensitivity and the Content of Maternal Interactive Behaviour to Understand Sibling Attachment Non-concordance

Having reconfirmed, then, that the quality of siblings' attachment relationships often diverges, this study aimed to understand these differences by examining aspects of the non-shared environment that may account for differences between siblings. This approach is consistent with a behavioural-genetics perspective, which suggests that the

most reasonable way to account for differences among siblings is to first examine the

impact of experiences that differ for each child (e.g. differential treatment by parents),

instead of searching for mechanisms within shared experiences (Plomin, Asbury, &

Dunn, 2001).

The first aspect of the within-family experience to be examined in the present

study was maternal sensitivity, or mothers' overall ability to tailor their interactions with

each child to suit his or her individual needs (de Wolff & van IJzendoorn, 1997). Initially,

it appeared that, for the sample as a whole, maternal sensitivity followed a pattern that

was somewhat consistent with attachment theory. That is, high sensitivity was associated

with attachment security, while low sensitivity was associated with insecurity. Further,

when sensitivity was examined in the context of sibling attachment concordance, a

pattern that corresponded somewhat to attachment theory also seemingly emerged:

mothers appeared to interact most sensitively with securely attached infants who had a

securely attached sibling, followed by securely attached infants with an insecurely

attached sibling, then insecurely attached infants with a securely attached sibling, and

finally insecurely attached infants with an insecurely attached sibling. Upon closer

examination, however, this apparent confirmation of theoretical predictions proved

considerably more complex. In terms of statistically significant differences, the latter

group – insecurely attached infants with an insecurely attached sibling – was the only one

distinguishable from the rest. That is, mothers interacted equally sensitively towards

securely attached infants (regardless of whether they had a securely or insecurely

attached sibling) as they did towards insecurely attached infants who had a securely

attached sibling. Further, in all three of these groups, the degree of sensitivity with which

mothers interacted was higher than that observed in mothers who had insecure relationships with both of their children. This trend was maintained for first- and second-born infants, although mothers were more sensitive overall towards first-borns. Thus, despite mothers interacting in ways that appear equally sensitive, some infants were securely attached, while others were insecurely attached. While the former is expected, given the theoretical link between sensitivity and attachment security (van IJzendoorn, 1995), the latter most emphatically is not.

One potential explanation for these puzzling results lies in a theory suggested by Belsky (1997), which proposed that it may make evolutionary sense for parents to bear children that vary in their capacity to be securely attached, and in the degree to which they are influenced by their rearing environment. When applied to the findings of the present study, this model appears to account for the differential impact of consistent levels of maternal sensitivity on siblings with non-concordant patterns of attachment. Alternatively, there is some indication in our results that the occurrence of a secure mother-infant relationship in some families modifies the link between maternal interaction and the nature of the attachment relationship for the other child. That is, the insecurely attached child whose sibling has a secure relationship with their mother has formed an insecure relationship in spite of the fact that the mother treats him or her in a relatively sensitive manner. What remains unexplained, however, is why relatively consistent levels of maternal sensitivity across siblings are associated with two securely attached children in some families, and one securely attached and one insecurely attached child in others.

To further explore aspects of siblings' non-shared environments that may account for variation in patterns of attachment across families, this study also examined the content of mothers' interactions with each of their children via nine domains of interactive behaviour. Here, distinct trends emerged that distinguished between families in which siblings shared the same (i.e. concordant) attachment relationships with their common mother, and families in which attachment relationships were different (i.e. non-concordant). Mothers whose children were concordant interacted very differently with each child; that is, the content of their interactions varied substantially across siblings. In particular, mothers interacted differently towards each child in terms of their response effectiveness, positive affect, rejection, synchrony, controlling/interfering, and facilitation of exploration and learning. Mothers whose children were non-concordant, on the other hand, demonstrated a very similar content of interaction with each child on nearly all aspects of interactive behaviour.

As previously discussed, numerous studies support the existence of differences in how mothers interact towards siblings; indeed, differences in some aspects of interaction have been documented when siblings were as young as two months of age (Moore, Cohn, & Campbell, 1997). The current study was the first to examine these variations in the context of the attachment relationships that exist within families, and suggests that they may be central in elucidating aspects of the non-shared environment associated with sibling attachment concordance. More specifically, it seems that mothers of concordant siblings differ from those of non-concordant siblings in the extent to which their interactive style is flexible across children. Mothers of siblings with the same attachment relationships appear to modify the content of their interactions to suit – or fail to suit –

the unique characteristics of each child, ultimately promoting the development of the same pattern of attachment (whether secure or insecure) with each. On the other hand, mothers of siblings with different patterns of attachment seem quite inflexible in the content of their interactions, applying a rigid pattern of interaction across children without apparent regard to individual differences between them. These trends are contrary to the theoretical prediction that similar styles of maternal interaction lead to a similar quality of attachment. In fact, paradoxically, it appears that different patterns of maternal interaction are associated with similarity in sibling attachment relationships, and vice versa.

Not only does examining the content of maternal interaction provide insight into how interactions may differ across concordant and non-concordant families, but it also appears to account for some likelihood of concordance in sibling attachment that cannot be explained by global sensitivity. For instance, we can explore, for illustrative purposes, the fact that mothers' overall degree of sensitivity towards secure infants, and towards insecurely attached infants with a securely attached sibling, were relatively similar. However, the patterns of behaviour underlying these "sensitive interactions" appeared substantially different depending on the concordance of siblings' attachment relationships. First, in families where attachment relationships were the same, interactions that appeared similarly sensitive or insensitive across siblings were actually composed of very different interactive content. Presumably, this variation occurs as mothers adjust their behaviour to the unique characteristics of each child. Second, in families where attachment relationships were non-concordant, the content of maternal interaction provides a potential explanation for why one sibling is securely attached,

while the other is not, despite similar sensitivity scores. That is, these mothers apparently maintain an inflexible pattern of behaviour that is applied to interactions with both children despite their unique characteristics. Following with the logic of the account suggested here, the fact that only one child is securely attached may be because this unwavering style of interaction is apparently experienced as sensitive by only one child - even though, to the observer, it appears equally sensitive to both. Evidently, examining the content of maternal interaction leads to conclusions that could not be reached based on assessments of global sensitivity alone.

Even as the present study provides novel insight into potential mechanisms behind sibling attachment concordance, these findings also undoubtedly raise a series of intriguing new issues. Of particular interest is the association between global sensitivity and maternal interactive content in families where sibling attachment relationships are different. More specifically, if the assertions raised here are accurate, why mothers of non-concordant infants were rated by observers as interacting sensitively with their insecurely attached infants remains unclear. As previously mentioned, these results suggest that, although mothers' interactions with these infants appeared sensitive, the child's experience of the attachment relationship (i.e. his "felt security") was actually quite different, as evidenced by the quality of his attachment relationship. At it appears that sensitivity may take on a number of different forms (as evidenced by diverging patterns of maternal interaction observed in relation to securely attached infants), determining whether the specific content or format of a mother's "sensitive" style is the most effective or appropriate one given the child's unique characteristics may depend on subtle nuances in the interaction, arising not only from the mother's behavioural style but

also from potentially understated cues in the child's responses to her. Thus, it may be that accurate assessments of global maternal sensitivity are even more difficult to make than previously recognized.

One potential challenge in accurately assessing the sensitivity of mothers' interactions with their children may be how this construct is currently evaluated. Consistent with previous research, this study used the MBQS (Pederson et al., 1990) to determine the degree to which mothers responded sensitively to their infants. As previously outlined, this measure requires observers to sort cards describing various aspects of a mother's behaviour into piles that range from most to least descriptive of her. Each card is assigned a weight, depending on its placement within the piles, and correlated with its positioning in a criterion sort. This sort, established by experts in the field, describes the current theoretical concept of how the "prototypically sensitive" mother would interact; thus, a mother's sensitivity score describes how closely her behaviours match those weighted heavily in the prototypical sort. As findings from the present study suggest, however, it appears that there are multiple patterns of behaviour that can be "sensitive" so long as they are suited to the child's unique characteristics. Indeed, it may be that the interactive content that represents "sensitivity" to two different children is substantially different. Furthermore, "sensitivity" as it applies to one or both of these children may differ substantially from the theoretical view of sensitivity, as it is currently captured in the MBQS. Thus, it may be that the card weightings in this measure are not appropriate to every relationship, as these weightings may not reflect multiple patterns of sensitive responding (which can "look different" from child to child). Rather,

they may reflect sensitivity only to the extent that a child's needs match the interactive style represented by the prototype.

Beyond the challenges involved in assessing and measuring sensitivity, recent research suggests that the fundamental role of this dimension in a triadic context may be even more complex than previously recognized. For instance, only limited work has focused on the impact of one sibling's attachment relationship on that of the other. One such study, which examined the attachment relationships of twins, found that a twin's attachment security was better predicted by the degree of sensitivity demonstrated by his mother toward his co-twin than toward himself (Fearon et al., 2006). To explain these findings, Fearon, Bakermans-Kranenburg, and van IJzendoorn (in press) recently proposed an evolutionary model that conceptualizes maternal sensitivity as a resource necessary for infant survival, and attachment behaviour (e.g. crying, clinging) as a way of demanding and possibly competing for this resource. This theory suggests that siblings' attachment styles shift depending on how each perceives that these resources are being allocated. That is, infants who see resources being directed towards a sibling will compete by expressing greater attachment behaviour, causing infants who previously appeared anxious-avoidant to appear secure; those who perceive that resources are being allocated towards them will also increase their attachment behaviour to maintain this preferential status over their sibling, resulting in a shift from security to anxious-ambivalence. Fearon et al. (in press) suggest that the extent to which siblings are in competition with each other for these resources may be influenced by the degree to which their temperaments are similar. Because infants with the same temperaments – and thus the same needs and interests – place very similar demands on the parent, these infants

may be more likely to directly compete with each other, creating a 'niche-competition' effect. Those with different temperaments would likely make different demands on the parent, which may be easier for the parent to manage and thus result in less competition.

Empirically, there is arguable support (although preliminary) for Fearon et al.'s (in press) model. Significant links between temperament and attachment non-concordance were found in a subset of their twin sample ($n = 52$ pairs); that is, the more similar twins' temperaments were, the more likely they were to demonstrate different patterns of attachment to their common mother. Furthermore, when aspects of twins' temperaments (e.g. emotionality, sociability) became more similar, differences in attachment security also increased, providing some support for the concept of 'niche-competition'. Using another subset of this twin sample ($n = 76$ pairs), Bokhorst et al. (unpublished data, as cited in Fearon et al., in press) presented mothers with 10 positive and 10 negative statements describing child characteristics (e.g. 'is very sweet' or 'wants to play with different toys after a short time') and asked them to select which twin was best described by each; mothers' sorts were then used to generate a preference score for each child. Results indicated that mothers' preferences toward twins diverged more when the quality of their attachments were concordant versus non-concordant. Fearon et al. (in press) suggested that this parental preference index may be related to temperament, and that the greater differences in maternal preference may reflect distinctive twin temperaments, which consequently result in less niche-competition between siblings.

In addition to the findings presented above, aspects of the present study also offer some support for Fearon et al.'s (in press) theory of niche-competition and the associated role of temperament. The present study found that mothers whose infants demonstrated

concordant patterns of attachment had very different perceptions of their relationship with each, as indicated by the lack of association in maternal AQS scores across siblings, while mothers of non-concordant infants appeared to view their relationships with each child similarly. Previous research has shown that maternal AQS scores are linked to measures of infant temperament, with a meta-analysis estimating the strength of this association at $r = .35$ (van IJzendoorn et al., 2004). Consequently, it is possible that they may also reflect the child's 'niche', or the demands and needs that the mother perceives are directed towards her by each child. Indeed, in a study comparing maternal versus AQS scores, mothers were found to place particular emphasis on items relating to infant fussiness when describing their infants' attachment behaviours (Tarabulsy et al., 1997). Thus, if maternal AQS scores are taken as a reflection of infant temperament, especially reflecting the mother's concept of the demands that each child places on the attachment relationship, then the association between maternal AQS scores and sibling attachment concordance found in the present study could be well-explained by Fearon et al.'s (in press) model.

Fearon et al.'s (in press) hypotheses are also consistent with trends in maternal interactive behaviour found in the present study. That is, if siblings' temperaments are different, and their mother perceives that what each requires of the relationship is unique (i.e. they occupy a different 'niche'), she may respond to these circumstances by interacting quite differently with each child. If this were true, not only would each child's needs be met by an interactive style that is adapted to his characteristics, but competition between siblings could also be managed as each child might perceive that maternal resources were being adequately allocated. The contrary would be true for siblings whose

temperaments are similar and are perceived by their mothers as occupying the same

'niche', consequently demonstrating similar interactive style towards each. The model

proposed by Fearon et al. (in press) thus offers a potential explanation for the finding

that, contrary to the predictions of traditional attachment theory, different patterns of

maternal are associated with concordance in sibling attachment relationships.

Despite the ease with which the niche-competition model seems to explain some

aspects of the present study's findings, there is at least one notable inconsistency. Fearon

et al's (in press) model suggests that the link between maternal sensitivity and attachment

security is compromised when there are multiple infants competing for the same maternal

resources, who adjust their attachment behaviours to match their perceptions of how

these resources are allocated. While this model was based on twins, whose relationships

are always subject to the presence of another infant, the present study includes siblings,

one of which was assessed when he or she was the only child in the family. One would

hypothesize, based on the niche-competition model, that the link between sensitivity and

security might be stronger for the firstborn child, as this child would have no competition

for maternal resources at the time of their assessment, than for the second-born child, for

whom the link between sensitivity and security may have been weakened by the presence

of another child. Yet, no birth order effects were found; that is, the strength of the

relationship between sensitivity and security was the same for both first- and second-born

children. This finding does not support the model suggested by Fearon et al. (in press) as

an adequate explanation for the frequently puzzling link between these two factors.

Although, as suggested by Fearon et al. (in press), the interrelationships between family

members will are almost certainly important in understanding how attachment

relationships develop within families, further research is required to determine if and how their proposed model can be applied to siblings.

An alternative way of approaching the issue of why some mothers are flexible in how they behave and perceive their children's attachment relationships, while others appear quite rigid, is that there may simply be variability in the extent to which mothers have the capacity to adjust these aspects of the relationship across siblings. One factor influencing this capacity may be maternal state of mind regarding attachment, which over-arches relationship-specific representations and influences how they are formulated and conceptualized (Bretherton & Munholland, 2008). Because state of mind impacts the extent to which mothers are able to create coherent and well-formulated representations of their relationships with each child, it seems very plausible that state of mind would impact mothers' ability to recognize that their two children have different characteristics and needs. This, in turn, would affect her capacity to conceptualize these relationships appropriately, and interact accordingly.

An interesting possibility related to the present study is that, by being flexible, some mothers are more successful in adjusting their interactions (and consequently the quality of their children's attachment relationships) to reflect their own working model of relationships. On the other hand, the working models of mothers who are inflexible are reflected in their relationship with only one child (again, whether secure or insecure). Again, what remains unclear at this point is why some mothers are able to flexibly adapt their interactive style to the distinct characteristics of both children, while others are not.

The Role of Infant Gender in Sibling Attachment Concordance

As previously mentioned, infant gender is not usually emphasized in attachment theory or research because gender differences (in attachment security or maternal sensitivity, for example) are not typically found (Benenson, 1996). Indeed, van IJzendoorn et al.'s (2000) study of sibling attachment found no gender differences in sensitivity or security, yet found that gender contributed to concordance in sibling attachment relationships. In contrast, the present study did not find that siblings' genders related to their attachment concordance; indeed, the rate of attachment concordance found in this study for same-gendered siblings (24%) is substantially different from that found in van IJzendoorn et al's (2000) study (62%). However, similar to this study's inability to replicate van IJzendoorn et al.'s (2000) association between siblings' secondary attachment classifications, these differences may be due to sample size rather than the absence of an association as the van IJzendoorn et al. (2000) study combined samples from three different groups, one of which included nearly all families from the present study.

The present study did find, however, that correspondence in sibling gender was associated with striking trends in maternal interactive style. Mothers of both same- and different-gendered children demonstrated the same levels of overall sensitivity across siblings; when their interactions were examined more closely, mothers of same-gendered siblings interacted similarly with their children on all domains of behaviour, while those with different-gendered siblings interacted differently with each on four domains: affect, synchrony, controlling/interfering, and engagement.

This study's finding that mothers interact more similarly with same- versus different-gendered infants is not surprising, given previous research. Maternal behaviour

has been found to differ across infant gender in a variety of ways; for instance, studies have suggested that mothers are more synchronous (Tronick & Cohn, 1989) and focused on promoting autonomy and efficacy (Robinson, Little, & Biringen, 1993) when interacting with sons versus daughters. These differences may emerge from maternal socialization, or their perceptions of what relationships with sons versus daughters "should" be like. These expectations, which may be in place even before the infant is born, are based on gender schemas that may subsequently influence maternal interactive style in two ways: first, the mother may interact in ways that elicit certain behaviours from the infant; second, her responses to these behaviours may be reinforcing, thus confirming her own schemas and contributing to the child's own sex role identity (Stern & Karraker, 1989). Socialization may also help to explain the finding that mothers perceived their relationship with each child similarly when siblings were the same gender, and differently when sibling gender also differed. That is, gender role schemas may impact mothers' perceptions of how a relationship with a son versus a daughter should be conceptualized and described (Stern & Karraker, 1989).

Some studies also suggest potential biological influences on maternal behaviour by infant gender; for example, Weinberg, Tronick, Cohn, and Olson (1999) suggest that males may have more difficulty with self-regulation in early infancy, thus placing demands on their mothers during interactions that differ from those faced by mothers of girls. If maternal AQS scores reflect mothers' perceptions of the infant's temperament, and especially the demands placed on them by the infant, then similarity across gender may support the notion that boys inherently express certain characteristics and needs to their mothers (e.g. a diminished capacity for self-regulation) that differ from those

expressed by girls. Moreover, these demands and their accompanying differences in mothers' representations in patterns of maternal interaction that are consistent when siblings are of the same gender, and diverge when gender is different.

Regardless of the process underlying these findings, they suggest that the extent to which mothers perceive their relationships with siblings as similar is related to how similarly they interact with each; furthermore, it appears that gender plays a role in how similar their perceptions and interactive behaviours are. One notable aspect of these findings is that, despite differences in the interactive content of mothers with same- and different-gendered children, global sensitivity across siblings was similar regardless of gender correspondence. Again, as previously discussed in relation to the trends associated with concordance, it appears that assessments of global sensitivity may mask important differences in subtler aspects of the patterning of dyadic interaction.

Limitations and Directions for Future Research

Although this study has been successful overall in expanding on current understanding of several factors that appear important in establishing sibling attachment concordance, it was also subject to several limitations that should be addressed in future research. First, relatively small sample sizes limited the analyses that could be performed and thus left several interesting questions unanswered. For instance, the present study could not determine whether differences in global sensitivity, interactive content, and/or maternal relationship-specific representations exist according to four-way (anxious-avoidant, secure, anxious-ambivalent, and disorganized) or even three-way (secure, insecure, disorganized) patterns of attachment. Although sample size limitations are common in attachment research, and especially in sibling studies, future studies should

focus on addressing this issue to determine whether there are differences in non-shared environment, even beyond those found in this study, when siblings' patterns of attachment are subdivided further. Larger sample sizes would also have allowed for four-way (SS, Ss, sS, ss) concordance groups to be used more frequently in analyses, which would have been preferable to the two-way concordance group design by allowing for a more detailed distinction of attachment patterns within families.

As much of this research was exploratory, many ideas put forth in this discussion are speculative and often based on notions that have either never been directly related to siblings and/or are quite novel themselves. Thus, future research should focus on investigating these further to determine whether they are empirically supported, and to examine whether they can account for any additional variance in sibling attachment concordance. For instance, to test Fearon et al.'s (in press) 'niche-competition' theory, studies should include measures of sibling temperament and parenting stress, which is conceptualized as "the aversive psychological reaction to the demands of being a parent" (Deater-Deckard, 1998, p. 315) and is thought to vary among children in a family. As Fearon et al.'s model has only been used previously to account for patterns of attachment between twins, including these measures would be useful in testing whether this model is applicable to sibling attachment relationships.

Another aspect of the attachment relationship that should be addressed in future research is maternal state of mind regarding attachment, or mothers' representations of attachment relationships overall. This construct is associated, both theoretically and empirically, with both relationship-specific representations (Bretherton & Munholland, 2008) and maternal interactive behaviour (Atkinson et al., 2005). Previous research

(although preliminary) found that maternal state of mind may be associated with the capacity to adopt flexible patterns of interactive behaviour across siblings (Villani, 2008). Thus, examining this factor may provide information as to why some mothers are able to adapt their perceptions and behaviour across siblings, while others are not. Furthermore, although maternal state of mind is thought to be relatively stable over time, no previous research has examined if and how state of mind may change with the birth of multiple children. Again, accounting for any change in state of mind, as well as the impact of these representations on maternal perceptions and behaviour towards siblings, may provide answers to many issues that the present study was only able to speculate on.

Finally, future research should consider taking into account aspects of the family context, particularly those that have changed since the birth of the first child. Previous research (Bar-Haim et al., 2000) suggests that changes in family circumstances may be associated with change in attachment classification; however, as is typically the case in attachment research, these changes were observed in a dyadic context only. Furthermore, no previous research has examined the effects that these life events may have on the content of maternal interaction, or on mothers' ability to adapt flexibly to the characteristics of multiple children in a family. Accounting for these factors, and examining their potential effects on the non-shared environment, may result in additional steps towards an understanding of sibling attachment concordance.

Clinical Implications

In addition to providing results that are novel and challenging to attachment theory, this study also has important implications for clinical work. In particular, the findings outlined here may be important for those designing attachment-based

intervention programs, which often aim to improve attachment security and its associated outcomes by focusing on maternal attitudes, representations, and behaviour (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2008). First, as previously discussed, the results of this study suggest that maternal sensitivity may take on multiple forms, each effective in promoting attachment security if matched appropriately to the needs of the individual child. Furthermore, each form may be substantially different, and not entirely consistent with the patterning of sensitivity that is considered ideal theoretically. Thus, the present study suggests that interventionists may need to examine aspects of their programs that address maternal behaviour to ensure that the possibility of different "types" of sensitivity are accounted for and that the implications of promoting one "right" way to conceptualize and behave in relationships are considered.

Second, the present study emphasizes the importance of accounting for multiple children in a family when targeting attachment and associated outcomes. Most frequently, attachment interventions focus on dyadic interaction; however, realistically, many families participating in these programs will consist of more than one child. As the present study suggests, targeting the relationship between a mother and one of her children cannot be taken as an intervention on all attachment relationships in the family. Each child may have unique characteristics that must be considered separately; indeed, encouraging a set style of perceiving and interacting in an intervention program may actually be detrimental in promoting attachment security across siblings. Furthermore, as previous research suggests, an infant's observations of his mother interacting with his sibling may have an impact on attachment security that is distinct from his own experience in the relationship (Fearon et al., 2006). Thus, the ideal intervention appears

to be one that includes mothers in interaction with all of their children, and that takes into account the different behavioural styles that may be required of her towards each.

In conclusion, this study found that, consistent with previous research, assessments of global sensitivity are not sufficient to account for concordance in sibling attachment relationships. Examining the content of maternal interactive behaviour suggests that, contrary to theoretical prediction, flexibility in maternal interaction is associated with concordance in siblings' attachment relationships. Furthermore, it appears that this flexibility is also associated with differences in mothers' representations of their relationships with each child. Mothers of different-gendered siblings appear more flexible, both in their representations and interactive behaviour. Future research examining the mechanisms underlying the tendency to be flexible versus rigid in these aspects of the attachment relationship is required; however, the present study suggests that examining siblings' non-shared environments is a promising avenue for establishing important factors related to sibling attachment concordance.

References

Ainsworth, M. D. S. (1969). Object relations, dependency, and attachment: A theoretical review of the infant-mother relationship. *Child Development, 40,* 969-1025.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the Strange Situation.* Hillsdale, NJ: Erlbaum.

Ainsworth, M. D. S., Bell, S. M. V., & Stayton, D. J. (1971). Individual differences in Strange Situation behaviour of one-year-olds. In H. R. Schaffer (Ed.), *The origins of human social relations* (pp. 17-57). New York: Academic Press.

American Psychological Association. (1981). Ethical principles of psychologists. *American Psychologist, 36, 633-638.*

Atkinson, L., Goldberg, S., Raval, V., Pederson, D., Benoit, D., Moran, G., et al. (2005). On the relation between maternal state of mind and sensitivity in the prediction of infant attachment security. *Developmental Psychology, 41,* 42-53.

Atkinson, L., Niccols, A., Paglia, A., Coolbear, J., Parker, K. C. H., Poulton, L., et al. (2000). A meta-analysis of time between maternal sensitivity and attachment assessments: Implications for internal working models in infancy/toddlerhood. *Journal of Social and Personal Relationships, 17,* 791-810.

Bailey, H. N., Moran, G., Pederson, D. R., & Bento, S. (2007). Understanding the transmission of attachment using variable- and relationship-centered approaches. *Development and Psychopathology, 19,* 313-343.

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2008). Less is more: Meta-analytic arguments for the use of sensitivity-focused interventions. In F. Juffer, M. J. Bakermans-Kranenburg, & M. H. van IJzendoorn (Eds.), *Promoting positive parenting: An attachment-based intervention.* New York: Lawrence Erlbaum Associates.

Bar-Haim, Y., Sutton, D. B., & Fox, N. A., & Marvin, R. S. (2000). Stability and change in attachment at 14, 24, and 58 months of age: Behaviour, representation, and life events. *The Journal of Child Psychology and Psychiatry and Allied Disciplines, 41,* 381-388.

Barnett, D., & Vondra, J. I. (1999). Atypical patterns of early attachment: Theory, research, and current directions. *Monographs of the Society for Research in Child Development, 64,* 1-24.

Belsky, J. (1997). Variation in susceptibility to environmental influence: An evolutionary argument. *Psychological Inquiry, 8,* 182-186.

Belsky, J., & Isabella, R. (1988). Maternal, infant, and social-contextual determinants of attachment security. In J. Belsky & T. Nezworski (Eds.), *Clinical implications of attachment* (pp. 41-94). Hillsdale, NJ: Lawrence Erlbaum Associates.

Benenson, J. F. (1996). Gender differences in the development of relationships. In G. G. Noam & K. W. Fischer (Eds.), *Development and vulnerability in close relationships*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Bokhorst, C. L., Bakermans-Kranenburg, M. J., Fearon, R. M. P., van IJzendoorn, M., Fonagy, P., & Schuengel, C. (2003). The importance of shared environment in mother-infant attachment security: A behavioural genetic study. *Child Development, 74*, 1769-1782.

Bretherton, I. (1985). Attachment theory: Retrospect and prospect. *Monographs of the Society for Research in Child Development, 50*, 3-35.

Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology, 28*, 759-775.

Bretherton, I., & Munholland, K. A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 102-127). New York: Guilford Press.

Cassidy, J. (2008). The nature of the child's ties. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 3-22). New York: Guilford Press.

Clarke-Stewart, K. A., & Hevey, C. M. (1981). Longitudinal relations in repeated observations of mother-child interaction from 1 to 2 ½ years. *Developmental Psychology, 17*, 127-145.

de Wolff, M. S., & van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta analysis on parental antecedents of infant attachment. *Child Development, 68*, 571-591.

Deater-Deckard, K. (1998). Parenting stress and child adjustment: Some old hypotheses and new questions. *Clinical Psychology: Science and Practice, 5*, 314-332.

Dunn, J. F., Plomin, R., & Nettles, M. (1985). Consistency of mothers' behaviour toward infant siblings. *Developmental Psychology, 21*, 1188-1195.

Dunn, J., Stocker, C., & Plomin, R. (1991). Nonshared experiences within the family:

Correlates of behavioural problems in middle childhood. In S. Chess & M. E. Hertzig (Eds.), *Annual Progress in Child Psychiatry and Child Development* (pp. 27-44). New York: Psychology Press.

Fearon, R. M. P., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (in press). Jealousy and attachment: The case of twins. In S. L. Hart & M. Legerstee (Eds.), *Handbook of jealousy: Theories, principles, and multidisciplinary approaches.* Wiley-Blackwell Publishing.

Fearon, R. M. P., van IJzendoorn, M. H., Fonagy, P., Bakermans-Kranenburg, M. J., Schuengel, C., & Bokhorst, C. L. (2006). In search of shared and nonshared environmental factors in security of attachment: A behaviour-genetic study of the association between sensitivity and attachment security. *Developmental Psychology, 42,* 1026-1040.

Gardner, R. C., & Tremblay, P. F. (2007). Essentials of data analysis: Statistics and computer applications. London, ON: University of Western Ontario, Department of Psychology.

Garson, D. (2009). *Reliability analysis.* Retrieved June 29, 2009 from North Carolina State University, Statnotes: Topics in Multivariate Analysis Web site: http://faculty.chass.ncsu.edu/garson/PA765/reliab.htm#rater.

George, C., & Solomon, J. (2008). The caregiving system: A behavioural systems approach to parenting. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 395-433). New York: Guilford Press.

Goldberg, S. (2000). *Attachment and development.* New York: Oxford University Press.

Hesse, E. (1999). The Adult Attachment Interview: Historical and current perspectives. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 395-433). New York: Guilford Press.

Hesse, E. (2008). The Adult Attachment Interview: Protocol, method of analysis, and empirical studies. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 552-598). New York: Guilford Press.

Hesse, E., & Main, M. (1999). Second-generation effects of unresolved trauma in nonmaltreating parents: Dissociated, frightened, and threatening parental behaviour. *Psychoanalytic Inquiry, 19,* 481-540.

Hesse, E., & Main, M. (2000). Disorganized infant, child, and adult attachment: Collapse in behavioural and attentional strategies. *Journal of the American Psychoanalytic Association, 48,* 1097-1127.

Kozlowska, K., & Hanney, L. (2002). The network perspective: An integration of attachment and family systems theories. *Family Process, 41*, 285-312.

Lyons-Ruth, K., & Jacobvitz, D. (2008). Attachment disorganization: Genetic factors, parenting contexts, and developmental transformation from infancy to adulthood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 666-697). New York: Guilford Press.

Lyons-Ruth, K., Yellin, C., Melnick, S., & Atwood, G. (2005). Expanding the concept of unresolved mental states: Hostile/Helpless states of mind on the Adult Attachment Interview are associated with disrupted mother-infant communication and infant disorganization. *Development and Psychopathology, 17*, 1-23.

Main, M. (2000). The organized categories of infant, child, and adult attachment: Flexible vs. inflexible attention under attachment-related stress. *Journal of the American Psychoanalytic Association, 48*, 1055-1096.

Main, M., & Hesse, E. (1990). Parents' unresolved traumatic experiences are related to infant disorganized attachment status: Is frightened and/or frightening behaviour the linking mechanism? In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the preschool years: Theory, research, and intervention* (pp. 161-182). Chicago, IL: University of Chicago Press.

Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development, 50*, 66-104.

Marvin, R. S., & Britner, P. A. (2008). Normative development: The ontogeny of attachment. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 269-294). New York: Guilford Press.

McCartney, K., & Diggins, A. (1993). *Child, mother, and relationship effects in mother child attachment.* Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.

Moore, G. A., Cohn, J. F., & Campbell, S. B. (1997). Mothers' affective behaviours with infant siblings: Stability and change. *Developmental Psychology, 33*, 856-860.

Moran, G., Forbes, L., Evans, E., Tarabulsy, G. M., & Madigan, S. (2008). Both maternal sensitivity and atypical maternal behaviour independently predict attachment security and disorganization in adolescent mother-infant relationships. *Infant Behaviour & Development, 31*, 321-325.

Moran, G., & Pederson, D. R. (2000). Des representations maternelles jusqu'à la

première relation par l'entremise de la sensibilité maternelle: Une revision du modèle développemental. In G. Tarabulsy, S. Larose, D. Pederson, & G. Moran (Eds.), *Attachement et développement: Le role des premières relations dans le développement humain* (pp. 235-267). Sainte-Foy, Quebec: Presses de l'Université du Québec.

Moss, E., & St.-Laurent, D. (2001). Attachment at school age and academic performance. *Developmental Psychology, 37*, 863-874.

O'Connor, T. G., & Croft, C. M. (2001). A twin study of attachment in preschool children. *Child Development, 72*, 1501-1511.

Pederson, D. R., Gleason, K. E., Moran, G., & Bento, S. (1998). Maternal attachment representations, maternal sensitivity, and the infant-mother attachment relationship. *Developmental Psychology, 34*, 925-933.

Pederson, D. R., & Moran, G. (1996). Expressions of the attachment relationship outside of the Strange Situation. *Child Development, 67*, 915-927.

Pederson, D. R., Moran, G., Neufeld Bailey, H., & Bento, S. (1999, April). Relation of maternal interactive behaviour and attachment representations to sibling attachments with their common mother. In G. Moran & M. J. van IJzendoorn (Chairs), *Experiential and genetic influence on attachment: Studies of siblings and twins*. Symposium conducted at the meeting of the Society for Research in Child Development, Albuquerque, New Mexico.

Pederson, D. R., Moran, G., Sitko, C., Campbell, K., Ghesquire, K., & Acton, H. (1990). Maternal sensitivity and the security of infant-mother attachment: A Q-sort study. *Child Development, 61*, 1974-1983.

Plomin, R., Asbury, K., & Dunn, J. (2001). Why are children in the same family so different? Nonshared environment a decade later. *Canadian Journal of Psychiatry, 46*, 225-233.

Plomin, R., & Caspi, A. (1999). Behavioural genetics and personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 251-278). New York: Guilford Press.

Plomin, R., Chipuer, H. M., & Neiderhiser, J. M. (1994). Behavioural genetic evidence for
the importance of nonshared environment. In E. M. Hetherington, D. Reiss, & R. Plomin (Eds.), *Social worlds of siblings: The impact of nonshared environment on development* (pp. 1-32). Hillsdale, NJ: Lawrence Erlbaum Associates.

Plomin, R., & Daniels, D. (1987). Why are children in the same family so different from one another? *Behavioural and Brain Science, 10*(1), 1-16.

Robinson, J. A., Little, C., & Biringen, Z. (1993). Emotional communication in mother toddler relationships: Evidence for early gender differentiation. *Merrill-Palmer Quarterly, 39,* 496-517.

Sagi, A., van IJzendoorn, M. H., Aviezer, O., Donnell, F., Koren-Karie, N., Joels, T., et al. (1995). Attachments in a multiple-caregiver and multiple-infant environment: The case of the Israeli kibbutzim. *Monographs of the Society for Research in Child Development, 60,* 71-91.

Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment and Human Development, 7,* 349-367.

Stern, M., & Karraker, K. H. (1989). Sex stereotyping of infants: A review of gender labeling studies. *Sex Roles, 20,* 501-522.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Pearson Education, Inc.

Tarabulsy, G. M., Avgoustis, E., Phillips, J., Pederson, D. R., & Moran, G. (1997). Similarities and differences in mothers' and observers' descriptions of attachment behaviours. *International Journal of Behavioural Development, 21,* 599-619.

Tarabulsy, G. M., Provost, M. A., Larose, S., Moss, E., Lemelin, J-P., Moran, G., et al. (2008). Similarities and differences in mothers' and observers' ratings of infant security on the Attachment Q-sort. *Infant Behaviour and Development, 31,* 10-22.

Teti, D. M., & McGourty, S. (1996). Using mothers vs. trained observers in assessing children's secure-base behaviour: Theoretical and methodological considerations, *Child Development, 67,* 597-605.

Teti, D. M., Nakagawa, M., Das, R., & Wirth, O. (in press). Concordance and non concordance of child-mother attachment among infant-sibling pairs: An examination of mother-child interaction. In E. Waters, B. E. Vaughn, G. Posada, & D. M. Teti (Eds.), *Patterns of secure base behaviour: Q-sort perspectives on attachment and caregiving in infancy and childhood.* Mahwah, NJ: Erlbaum.

Touris, M., Kromelow, S., & Harding, C. (1995). Mother-firstborn attachment and the birth of a sibling. *American Journal of Orthopsychiatry, 65,* 293-297.

Tronick, E. Z., & Cohn, J. F. (1989). Infant-mother face-to-face interaction: Age and gender differences in coordination and the occurrence of miscoordination. *Child Development, 60,* 85-92.

van IJzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness,

and infant attachment: A meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin, 117,* 387-403.

van IJzendoorn, M. H., Moran, G., Belsky, J., Pederson, D., Bakermans-Kranenburg, M. J., & Kneppers, K. (2000). The similarity of siblings' attachments to their mother. *Child Development, 71,* 1086-1098.

van IJzendoorn, M. H., Schuengel, C., & Bakermans-Kranenburg, M. J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and Psychopathology, 11,* 225-249.

van IJzendoorn, M. H., Vereijken, C. M. J. L., Bakermans-Kranenburg, M. J., & Riksen Walraven, J. M. (2004). Assessing attachment security with the Attachment Q Sort: Meta-analytic evidence for the validity of the observer AQS. *Child Development, 75,* 1188-1213.

Vaughn, B. E., & Waters, E. Attachment behaviour at home and in the laboratory: Q-sort observations and Strange Situation classifications of one-year-olds. *Child Development, 61,* 1965-1973.

Villani, V. C. (2008). *The influence of maternal representations on maternal behaviours across siblings.* Unpublished senior honors thesis, University of Western Ontario, London, Ontario, Canada.

Ward, M. J., Vaughn, B., & Robb, M. D. (1988). Social-emotional adaptation and infant mother attachment in siblings: Role of the mother in cross-sibling consistency. *Child Development, 59,* 643-651.

Waters, E., & Deane, K. (1985). Defining and assessing individual differences in attachment relationships: Q-methodology and the organization of behaviour in infancy and early childhood. In I. Bretherton & E. Waters (Eds.), Growing points of attachment theory and research. *Monographs of the Society for Research in Child Development, 50,* 41-65.

Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: A twenty-year longitudinal study. *Child Development, 71,* 684-689.

Weinberg, M. K., Tronick, E. Z., Cohn, J. F., & Olson, K. L. (1999). Gender differences in emotional expressivity and self-regulation during early infancy. *Developmental Psychology, 35,* 175-188.

Weinfield, N. S., Sroufe, L. A., Egeland, B., & Carlson, E. (2008). Individual differences in infant-caregiver attachment: Conceptual and empirical aspects of security. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 98-101). New York: Guilford Press.

Appendix A: Letter of Information

Siblings' Social Development

Dear Parent:

As you may have already observed, two children growing up in the same family often turn out to be very different from each other. We are conducting a study looking at one way in which siblings can be different from each other: in their social development. To this end, we would like to observe you with both of your children in order to observe the similarities and differences between them.

To explore this question we want to observe two children in the same family when they are the same age – because your older child participated in a study with us when he/she was between 12 and 18 months old, we would like to study your younger child at about the same age.

To investigate this issue, there are a few things that we need from you. First of all we need your permission to use the data that were collected when you and your first child participated in a study of early social development with us. We would then like to observe you and your younger child in the same situations as those in which your older child was observed. This would involve both a home visit and a visit to the university.

The home visit would last approximately 2 hours. During this visit we would like to observe you at home when both of your children are there. We will assess your younger child's developmental progress, ask you some questions about parenting, and videotape you interacting with your younger child. The reason we are interested in seeing your older child now is to see whether there is continuity or change in his/her social

development. At the end of the home visit we will leave you three questionnaires, which we would ask you to complete and bring with you to the university when you come.

In the final part of the study we would like you and both of your children to come to the university for a single session lasting about 45 minutes. During this session we will be interested in observing how your younger child plays with a selection of toys both when he/she is alone in a room and when you are with him/her. We will ask you to leave your infant alone in the room for two brief periods, lasting no more than three minutes each during this part of the university procedure. Of course, if your baby cries or becomes distressed, and thus does not play during your absence, we will send you in before the full 3 minutes have passed. While you and your infant are playing together, we will occupy your older child. Finally, at the end of the session with your younger child, we would like to videotape all three of you playing together and enjoying each other for a brief time. This too, will be videotaped, and will last about ten minutes. The entire visit to the university will be videotaped and the videotapes will be erased at the completion of the study.

Our records will be confidential unless disclosure is required by law. Only those directly involved in the study will see the videotapes and other records. Videotapes, records of assessments and questionnaires will be given code numbers to maintain confidentiality (i.e. your names will not appear on these records). The family names will only be available to members of our research group. Any reports of the research findings will be written in such a way that it would be impossible to identify any person or family who participated.

Participation throughout the study is completely voluntary, and you may withdraw at any time for any reason. There are no known risks associated with any of the procedures used in this study, nor are there any direct benefits. However, findings from this study may better our understanding of early mother-infant relationships.

You will have the opportunity to receive a summary of the study if you wish. Please do not hesitate to ask any questions you may have now, or if questions come up regarding this study in the future, please feel free to contact us at 679-2111, extension 4702, 4660, or 4272.

Sandi Bento, Research Coordinator

Effic Avgoustis, Research Assistant

David R. Pederson, PhD., Department of Psychology

Greg Moran, PhD., Department of Psychology

Appendix B: Consent Form

Informed Consent

I have read the information letter describing the study of siblings and their social development, and have been informed of all procedures involved. I give my consent for the participation of myself, both of my children and for the use of any information collected on my elder child in a previous study by the current researcher.

I understand that the videotapes and any other records of participation are strictly confidential, subject to provisions of the Child and Family Services Act, and will be looked at only by those directly involved with the study. At the completion of the study all records and videotapes will be destroyed.

I understand that this study will not result in any direct benefits to me or to my children, but that the study findings may help further our knowledge of factors involved in the social development of children. I also understand that I may be contacted in the future, and may be asked to participate in future studies. I realize that agreeing to participate in this study does not leave my under any obligation to participate in future studies (i.e. if asked to participate in other studies in the future, I understand that I can refuse to participate in them).

I also understand that participation in this study is completely voluntary and that I may refuse to participate in the study or may withdraw at any time and for any reason.

_____   _____
NAME   DATE

_____   _____
SIGNATURE   TELEPHONE

ADDRESS _____

POSTAL CODE _____

TELEPHONE _____

Appendix C: Ethics Approval

113

The University of Western Ontario
Department of Psychology

May 25, 1993

M E M O R A N D U M

To: Kirstie Fisher
From: Bill Roberts on behalf of the Ethics and Subject Pool Committee
Re: Ethical review of "Attachment patterns of siblings to their mothers"
        Protocol #93 05 02 ∩ (Fisher, Advisor: Moran)

STATUS
_X_   Approved We assume that the families will receive feedback
___   Approved conditional to making changes listed below
      (please file changes with my office and with your application to
      use the subject pool)
___   Please make the changes listed below and resubmit for review

SIGN-UP POSTER
___   Briefly describe the task required of subjects
___   Do not "hype" the advertising of your study
___   Use 10cpi or 12cpi, with standard letter size, for description
___   Other (see attached sheet)

INFORMED CONSENT SHEET
___   Briefly describe the task the subjects are agreeing to perform
___   Promise that the data will be kept confidential and used for
      research purposes only
___   Promise that audio and/or video tapes will be erased, in part or
      entirely, at the subjects' wishes at any time
___   State how many credits the subjects will receive for participation
___   State that subjects may terminate the experiment at any time
      without loss of promised credit(s)
___   State that there are no known risks to participation or state the
      risks
___   State that subjects will receive written feedback at the end of
      the session or study and/or that subjects have had an opportunity
      to ask questions about the study
___   Other (see attached sheet)

WRITTEN FEEDBACK
___   Elaborate your feedback
___   Rewrite your feedback at a level that is understandable to a
      Psychology 020/023 student
___   Add a few references at the end and/or your name and how you can
      be reached
___   Other (see attached sheet)

OTHER ___ See attached comments

c. Moran

[KF25.eth]

Appendix D: Domains of Maternal Interactive Behaviour and General Descriptions

Awareness

This domain is assessing the mother's awareness of the baby and his needs. Mother may or may not respond to the baby, but she is clearly aware that the baby is signaling to her. If she does respond, her response is only used to note her awareness, which differentiates this category from "Response Effectiveness"; the success or appropriateness of mom's responses is not evaluated here. Signs of awareness include acknowledgement of baby's signals, even when she is involved in other activities, and efforts to position herself in order to facilitate accessibility to baby's cues.

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

Response Effectiveness

This domain is assessing the effectiveness of mothers' responses to the baby's signals; that is, the success of the mother's intervention as evidenced through her baby's responses. This domain captures the quality of the mother's responses, including her consistency, accuracy and predictability in response to distress and non-distress signals. This domain goes beyond that of Awareness because it assesses 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 mother's affect influences her interactions with the baby. What is being evaluated is the mother's interest and delight in their interactions, and whether she communicates this to the child. The focus of this domain is on how the baby experiences the mother's affect. It is distinguished from acceptance, where there is a sense of respect for the baby and his developing autonomy, in that it captures the expression of positivity, delight and enjoyment. Positive affect is evidenced through warmth, delight, and enjoyment of the baby and their interaction; these are clear indicators of the mom's love and adoration.

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. Those low on this domain are not necessarily hostile or rejecting (see Rejection domain), rather, their behaviour 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 behaviours. 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 behaviour, and overlooking positive signals

from her baby. A mom low on this domain accepts the baby's wishes 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. In particular, this domain focuses on whether the mother's behaviours are contingent and appropriate to the baby's needs and signals; for instance, 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 the baby.

A mother high on this domain is able to adapt her behaviour 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 the baby. This domain is not measuring whether the mother is actively attempting to control the baby's behaviour, but focuses instead on how concordant her behaviours are with the baby's current state, needs and interests.

Controlling/Interfering

This domain assesses the quality of the mother's guidance of the baby's behaviour. It looks at the extent to which the mother interferes with her baby's autonomy in their interactions. This domain is not focusing on whether the mother's behaviours are out of tune with the baby's; instead, it deals with 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 knowing that the baby's wishes are not consistent with hers. These mothers will often consciously ignore their infant's protests against her interventions and tend to continue at her 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 the 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 the baby's exploratory behaviours by creating and encouraging an environment conducive to learning and exploration. A mother high on this domain structures the baby's environment and interactions to promote learning and development of exploratory behaviours. She promotes and initiates interactions for the baby outside of the dyadic relationship, but her involvement does not necessarily have an intrusive quality. A mother low on this domain is anxious about 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 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 her baby. 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 with her baby during interactions. A mother high on this domain seeks out social encounters with her baby, eliciting the baby's attention and using vocalizations throughout their interactions. A mother low on this domain does not often initiate interactions and conversations with her baby.

Appendix E: MBQS Version 2.0 Domain Items and Cronbach's Alphas[1]

Awareness (α = .94)

10.   Greets B when re-entering room.

68(R).[2] Often appears to "tune out" and not notice distress or bids for attention.

5.   Notices when B is distressed, cries, fusses, or whimpers.

60.   When B is distressed, M is able to quickly and accurately identify the

source.

66.   Arranges her location so that she can perceive B's signals.

65(R). Not skillful in dividing her attention between B and competing demands,

and thus misses B's cues.

1.   Notices when B smiles and vocalizes.

63.   Monitors and responds to B even when engaged in some other activity,

such as cooking or having a conversation with visitor.

2(R).   Unaware of or insensitive to B's signs of distress.

52(R). Fails to interrupt activity by her B that is likely to be dangerous.

62(R). Preoccupied with interview – seems to ignore B.

88(R). Often seems to forget B is present in the room during interaction with

visitor.

58.   Aware of B's moods and fluctuations in state.

61.   Seems to be aware of B, even when not in the same room.

89.   Very alert to "dirty diapers"; seems to change diapers as soon of any

indication of need.

---

[1] α > .60 is considered acceptable; α > .80 is considered good (Gardner & Tremblay, 2007)
[2] (R) indicates that the item was reverse-coded in the domain score calculation.

24.   Knows a lot about B; good informant.

Response Effectiveness (α = .89)

9.   Responds consistently to B's signals. Low : responses are unpredictable

        or arbitrary.

8(R).   Responses to B's communications are inconsistent and unpredictable.

7(R).   Responds only to frequent, prolonged, or intense signals.

64.   Responds immediately to cries/whimpers.

12.   Interprets cues correctly, as evidenced by B's response.

55(R). Repeated series of interventions in search of the best method to satisfy

        B; often resorts to trial and error.

11(R). Sometimes is aware of B's signals of distress, but ignores or does not

        respond immediately to these signals.

Positive Affect (α = .89)

42.   Is animated in social interactions with B.

40.   Praise directed towards B.

43(R). Kisses B on head as major mode of expressing affection.

41(R). Flat affect when interacting with B.

69(R). Seems overwhelmed, depressed.

21.   Is delighted over B.

36.   Predominantly positive mood about B.

27(R). Seems "long-suffering" in her attitude about her maternal duties.

Rejection (α = .87)

14(R). Scolds B.

13(R). Is irritated by demands of B (note information from interview including

comments on caregiving demands).

20(R). Seems to resent B's signals of distress or bids for attention.

19(R). Perceives B's negative behaviour as rejection of her; takes misbehaviour

"personally".

26(R). Critical in her descriptions of B.

37. Comments are generally positive when speaking about B.

22. Resolves negative feelings about B; that is, has some negative feelings

about B, but can set these aside in interacting with B.

Synchrony (α = .89)

6. Interactions appropriately vigorous and exciting, as judged from B's

response.

76(R). Sometimes will break off from the child in mid-interaction to speak to

the visitor or attend to some other activity that suddenly comes to mind.

75(R). Attempts to involve baby in games or activities that are obviously

beyond the child's current capability.

4(R). Response so delayed that B cannot connect M's response with the action

that initiated it.

29. Slows pace down, waits for B's response in face-to-face interactions.

54. Interactions revolve around B's tempo and current state.

53. Well-resolved interaction with B; interaction ends when B is satisfied

(also consider termination of ongoing interactions that B is enjoying).

18.   Structures environment considering B's and own needs (consider the balance in this item).

57(R). Subjects B to constant and unphased barrage of stimulation; B overwhelmed.

46.   Cues B and waits for response in feeding.

3(R).   Often interrupts B's signals according to own wishes and moods.

Controlling/Interfering (α = .84)

23.   Respects B as an individual, i.e. able to accept B's behaviour even if it is not consistent with her ideal.

74(R). Often misses "slow down" or "back off" signals from baby during face-to-face play.

73(R). Content and pace of interactions with B seem to be set by mother rather than according to B's responses.

28(R). Teases B beyond point where B seems to enjoy it.

84(R). Sometimes seems to treat B as an inanimate object when moving her around or adjusting her posture.

49.   Environment is safe; "baby-proofed".

16(R). Will often interfere with B's ongoing appropriate behaviour. Low: stands back and lets B carry on with activity without interruption.

59(R). Rough or intrusive in interactions with B.

44.   Balances task and B's activities when changing diapers.

25(R). Idealizes B – does not acknowledge negative aspects.

Facilitation of Exploration/Learning (α = .66)

33.   Creates interesting environment.

35.   Points to and identified interesting things in B's environment.

79.   Frequently repeats words carefully and slowly to the baby as if teaching meaning or labeling an activity or object.

90.   Often brings toy or other object within B's reach and attempts to interest her in it.

81(R).   Makes frequent use of playpen in order to permit carrying out normal household chores.

Comfort with Physical Contact (α = .85)

87(R).   Seems awkward and ill at ease when interacting directly with the baby face-to-face.

39.   When holding, cuddles B as a typical mode of interaction; molds B to self.

67.   When in the same room as B, provides B with unrestricted access to her.

38.   Displays affection by touching.

Engagement (α = .55)

34.   Seeks face-to-face interactions.

80(R).   Seldom speaks to B directly.

86.   Encourages interaction of B with visitor, e.g. invites visitor to hold baby; ensures that B is "introduced" to visitor, i.e. "Look who's here!"

31.   Makes an effort to take B on "outings", such as shopping, visiting friends.

30.   Plays games with B such as peek-a-boo, patty cake.

15.   Aware of how her moods affect B.

115

Appendix F: MBQS Version 3.0 Domain Items and Cronbach's Alphas[3]

Awareness (α = .92)

64. Greets B when re-entering room.

29. When B is distressed, M is able to identify the source.

25(R)[4]. 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 (α = .87)

3. M's responses are unpredictable.

66. Consistently unresponsive.

26. Responds immediately to cries/whimpers.

89. Interventions satisfy B.

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

_____

[3]α > .60 is considered acceptable; α > .80 is considered good (Gardner & Tremblay, 2007)
[4](R) indicates that the item was reverse-coded in the domain score calculation.

116

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 (α = .86)

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.

78.   Plays social games with B.

57.   Shows delight in interaction with B.

79(R). Distressed by B's demands.

Rejection (α = .85)

61(R). Is irritated by demands of B for physical contact or proximity.

80(R). Annoyed by B's uncooperative behaviour.

9(R).   Ignores positive signals (vocalizations, smiles, reaches).

45.   Praises B.

90(R). Punitive or retaliatory during interactions with B.

60(R). Scolds or criticizes B.

86(R). Terminates physical contact before B is satisfied.

73(R). When irritated with B, disengages or distances herself from interaction with

B.

Synchrony (α = .92)

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

activity.

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).

88(R). Interactions with B are characterized by conflict.

Controlling/ Interfering (α = .87)

87(R). Actively opposes B's wishes.

82(R). Physically restricts B's movements while in proximity.

59.   Lets B carry on with appropriate activity without interruption.

16(R). During ongoing interactions, misses slow down or back off signals from

        B.

17(R). Content and pace of interaction set by M rather than according to B's

        responses.

55.   Respects B as an individual, i.e., able to accept B's behaviour even if it is not

        consistent with her wishes.

54(R). Teases B to promote continued interaction/contact.

85(R). Interactions with B are incomplete.

7(R).   Treats B as an inanimate object when moving her around or adjusting

        her posture.

1(R).   Provides B with little opportunity to contribute to the interaction.

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

30(R). Interactions with B characterized by active physical manipulations.

Facilitation of Exploration and Learning (α = .55)

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 labelling an activity or object.

Comfort with Physical Contact (α =.88)

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.

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

46. Molds B to self when holding.

Engagement (α = .80)

77. Vocalizes to B throughout the visit.

10. Speaks to B directly.

49. Seeks interactions with B.

6. Supports interaction of B with visitor.

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

Appendix G: MBQS Items Excluded from Domains of Maternal Interactive Behaviour

Version 2

71. When B is in a bad mood or cranky, M often will place B in another room so that she will not be disturbed.

17. Worried about spoiling; has lots of "shoulds" about B's care.

50. Sometimes will interfere with appropriate activity if it is likely to get B messy or soiled.

78. Naptimes are determined by M's convenience rather than the immediate needs of the baby (determined from interview).

77. Often "parks" the baby in front of the television in an attempt to keep her entertained.

72. At first glance, home shows little evidence of presence of B.

32. Provides age-appropriate toys.

45. Encourages B's initiatives in feeding.

83. Leaves the room without any sort of "signal" or "explanation" to the baby, e.g. "I'll be back in just a minute."

51. Disturbed by B becoming messy during feeding; these concerns sometimes interfere with feeding.

48. Provides nutritional snacks.

70. Responds accurately and promptly to signals or distress, but often ignores (is unresponsive to) signals of positive affect.

47. Balances task and B's activities in feeding.

56. Very concerned that B is well-dressed and attractive at all times.

82.   Feels at ease leaving the child with a babysitter in the evening.

85.   Is very reluctant to leave the baby with anyone other than husband or

close relative (determine from interview).

Version 3

18.   Home shows little evidence of presence of B.

38.   Provides nutritional snacks

51.   Provides age appropriate toys

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

13.   Uses sibling or television to keep B entertained.

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

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

B.

21.   Overwhelmed by caretaking demands.

40.   Encourages B's initiatives in feeding

47.   Displays affection by touching, caressing

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 intervene

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

Appendix H: Items of the Attachment Q-Sort (Waters & Deane, 1985)

1.   Child readily shares with mother or lets her hold things if she asks to.

2.   When child returns to mother after playing, he is sometimes fussy for no clear reason.

3.   When he is upset or injured, child will accept comforting from adults other than mother.

4.   Child is careful and gentle with toys and pets.

5.   Child is more interested in people than in things.

6.   When child is near mother and sees something he wants to play with, he fusses or tries to drag mother over to it.

7.   Child laughs and smiles easily with a lot of different people.

8.   When child cries, he cries hard.

9.   Child is lighthearted and playful most of the time.

10.   Child often cries or resists when mother takes him to bed for naps or at night.

11.   Child often hugs or cuddles against mother, without her asking or inviting him to do so.

12.   Child quickly gets used to people or things that initially made him shy or frightened him.

13.   When the child is upset by mother's leaving, he continues to cry or even gets angry after she is gone.

14.   When child finds something new to play with, he carries it to mother or shows it to her from across the room.

15. Child is willing to talk to new people, show them toys, or show them what he can do, if mother asks him to.

16. Child prefers toys that are modeled after living things (e.g., dolls, stuffed animals).

17. Child quickly loses interest in new adults if they do anything that annoys him.

18. Child follows mother's suggestions readily, even when they are clearly suggestions rather than orders.

19. When mother tells child to bring or give her something, he obeys.

   (Do not count refusals that are playful or part of a game unless they are clearly disobedient.)

20. Child ignores most bumps, falls, or startles.

21. Child keeps track of mother's location when he plays around the house. Calls to her now and then; notices her go from room to room. Notices if she changes activities.

22. Child acts like an affectionate parent toward dolls, pets, or infants.

23. When mother sits with other family members, or is affectionate with them, child tries to get mom's affection for himself.

24. When mother speaks firmly or raises her voice at him, child becomes upset, sorry, or ashamed about displeasing her.

25. Child is easy for mother to lose track of when he is playing out of her sight.

26. Child cries when mother leaves him at home with babysitter, father, or grandparent.

27. Child laughs when mother teases him.

28. Child enjoys relaxing in mother's lap.

29. At times, child attends so deeply to something that he doesn't seem to hear when people speak to him.

30. Child easily becomes angry with toys.

31. Child wants to be the center of mother's attention. If mom is busy or talking to someone, he interrupts.

32. When mother says "No" or punishes him, child stops misbehaving (at least at that time). Doesn't have to be told twice.

34. When child is upset about mother leaving him, he sits right where he is and cries. Doesn't go after her.

35. Child is independent with mother. Prefers to play on his own; leaves mother easily when he wants to play.

36. Child clearly shows a pattern of using mother as a base from which to explore. Moves out to play; Returns or plays near her; moves out to play again, etc.

37. Child is very active. Always moving around. Prefers active games to quiet ones.

38. Child is demanding and impatient with mother. Fusses and persists unless she does what he wants right away.

39. Child is often serious and businesslike when playing away from mother or alone with his toys.

40. Child examines new objects or toys in great detail. Tries to use them in different ways or to take them apart.

41. When mother says to follow her, child does so. (Do not count refusals or delays that are playful or part of a game unless they clearly become disobedient.)

42. Child recognizes when mother is upset. Becomes quiet or upset himself. Tries to comfort her. Asks what is wrong, etc.

43. Child stays closer to mother or returns to her more often than the simple task of keeping track of her requires.

44. Child asks for and enjoys having mother hold, hug, and cuddle him.

45. Child enjoys dancing or singing along with music.

46. Child walks and runs around without bumping, dropping, or stumbling.

47. Child will accept and enjoy loud sounds or being bounced around in play, if mother smiles and shows that it is supposed to be fun.

48. Child readily lets new adults hold or share things he has, if they ask to.

49. Runs to mother with a shy smile when new people visit the home.

50. Child's initial reaction when people visit the home is to ignore or avoid them, even if he eventually warms up to them.

51. Child enjoys climbing all over visitors when he plays with them.

52. Child has trouble handling small objects or putting small things together.

53. Child puts his arms around mother or puts his hand on her shoulder when she picks him up.

54. Child acts like he expects mother to interfere with his activities when she is simply trying to help him with something.

55. Child copies a number of behaviours or way of doing things from watching mother's behaviour.

56. Child becomes shy or loses interest when an activity looks like it might be difficult.

57. Child is fearless.

58. Child largely ignores adults who visit the home Finds his own activities more interesting.

59. When child finishes with an activity or toy, he generally finds something else to do without returning to mother between activities.

60. If mother reassures him by saying "It's OK' or "It won't hurt you", child will approach or play with things that initially made him cautious or afraid.

61. Plays roughly with mother. Bumps, scratches, or bites during active play. (Does not necessarily mean to hurt mom)

62. When child is in a happy mood, he is likely to stay that way all day.

63. Even before trying things himself, child tries to get someone to help him.

64. Child enjoys climbing all over mother when they play.

65. Child is easily upset when mother makes him change from one activity to another. (Even if the new activity is something child often enjoys.)

66. Child easily grows fond of adults who visit his home and are friendly to him.

67. When the family has visitors, child wants them to pay a lot of attention to him.

68. On the average, child is a more active type person than mother.

69. Rarely asks mother for help. Middle if child is too young to ask.

70. Child quickly greets his mother with a big smile when she enters the rooms (Shows her a toy, gestures, or says "Hi, Mommy").

71. If held in mother's arms, child stops crying and quickly recovers after being frightened or upset.

72. If visitors laugh at or approve of something the child does, he repeats it again and again.

73. Child has a cuddly toy or security blanket that he carries around, takes it to bed, or holds when upset. (Do not include bottle or pacifier if child is under two years old.)

74. When mother doesn't do what child wants right away, child behaves as if mom were not going to do it at all. (Fusses, gets angry, walks off to other activities, etc.)

75. At home, child gets upset or cries when mother walks out of the room. (May or may not follow her.)

76. When given a choice, child would rather play with toys than with adults.

77. When mother asks child to do something, he readily understands what she wants (May or may not obey.)

78. Child enjoys being hugged or held by people other than his parents and/or grandparents.

79. Child easily becomes angry at mother.

80. Child uses mother's facial expressions as good source of information when something looks risky or threatening.

81. Child cries as a way of getting mother to what he wants.

82. Child spends most of his play time with just a few favorite toys or activities.

83. When child is bored, he goes to mother looking for something to do.

84. Child makes at least some effort to be clean and tidy around the house.

85. Child is strongly attracted to new activities and new toys.

86.   Child tries to get mother to imitate him, or quickly notices and enjoys it when mom imitates him on her own.

87.   If mother laughs at or approves of something the child has done, he repeats again and again.

88.   When something upsets the child, he stays where he is and cries.

89.   Child's facial expressions are strong and clear when he is playing with something.

90.   If mother moves very far, child follows along and continues his play in the area she has moved to. (Doesn't have to be called or carried along; doesn't stop play or get upset)