

Western  Graduate&PostdoctoralStudies

Western University
Scholarship@Western

Electronic Thesis and Dissertation Repository

11-11-2014 12:00 AM

Attachment Relationships Across Siblings and their Common Mother: Patterns and Predictors

Kathleen Anne O'Connor
The University of Western Ontario

Supervisor
Dr. Greg Moran
The University of Western Ontario

Graduate Program in Psychology
A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy
© Kathleen Anne O'Connor 2014

Follow this and additional works at: <https://ir.lib.uwo.ca/etd>



Part of the [Developmental Psychology Commons](#)

Recommended Citation

O'Connor, Kathleen Anne, "Attachment Relationships Across Siblings and their Common Mother: Patterns and Predictors" (2014). *Electronic Thesis and Dissertation Repository*. 2620.
<https://ir.lib.uwo.ca/etd/2620>

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact wlsadmin@uwo.ca.

ATTACHMENT RELATIONSHIPS ACROSS SIBLINGS AND THEIR
COMMON MOTHER: PATTERNS AND PREDICTORS

(Thesis format: Integrated Article)

by

Kathleen A. O'Connor

Graduate Program in Psychology

A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

The School of Graduate and Postdoctoral Studies
The University of Western Ontario
London, Ontario, Canada

© Kathleen A. O'Connor 2014

Abstract

Traditional attachment theory suggests that because maternal state of mind regarding attachment is generally stable by adulthood, mothers should interact similarly with their children and, consequently, should share a similar quality of attachment with each. Early empirical work, however, suggests that the quality of siblings' relationships is frequently different. Using varied theoretical and methodological approaches, this dissertation expanded upon the existing literature to further explore the nature and underpinnings of variability in the quality of mother-infant attachment across siblings.

Study 1 comprehensively described patterns of attachment within the family, investigating the extent to which the quality of siblings' relationships with their common mother are a) similar to each other; and b) consistent with the quality of maternal state of mind. While concordance in family classifications was common, so was non-concordance – unexpectedly so, from the perspective of traditional theory, indicating that patterns of attachment within the family are complex and warrant further exploration.

Studies 2 and 3 explored the roots of variability in family attachment relationships. *Study 2* examined links between family attachment patterns and maternal mentalization, which reflects mothers' capacity to represent their child in terms of mental states. Patterns of mentalization across siblings did not vary with maternal state of mind, nor were they linked with similarity in siblings' attachment classifications. However, when attachment security was represented as a continuous dimension, similarity in mentalization across siblings was associated with similarity in their relationship quality.

Study 3 returned to the field's traditional focus on maternal sensitivity, but examined its role from a family systems perspective including shared and non-shared components. Shared sensitivity contributed to similarity in the quality of siblings' relationships, but non-shared sensitivity did not account for differences. This work also revealed that siblings' relationship quality diverged even when assessed continuously and contemporaneously, complementing previous work based on categories assigned at different ages.

Together, these studies highlighted that variability in family attachment is a normative phenomenon requiring more comprehensive integration into theory and research. Future directions for the field are discussed, including the utility of applying approaches from beyond the realm of attachment to advance research in this area.

Keywords: attachment; siblings; family systems; maternal state of mind; attachment security; mentalization; sensitivity; shared environment; non-shared environment

Acknowledgements

This dissertation would never have been possible without the support of numerous individuals whom I am lucky to call mentors, colleagues, family, and friends. First and foremost, I would like to thank my supervisor, Dr. Greg Moran, for his unwavering support throughout my grad school years. His wisdom, sense of humour, and faith in me taught me lessons that went far beyond research skills and attachment theory. I will forever be grateful for the opportunity to have worked with Greg throughout these formative years of my career.

I have also been extremely lucky to work with two other wonderful mentors over the past seven years – Dave Pederson and Sandi Bento. Their smiling faces, supportive words, and readiness to help me succeed were integral in getting me through the ups and downs of grad school and made my experience at Western so rewarding. Also, thank you to the many other members of the Child Development Centre who helped me to reach my personal and professional goals. I will look back fondly on all the good times we shared and look forward to crossing paths again in the future.

I am extremely grateful for the mentorship and support of Dr. Jenny Jenkins and her team at OISE, especially Mira Boskovic, who generously shared their time, resources, and expertise with me as I worked towards completing my dissertation. I would also like to thank my other committee members – Dr. Pasco Fearon and Dr. Alan Leschied – for their cooperation, enthusiasm, and expertise. Their dedication to research and learning is inspiring.

No words would be enough to express how much I have appreciated the love and support of my family and friends. Thank you especially to my parents for always being only a phone call away, and for their selfless commitment to me and my goals. I am also beyond grateful to Anna, who has (and always will be) the best sister and friend I could ever ask for. In addition, I would like to thank my extended family and friends for being such wonderful and dedicated cheerleaders. None of this would have been possible without them.

Last, but definitely not least – I would like to thank my taller half, Paul, for his patience, love, and support. This dissertation is as much his accomplishment as it is mine.

Table of Contents

ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	xi
LIST OF APPENDICES	xii
1. Introduction	
Attachment Theory and Siblings	6
The Present Research	10
References	15
2. Patterns of Attachment Across Siblings and their Association with Maternal State of Mind	
State of Mind	20
Patterns of Attachment across Siblings: What has been Explored to Date?	21
Patterns of Attachment across Siblings: What Remains Uncharted?	23
Methods	26
Participants	26
Measures	29
Procedure	32
Results	33
Sample Characteristics – Attachment Distributions	33
Sibling Attachment Concordance	38
Associations between Maternal State of Mind and Sibling Attachment Concordance	41
Discussion	47
Patterns of Attachment Across Siblings: Variability is the Norm	49
Patterns of Attachment Within the Family: Further Complexity Emerges	50
Beyond Categorical Concordance: Measurement in Sibling Attachment Research	55
References	58

3. Patterns of Maternal Mentalization across Siblings: How are they Linked with State of Mind and the Quality of Siblings' Relationships?	62
Accounting for Individual Differences in Attachment: Beyond Maternal Sensitivity ...	63
Mentalization: Examining the Processes Underlying its Role in Attachment	66
Sibling Attachment Research: A Useful Model for Exploring Mentalization?	72
The Present Study	74
Methods	77
Participants	77
Measures	78
Procedure	82
Results	83
Descriptive Analyses	83
Preliminary Analyses	88
Links between Mentalization and Maternal State of Mind	92
Links between Mentalization, Attachment Security, and Attachment Concordance	96
Associations across concordance groups: Categorical analyses	97
Associations across concordance groups: Continuous analyses	105
Discussion	111
Returning to the Study's First Major Objective: Exploring Associations between Mentalization and State of Mind	111
Returning to the Study's Second Major Objective – Exploring Associations Between Mentalization, Infant Attachment Security, and Patterns of Attachment Within the Family	115
Links between Mentalization and Sibling Attachment Concordance: What Remains Unaccounted For?	119
Limitations and Future Directions	122
References	125
4. Expanding on Sensitivity: How do its Shared and non-Shared Components Shape the Quality of Siblings' Attachment Relationships?	131
New Directions for the Study of Sibling Attachment Concordance: Where to Next? .	132

Conceptualizing Shared and non-Shared Effects on Attachment across Siblings: Where does Sensitivity Fit in?	138
Non-shared influences arising from differential parenting	139
Non-shared influences arising from ambient parenting	141
Applying Perspectives from the Broader Literature to Attachment: Do Similar Mechanisms Link Sensitivity and Security	144
The Present Study	146
Methods	149
Participants	149
Measures	150
Procedure	155
Results	156
Part I: Exploring Associations between Study Variables	156
Part II: Main Analyses	161
Discussion	165
Patterns of Attachment across Siblings: A Concurrent Perspective	167
Accounting for Variability in Siblings' Relationships: How do Shared and Non-Shared Sensitivity Contribute	169
Beyond Sensitivity: What Might Account for Variability that Remains?	175
References	181
 5. Discussion	
Strengthening the Foundation and Rationale for Family Attachment Research: Variability is Common across Mothers and Siblings	191
Exploring Factors Underlying Patterns of Attachment within the Family: Some Answers, but Many Questions	193
Limitations	197
Future Directions and Implications	200
References	203
Appendices	206
Curriculum Vitae: Kathleen Anne O'Connor	222

List of Tables

Chapter 2: Patterns of Attachment Across Siblings and their Association with Maternal State of Mind

Table 1. Maternal State of Mind Regarding Attachment: Distribution of Adult Attachment Interview (AAI) Classifications	34
Table 2. Infant Attachment Security: Distribution of Strange Situation Procedure (SSP) Classifications for First- and Second-Born Infants	36
Table 3. Patterns of Attachment across First- and Second-Born Siblings, as per Four-Way Primary SSP Classifications	39
Table 4. Patterns of Attachment across First- and Second-Born Siblings, as per Three-Way Primary SSP Classifications	40
Table 5. Patterns of Attachment across First- and Second-Born Siblings, as per Three-Way Secondary SSP Classifications	42
Table 6. Patterns of Attachment across First- and Second-Born Siblings, as per Two-Way Secondary SSP Classifications	43
Table 7. Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Three-Way Primary AAI and SSP Classifications	45
Table 8. Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Three-Way Secondary AAI and SSP Classifications	46
Table 9. Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Two-Way Secondary AAI and SSP Classifications	48

Chapter 3: Patterns of Maternal Mentalization across Siblings: How are they Linked with State of Mind and the Quality of Siblings' Relationships?

Table 1. Maternal State of Mind Regarding Attachment: Distribution of Adult Attachment Interview (AAI) Classifications	84
Table 2. Infant Attachment Security: Distribution of Strange Situation Procedure (SSP) Classifications for First- and Second-Born Infants	86
Table 3. Concordance in the Quality of First- and Second-Born Siblings' Relationships, as per Two-Way Secondary SSP Classifications	87

Table 4. Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Two-Way Secondary AAI and SSP Classifications	89
Table 5. Intercorrelations among Study Variables	90
Table 6. Associations among Siblings on Mothers' Use of Mental Attributes, Use of Mental Child and Relationship Descriptors, and Global Mentalization Scores within the Sample Overall, and by State of Mind	93
Table 7. Means and Standard Deviations for Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores within the Sample Overall, and by AAI Classification	95
Table 8. Means and Standard Deviations for Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores by Birth Order and Four-Way Concordance Group	99
Table 9. Associations among Siblings in Concordant/Secure, Concordant/non-Secure, and Non-concordant Relationships on Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores	102
Table 10. Means and Standard Deviations for Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores, as well as Differences in these Values among Siblings by Birth Order and Concordance Group	104
Table 11. Regression Statistics for the Prediction of Differences in Siblings' Continuous Security Scores from Sibling Differences on Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores	107

**Chapter 4: Expanding on Sensitivity: How do its Shared and non-Shared
Components Shape the Quality of Siblings' Attachment Relationships?**

Table 1. Bivariate Associations between Study Variables and Covariates	158
Table 2. Descriptive Statistics for Direct, Differential and Ambient Sensitivity and Attachment Security for the Sample Overall, and for Older and Younger Siblings Separately	159
Table 3. Fixed-Effects Estimates and Variance-Covariance Estimates for Models Predicting Attachment Security from Differential Sensitivity, Ambient Sensitivity, and the Interaction between Them	162

Table 4. Fixed-Effects Estimates and Variance-Covariance Estimates for Model
Predicting Attachment Security from Ambient Sensitivity and Potential Covariates .. 163

List of Figures

Chapter 3: Patterns of Maternal Mentalization across Siblings: How are they Linked with State of Mind and the Quality of Siblings' Relationships?

- Figure 1. Scatterplot depicting the association between sibling differences on attachment security and on mothers' use of attributes referencing child Desires, Wishes, and Preferences 109
- Figure 2. Scatterplot depicting the association between sibling differences on attachment security and on mothers' use of attributes referencing child Emotions 110

List of Appendices

Appendix A. Letter of Information (Archival Sample)	206
Appendix B. Letter of Information (Recent Sample)	208
Appendix C. Consent Form (Archival Sample)	210
Appendix D. Consent Form (Recent Sample)	211
Appendix E. Ethics Approval (Archival Sample)	212
Appendix F. Ethics Approval (Recent Sample)	213
Appendix G. Modified Working Model of the Child Interview: Questions Common to First and Second-Born Siblings	215
Appendix H. Mini-Attachment Q-Sort (AQS) Items	216
Appendix I. Letter of Information (Kids, Families, and Places Study)	217
Appendix J. Consent Form (Kids, Families, and Places Study)	219
Appendix K. Ethics Approval (Kids, Families, and Places Study)	221

**Attachment Relationships within a Family Context:
Patterns and Predictors
Chapter 1: Introduction**

The field of attachment has long been recognized for its role in describing and explaining child development via the impact of early relationships (Sroufe, 2005). Rooted in a biological or evolutionary perspective, attachment theory proposes that both caregivers and infants are predisposed to behave in ways that maximize infant survival by providing and seeking out (respectively) comfort and care. Over time, and especially throughout the infant's first year of life, the emergent relationship shapes a goal-corrected system for balancing two behavioral systems key to infant adaptation (Bowlby, 1969): *attachment*, which motivates the infant to seek safety and protection, particularly when his environment is too complex; and *exploration*, which motivates him to explore his surroundings, particularly those that are unfamiliar (Ainsworth, Bell, & Stayton, 1971). Although these systems begin to emerge in infancy, they operate in dynamic equilibrium throughout the lifespan to fulfill functions required for survival, including the need for safety and security; understanding and awareness of one's environment; and the capacity to adapt to one's surroundings (Cassidy, 2008). Importantly, these systems also provide a key mechanism for exploring the social environment, which is thought to be one of the most significant – yet potentially most threatening – domains encountered by the child.

While most infants are capable of shifting between attachment and exploration depending on their perception of threat within the environment (rare exceptions include infants without consistent caregivers, such as those raised in institutions; Dozier & Rutter, 2008), individual differences in the patterning and organization of these shifts – that is, in the *quality* of an infant's attachment to his caregiver – can be observed as early as one year of age (Ainsworth et al., 1971). These differences are generally conceptualized

according to two broad relationship categories – “Secure” and “non-Secure” – that together reflect variability in the extent to which infants perceive their caregivers as available and responsive to their needs; and the corresponding organization of infants’ responses to their caregiver in light of these perceptions (Weinfield, Sroufe, Egeland, & Carlson, 2008). Infants in Secure relationships are thought to be confident in their caregiver’s capacity to support their exploration and to provide appropriate care should the need for protection arise. Consequently, these infants tend to balance attachment and exploration in a manner that is well suited to environmental demands. For instance, they may engage with new toys or individuals in the presence of their caregiver, but quickly display attachment behavior (e.g., crying, searching for the caregiver) when overwhelmed or separated; when reunited, those in Secure relationships tend to respond positively to their caregiver and generally return to exploration relatively easily (Main, 2000; Weinfield et al., 2008).

In contrast to those in Secure relationships, infants in non-Secure relationships are viewed as lacking confidence in their caregiver to the extent that they appear anxious and/or angry about their caregiver’s availability, as well as fearful that she will be unresponsive or ineffective when needed. These perceptions are expressed via one of two non-Secure patterns of attachment, each of which emphasizes one behavioral system more strongly at the cost of fulfilling the opposing need. First, infants in *Avoidant* relationships appear to be guided by the perception that their caregiver will reject bids for attention or comfort; while these infants tend to display exploratory behaviors in new situations, they rarely display strong attachment behaviors when distressed or indicate strong preference for their caregiver over unfamiliar individuals. In contrast, those in *Resistant* relationships appear to view their caregivers as inconsistently responsive to

their needs; accordingly, they tend to inhibit exploration even in novel situations and engage in intense (and often angry) displays of attachment behavior that persist even when provided with ongoing access to their caregiver. Although the patterns of behavior displayed by infants in non-Secure relationships are considered non-optimal because they inhibit exploration, they are also considered adaptive in that they represent the infant's attempts to structure his attachment system to the characteristics of his caregiving environment; that is, they represent a relatively predictable, systematic approach for maintaining as much safety and proximity as possible, thus promoting survival (Main, 2000; Weinfield et al., 2008).

A fourth attachment classification, *Disorganized*, was more recently developed to describe infants who display attachment behaviors that do not follow any of the organized frameworks described above (Hesse & Main, 2000). Those in Disorganized relationships are thought to perceive their caregiver as frightened and/or frightening, resulting in a "biologically-channeled paradox: the simultaneous need to approach, and take flight from, the parent" (Hesse & Main, 2000, p. 1118). This "fear without resolution" (Lyons-Ruth & Jacobvitz, 2008, p. 668) prevents the infant from organizing any consistent, identifiable strategy (whether Secure or non-Secure) for gaining comfort from their caregiver; for instance, those in Disorganized relationships may react to attachment-related distress by displaying contradictory attachment behaviors (e.g., approaching the caregiver with limbs pulled away) or behaviors that directly or indirectly signal apprehension (e.g., freezing; Main & Solomon, 1990). Again, these behaviors are viewed as adaptive responses to potential threat within the infant's caregiving environment, but are considered non-optimal as they leave key attachment needs unfulfilled.

Along with developing and refining the attachment patterns outlined above, decades of research have also been devoted to exploring the underpinnings of individual differences in the quality of attachment. These efforts have resulted in a widely held model describing the specific processes by which attachment relationships develop.¹ Specifically, this model suggests that the earliest predictor of the quality of attachment lies within mothers' internal working model (IWMs) regarding attachment, which develops as a function of their experiences in relationships over their lifetime (Bretherton & Munholland, 2008; Goldberg, 2000). In addition to providing a framework for conceptualizing relationships in general (Main, Kaplan, & Cassidy; van IJzendoorn, 1995), these IWMs also shape mothers' representations on a more specific level to influence how relationships with her own children are perceived (George & Solomon, 2008). The quality of these IWMs – particularly the extent to which they are reflective and free of psychological defenses (Bakermans-Kranenburg & van IJzendoorn, 1993) – appears to be one of the strongest predictors of the quality of attachment (Bernier & Dozier, 2003), even when assessed before the infant is born (Fonagy, Steele, & Steele, 1991). Specifically, mothers whose IWMs are “Autonomous” (i.e., balanced, consistent, and valuing of attachment relationships) tend to be in Secure relationships with their children, those whose IWMs are “non-Autonomous” (i.e., incoherent, angry/passive, or minimizing) tend to be in non-Secure relationships, and those whose IWMs are “Unresolved”, or characterized by unresolved trauma, tend to be in Disorganized relationships (Pederson, Gleason, Moran, & Bento, 1998; van IJzendoorn, 1995).

¹ This model, including its theoretical and empirical components, will be discussed further throughout this dissertation; however, an overview highlighting its key components is presented here.

Because mothers' cognitions regarding attachment are not directly accessible to their children, especially during infancy, attachment theory suggests that both general and relationship-specific elements of IWMs are communicated more proximally to the child by the quality of maternal interactive style (Atkinson et al., 2005). Within the field of attachment, the operative component of interactive style is conceptualized as *maternal sensitivity*, or the extent to which a mother is able to tailor her responses to suit the child's individual characteristics and needs (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969). A mother's capacity to interact sensitively is thought to be shaped – although, of course, not entirely determined – by the quality of her IWM: those classified Autonomous appear to perceive their child's signals more accurately, thus responding in ways that are sensitive to the child's needs; those classified as non-Autonomous may reflexively experience their child's attachment behavior as a stimulus for negative attachment-related memories, leading them to respond less sensitively (van IJzendoorn, 1995; Hesse, 2008). Finally, those classified Unresolved are thought to consciously or unconsciously perceive their child's signals as triggers for unresolved loss or trauma experiences, leading them to respond in ways that are frightened or frightening to the child (Hesse & Main, 2006; Main & Hesse, 1990).

Taken together, the model described above is considered foundational within the field of attachment for several reasons. First, it provides a mechanism for the intergenerational transmission of attachment, or the process via which the quality of attachment is communicated from mother to child. In particular, this model suggests that attachment is transmitted via elements of the child's caregiving environment, shaped most proximally by the quality of maternal interaction (sensitivity) and more distally by the mother's representations of past attachment-related experiences (IWMs; Main, 2000).

Second, in a related way, this model also provides insight into the forces shaping individual differences in relationships: experiences, even those occurring early in life, result in varying capacities to balance the key behavioral systems required for adaptation. The field's capacity to understand and predict these differences is especially significant given that patterns of early attachment are meaningfully and reliably linked with a broad range of developmental outcomes (Sroufe, 2005). For instance, a 30-year longitudinal study revealed that children with Secure histories appeared to have more optimal coping strategies and ego-resiliency at age 10; shared more balanced friendships in middle childhood; and were more often viewed as peer role models in adolescence. In contrast, those with non-Secure histories had ongoing difficulty with interpersonal relationships and were more likely to display certain forms of psychopathology (e.g., anxiety) throughout childhood and adolescence. Those with a history of Disorganization appeared most susceptible to poor developmental outcomes, including internalizing and externalizing disorders (Lyons-Ruth & Jacobvitz, 2008); poor academic achievement (Moss, St-Laurent, & Parent, 2001); and dissociation, conduct disorder, and self-injury – even after family and life history variables were controlled for (Sroufe, 2005). Although the processes leading to these developmental outcomes are complex and undoubtedly moderated by influences beyond attachment history, the quality of early relationships appears to play an important role in initiating certain pathways and in shaping a range of functions required for adaptation, including emotion regulation and patterns of social interaction (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2008; Sroufe, 2005).

Attachment Theory and Siblings

Despite the fact that most children grow up in families that include two or more children, the vast majority of attachment research to date has utilized between-family

designs that focus on only one child per family. Indeed, the possibility of differences in the attachment relationships shared across siblings and their common mother has traditionally been minimized because it was widely assumed that the model outlined above could simply be extended to represent a mother's relationship with more than one child. More specifically, because IWMs are viewed as generally stable by adulthood (George & Solomon, 2008), mothers were expected to conceptualize their relationship with each child similarly, leading them to display relatively constant levels of sensitivity in interaction with each child. This predicted consistency, in turn, was thought to yield relative concordance (i.e., similarity) in the quality of mothers' relationship with each sibling (O'Connor, Croft, & Steele, 2000; van IJzendoorn, et al., 2000).

A growing body of empirical work, however, suggests that the origins and patterning of attachment relationships within the family are much more complex than theory would predict. As described further in Study 1, research examining the extent to which the quality of siblings' relationships are similar report rates of concordance ranging from 54% (McCartney & Diggins, 1993, as cited in van IJzendoorn et al., 2000) to 64% (Teti, Nakagawa, Das, & Wirth, 1991, as cited in van IJzendoorn et al., 2000). Although these rates were sometimes statistically greater than chance (depending on sample size and how relationships were classified; van IJzendoorn et al., 2000), all clearly suggest that non-concordance is common – unexpectedly so, from the perspective of traditional attachment theory. Together, these studies suggest that the field's longstanding framework describing the development of attachment within dyads cannot be directly extended to account for patterns of attachment within the family; rather, siblings' relationships and their underlying processes appear to be more complex than originally predicted (O'Connor et al., 2000).

In exploring these theoretically unexpected findings, research has generally focused on the hypothesis that maternal representations, maternal sensitivity, or both of these factors may not be as stable across siblings' relationships as originally believed; and, moreover, that variability across siblings on these factors might then account for differences in the quality of their relationships. Indeed, research suggests that both factors, especially sensitivity, can indeed fluctuate within mothers over time. For instance, studies exploring sensitivity longitudinally tend to report only low to moderate stability (Lohaus, Keller, Ball, Voelker, & Elben, 2004), especially when assessment points are months to years apart and accompanied by changes in mothers' life circumstances and/or socio-emotional functioning (deWolff & Van IJzendoorn, 1997; Lindheim, Bernard, & Dozier, 2011; Meins, Fernyhough, Arnott, Turner, & Leekam, 2011) or by interventions aimed at improving sensitive responding (Bakermans-Kranenburg et al., 2008; Moran, Pederson, & Krupka, 2005; van den Boom, 1994). Although less research has explored longitudinal stability in maternal IWMs, some literature suggests that the nature and quality of representations may also be impacted by life events and attachment-related experiences (Touris, Kromelow, & Harding, 1995). Taken together, this work indicates that although these factors are likely stable to an extent, they are also characterized by some degree of within-person variability (Lindhiem et al., 2011; also see Bolger, Davis, & Rafaeli, 2003). Thus, it would be reasonable to assume that if maternal factors can vary within mothers across time, they might also vary across siblings – especially given that the integration of a new child into the family represents a significant attachment-related event that could well have a substantial impact on mothers' representations and interactive style (Touris et al., 1995). Theoretically,

differences in these factors across siblings could be systematically associated with differences in the quality of their attachment relationships.

To date, the majority of empirical work aiming to account for differences in siblings' relationships has focused on the role of maternal sensitivity, given that it is seen as the most important proximal influence on the relationship and is more easily assessed in research studies than most representational factors. As outlined in Studies 2 and 3, however, these efforts have not been successful in providing substantive insight into the underpinnings of sibling attachment concordance; that is, differences in the level of sensitivity displayed by mothers in interaction with each child do not appear systematically associated with differences in the quality of their relationships (Pederson, Moran, Bailey, & Bento, 1999; van IJzendoorn et al., 2000). Despite this failure to empirically establish that sensitivity is a key determinant of within-family patterns of attachment, essentially no further work has been devoted to searching for other factors underlying patterns of attachment within the family, resulting in a little movement within this area of research (Fearon, Bakermans-Kranenburg, & van IJzendoorn, 2010). Still, researchers within the field have increasingly recognized that restricting research to the between-family level precludes a true understanding of the processes via which relationships and their associated developmental outcomes emerge. Accordingly, many highlight a pressing need to shift the focus of research towards the family context, promoting a more integrated perspective that reflects the interrelatedness and interconnectedness of attachment relationships at levels beyond the dyad (Kozłowska & Hanney, 2002). Thus, calls for a stronger emphasis on the study of attachment within families, particularly the relationships between siblings and their common mother, have moved to the literature's forefront.

The Present Research

This dissertation aimed to move the field beyond its current crossroads by making preliminary and exploratory steps towards further insight into the processes underlying patterns of attachment within the family. This work focused on several main avenues of research, as explored in three separate studies integrating traditional attachment methods and constructs with a number of concepts and approaches that are less common within the field of attachment research.

This dissertation's first major objective (see Chapter 2) was to contribute to the field of sibling attachment on a foundational level by providing a detailed, comprehensive description of the patterns of attachment within the family. Due to the challenges associated with conducting sibling attachment research – particularly the substantial resources required to measure most attachment-based constructs – very few studies have utilized the full spectrum of attachment classifications (i.e., Avoidant, Secure, Resistant, and Disorganized) when estimating concordance among siblings. Moreover, no research to date has described the patterning of attachment relationships across generations; that is, the extent to which the quality of a mother's IWM is consistent not only with the quality of her relationship with one child, as in dyadic research, but with her two children. This study addressed these fundamental gaps by comprehensively characterizing patterns of attachment within the family in a dataset composed of psychometrically strong, detailed assessments of maternal state of mind and infant attachment security. Given that such work plays an especially important role in the early stages of a research programme, this descriptive study aimed to illustrate the varied ways in which attachment presents within a family context; and to expand upon existing estimates of concordance within the family.

The second major avenue explored in this dissertation was centered on the possibility that the field's emphasis on maternal sensitivity, long viewed as one of the most important determinants of the quality of attachment, may have masked the potential for other constructs to account for important variability in patterns of attachment within the family. To this end, Chapter 3 focused on the role of maternal *mentalization*, a construct that indexes the mother's capacity to represent her infant's mental processes and use this representation to understand the child's needs (Grienenberger, Kelly, & Slade, 2005; Meins, 2013). While between-family research indicates that mentalization is associated in meaningful ways with individual differences in attachment, relatively little is currently known about mentalization from a within-family perspective. For instance, while mentalization is assumed to be a relatively stable maternal trait, this assumption has not yet been tested empirically; that is, no previous work has explored patterns of mentalization across more than one child. Second, no work has yet explored the extent to which patterns of mentalization across siblings are associated with patterns of attachment within the family. In exploring these issues, Chapter 3 aimed to a) achieve more insight into the nature of mentalization and its links with family attachment relationships; and b) to broaden the focus of sibling attachment research by examining the utility of a factor whose role within a family context has not yet been considered.

The third major avenue explored in this dissertation returned to a focus on the factor that attachment theory most commonly associates with variability in attachment – maternal sensitivity – but explored its links with sibling relationships via a framework and methodology that has not yet been utilized within the field of sibling attachment. As previously discussed, attachment theorists and researchers tend to conceptualize sensitivity according to a dyadic framework centered on the relationship between one

mother and one child. This perspective, however, is limited in that parenting is typically experienced within a family system that includes both non-shared *and* shared effects; that is, each child's experience of parenting is in fact composed of a unique combination of a) the parenting that they experience directly; *and* b) the parenting directed towards their sibling(s), whose relationships are unfolding within the same family context (Hetherington, Reiss, & Plomin, 1994). Chapter 4 aimed to extend the existing literature by re-conceptualizing links between security and sensitivity according to a family systems perspective that includes shared and non-shared components, examining the extent to which each level of influence explains variability in the quality of siblings' relationships. In doing so, this study also contributed to the literature on concordance (as outlined in Chapter 2) by exploring patterns of attachment among siblings when relationships were assessed concurrently – an approach that has been utilized minimally to date in favor of assessing siblings' relationships at the same developmental stage. In adopting this multi-level, concurrent approach, Study 3 aimed to more comprehensively capture the processes by which sensitivity is linked with the quality of attachment in the family – the context, in most cases, within which most children's relationships unfold.

While the studies outlined above are different in important ways – each, for instance, explores unique research questions and thus utilizes its own set of participants and/or measures – all converge on several levels. First, each is aimed at describing and, in the case of Chapters 3 and 4, accounting for some aspect of attachment within the family, expanding upon existing work within the field by introducing constructs, methodological approaches, and/or analytic strategies that are less commonly used within the field. In doing so, these studies not only provide important information about the nature and underlying processes related to *family* attachment relationships, but also allow

for greater insight into *individuals'* characteristics and the forces shaping them (Plomin & Daniels, 1987). That is, sibling designs – in which each child is exposed to some features of family life that are similar to that of their siblings, and other features that differ – have the capacity to provide a unique perspective on the factors shaping individual differences that often cannot be fully addressed in dyadic research. Thus, while the studies in this dissertation focus most explicitly on characterizing and understanding variability in attachment among siblings, they are also united in their capacity to provide greater insight into social-emotional development at the level of the individual.

Note that the studies outlined above are not intended to be a comprehensive exploration of the myriad factors that likely shape attachment within the family. For instance, researchers – both within and beyond the field of attachment – have cited the importance of child-specific characteristics in shaping developmental outcomes, including age and ordinal position, child gender, and genetic/temperamental effects (Hoffman, 1991). Additionally, the relationships shared between children and other significant individuals in their lives (e.g., siblings, fathers) likely make further important contributions (Crouter, McHale, & Tucker, 1999; Feinberg & Hetherington, 2001). While a comprehensive approach that incorporates all these influences would be ideal, the following studies center predominantly on maternal factors to remain consistent with the focus of most attachment research to date and, perhaps more importantly, because mothers tend to be children's earliest and most significant attachment figures.

It is also important to underscore another important feature of this work: that is, that much of this dissertation was based upon literature outside the existing body of sibling attachment research. Relying solely on the sibling attachment literature to address the research questions outlined above would be challenging as it currently provides little

foundation upon which to build plausible and well-informed theories (Fearon et al., 2010). Accordingly, this dissertation frequently centered on two related yet distinct domains of research for additional support around conceptual, methodological, and statistical issues: first, attachment research with twins, which aligns with the present work in terms of its focus on processes specific to attachment; second, the literature exploring variability across siblings on broader domains of social-emotional development, which offers a more extensive and well-supported set of approaches for understanding sibling differences than is currently available within the attachment literature. As described more extensively throughout this dissertation (and especially in Chapter 4), neither domain is entirely generalizable to the developmental processes shaping the attachment relationships of non-twin siblings. However, when integrated with the existing body of sibling attachment research, they provided a stronger conceptual and empirical framework than could be achieved by relying on sibling attachment research alone. Moreover, they also allowed this dissertation to move towards achieving its broadest goals: to provide a foundation for further research investigating sibling attachment relationships, to direct attention beyond the traditional constructs and methods used in dyadic-level attachment research, and to provide a plausible starting point for empirical research examining contributors to attachment variability within families.

References

- 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.
- 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.
- 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.
- Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (1993). A psychometric study of the Adult Attachment Interview: Reliability and discriminant validity. *Developmental Psychology, 29*, 870-879.
- 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* (pp. 59-74). New York: Lawrence Erlbaum Associates.
- Bernier, A., & Dozier, M. (2003). Bridging the attachment transmission gap: The role of maternal mind-mindedness. *International Journal of Behavioral Development, 27*, 355-365.
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54*, 579-616.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.
- 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. 395-433). New York: Guilford Press.
- Crouter, A. C., McHale, S. M., & Tucker, C. J. (1999). Does stress exacerbate parental differential treatment of siblings? A pattern-analytic approach. *Journal of Family Psychology, 13*, 286-299.
- 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.

- Dozier, M., & Rutter, M. (2008). Challenges to the development of attachment relationships faced by young children in foster and adoptive care. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 698-717). New York: Guilford Press.
- Fearon, R. M. P., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2010). Jealousy and attachment: The case of twins. In S. L. Hart & M. Legerstee (Eds.), *Handbook of jealousy: Theories, principles, and multidisciplinary approaches*. United States: Wiley-Blackwell Publishing.
- Feinberg, M., & Hetherington, E. M. (2001). Differential parenting as a within-family variable. *Journal of Family Psychology*, 15, 22-37.
- Fonagy, P., Steele, H., & Steele, M. (1991). Maternal representations of attachment during pregnancy predict the organization of infant-mother attachment at one year of age. *Child Development*, 62, 891-905.
- 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.
- Grienenberger, J., Kelly, K., & Slade, A. (2005). Maternal reflective functioning, mother infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment and Human Development*, 7, 299-311.
- 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. (2000). Disorganized infant, child, and adult attachment: Collapse in behavioural and attentional strategies. *Journal of the American Psychoanalytic Association*, 48, 1097-1127.
- Hesse, E., & Main, M. (2006). Frightened, threatening, and dissociative parental behavior in low-risk samples: Description, discussion, and interpretations. *Development and Psychopathology*, 18, 309-343.
- Hetherington, E. M., Reiss, D., & Plomin, R. (Eds.). (1994). *Separate social worlds of siblings: The impact of nonshared environment on development*. Hillsdale, NJ:

Lawrence Erlbaum Associates, Inc.

- Hoffman, L. W. (1991). The influence of the family environment on personality: Accounting for sibling differences. *Psychological Bulletin*, *110*, 187-203.
- Kozłowska, K., & Hanney, L. (2002). The network perspective: An integration of attachment and family systems theories. *Family Process*, *41*, 285-312.
- Lindheim, O., Bernard, K., & Dozier, M. (2011). Maternal sensitivity: Within-person variability and the utility of multiple assessments. *Child Maltreatment*, *16*, 41-50.
- Lohus, A., Keller, H., Ball, J., Voelker, & Elben, C. (2004). Maternal sensitivity in interactions with three- and 12-month-old infants: Stability, structural composition, and developmental consequences. *Infant and Child Development*, *13*, 235-252.
- Lyons-Ruth, K., & Jacobvitz, D. (2008). Attachment disorganization: Genetic factors, parenting contexts, and developmental transformation. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 98-101). New York: Guilford Press.
- 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/disoriented attachment status: Is frightened and/or frightening parental behavior the linking mechanism? In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the Preschool Years* (pp. 121-160). 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.
- Main, M., & Solomon, J. (1990). Procedure for identifying infants as Disorganized/disoriented during the Ainsworth Strange Situation. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the Preschool Years* (pp. 121-160). Chicago, IL: University of Chicago Press.
- Meins, E. (2013). Sensitive attunement to infants' internal states: Operationalizing the construct of mind-mindedness. *Attachment and Human Development*, *15*, 524-544.
- Meins, E., Fernyhough, C., Arnott, B., Turner, M., & Leekam, S. (2011). Mother- versus infant-centered correlates of mind-mindedness in the first year of life. *Infancy*, *16*, 137-165.

- Moran, G., Pederson, D., & Krupka, A. (2005). Maternal unresolved attachment status impedes the effectiveness of interventions with adolescent mothers. *Infant Mental Health Journal, 26*, 231-249.
- Moss, E., St-Laurent, D., & Parent, S. (1999) Disorganized attachment and developmental risk at school age. In J. Solomon & C. George (Eds.), *Attachment disorganization* (pp. 160-186). New York, NY: Guilford.
- O'Connor, T. G., Croft, C., & Steele, H. (2000). The contributions of behavioral genetics studies to attachment theory. *Attachment and Human Development, 2*, 107-122.
- 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., Bailey, H. N., & 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.
- 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.
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment and Human Development, 7*, 349-367.
- Touris, M., Kromelow, S., & Harding, C. (1995). Mother-firstborn attachment and the birth of a sibling. *American Journal of Orthopsychiatry, 65*, 293-297.
- van den Boom, D. C. (1994). The influence of temperament and mothering on attachment and exploration: An experimental manipulation of sensitive responsiveness among lower-class mothers of irritable infants. *Child Development, 65*, 1457-1477.
- 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.
- 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.

Chapter 2: Patterns of Attachment Across Siblings and their Association with Maternal State of Mind

In contrast to the vast body of between-family research investigating the nature and development of attachment relationships, the field's exploration of patterns of attachment within the family has been very limited. In general, this area of attachment research has been under-studied for two main reasons. First, as outlined previously, many researchers within the field have subscribed – whether explicitly or implicitly – to the largely-untested notion that because maternal state of mind is thought to be relatively stable by adulthood (George & Solomon, 2008), mothers should hold similar representations regarding their relationship with each of their children and, consequently, should interact similarly across siblings. As a result, mothers should form a similar quality of attachment with each child, regardless of differences in their personal characteristics, birth order, and so on (O'Connor, Croft, & Steele, 2000). This line of reasoning, which arises from a rather linear interpretation of attachment theory's traditional model (van IJzendoorn et al., 2000), has dampened interest in within-family research because it suggests that conclusions stemming from between-family work can simply be extrapolated to processes taking place within the family; that is, if one understands how attachment relationships develop for one child, one can extend this understanding to account for the developmental processes experienced by his sibling(s).

In addition to these theoretical barriers, within-family research presents several very practical challenges: methodologically, high-quality attachment research typically involves intensive measures that require considerable input from researchers and participants alike (Richters, Waters, & Vaughan, 1988). Thus, completing these measures several times per family – that is, in relation to each sibling – is substantially more

demanding in comparison to more traditional designs involving only one child (Fearon, Bakermans-Kranenburg, & van IJzendoorn, 2010) – especially considering a) the number of families required to achieve adequate statistical power; and b) that some of this data is likely to be rendered unusable due to attrition, especially if data must be collected from families at intervals several years apart (e.g., when siblings are the same age). These considerations, coupled with the absence of a strong theoretical and empirical foundation for work to build upon (Fearon et al., 2010), have resulted in slow progress within this area of the literature.

Patterns of Attachment within the Family: What has been Explored to Date?

To date, most of the limited research investigating patterns of attachment within the family has focused on establishing rates of concordance in siblings' attachment classifications, investigating the theoretical prediction that siblings should share similar relationships with their common mother. In the earliest published study exploring sibling attachment relationships, Ward, Vaughn, and Robb (1988) contrasted the quality of siblings' relationships, as assessed when each child was 12 months old, in a sample of 61 families. When relationships were conceptualized according to the three organized classifications (i.e., Avoidant, Secure, or Resistant), 57% of siblings were in concordant relationships; when the two non-Secure classifications (i.e., Avoidant and Resistant) were collapsed, 61% were in concordant relationships. Similar rates were reported in two other unpublished studies that similarly based their estimates on whether siblings were in Secure versus non-Secure relationships (54%, McCartney & Diggins, 1993; and 64%, Teti, Nakagawa, Das, & Wirth, 1991, both cited in van IJzendoorn et al., 2000). While these studies were useful in providing a preliminary look at patterns of attachment within the family, they featured several limitations; for instance, sample sizes were generally

small and Disorganization, a relatively new classification within the field at the time, was not included. Overall, however, they provided early evidence that the patterning of relationships shared among siblings and their common mother is more complex than a straightforward extension of conventional attachment theory would predict.

More recently, van IJzendoorn et al. (2000) explored patterns of attachment in 138 families, combining three samples from North America and Europe.² In building upon the work described above, this study provided a more updated and detailed assessment of sibling attachment concordance by providing estimates based on all classifications, both organized and disorganized (again, assigned when each child was 12 months old). When distinctions in the quality of infants' relationships were based upon the full spectrum of relationships (Avoidant, Secure, Resistant, and Disorganized), concordance was modest and non-significant (44%); when those in Disorganized relationships were re-classified into their best-fitting organized classification, the rate of concordance among siblings did not change substantially (49%). Although concordance increased markedly when relationships were classified as either organized or Disorganized (73%), attachment distributions within this low-risk sample were too skewed towards non-Disorganization for classifications to be significantly associated across siblings. Rather, the quality of siblings' relationships was only significantly associated when relationships were classified as either Secure or non-Secure (62%). Although van IJzendoorn et al.'s (2000) findings must be considered preliminary for several reasons – for instance, they represent one of the few sets detailing patterns of attachment among siblings, and the only set to include Disorganization – they are notable in that they reflect the complex and

² A subset of van IJzendoorn et al.'s (2000) North American sample is included in the present study's archival dataset (see "Methods").

theoretically-unexpected nature of attachment within the family. That is, although attachment relationships across siblings and their mother are often similar, it appears that almost equally often, they are not – thus highlighting the need for additional investigation into the patterning of within-family relationships.

Patterns of Attachment within the Family: What Remains Uncharted?

To date, only a handful of studies have explored the correlates of sibling attachment concordance, as well as its underlying processes; this work, unfortunately, has not resulted in much substantive insight. For instance, some research suggests that gender correspondence among siblings increases the likelihood of concordance, but not to a statistically significant extent (Teti & Ablard, 1989; van IJzendoorn et al., 2000). Other research has explored the extent to which patterns of maternal interactive behavior are related to concordance; again, as outlined elsewhere in this dissertation, these efforts have not been very fruitful. Surprisingly, however, no research has explored links between sibling attachment concordance and one factor that appears consistently and strongly associated with attachment security in between-family research (Bernier & Dozier, 2003): maternal state of mind, or the mother's "set of rules for the organization of information relevant to attachment and for obtaining or limiting access to that information" (Main, Kaplan & Cassidy, 1985, pp. 66-67). This construct is viewed as largely global, organizing mothers' thoughts and emotions across her significant relationships – including those with each of her children – and, as mentioned above, is widely considered stable by adulthood following formative attachment-related experiences in childhood and adolescence (George & Solomon, 2008).

In attachment research, the quality of maternal state of mind is conceptualized according to four main categories: *Autonomous*, which describes mothers who value

attachment relationships and can coherently describe both positive and negative attachment experiences; *Dismissing*, which describes those who minimize attachment-related experiences or are unable to illustrate their account of these experiences using concrete examples; *Preoccupied*, which describes those who are overly engrossed in their recollection of past experiences and are unable to describe them coherently; and *Unresolved/disorganized*, which describes those whose accounts are characterized by signs of unresolved trauma (Hesse, 2008; van IJzendoorn & Bakermans-Kranenburg, 1996). These categories are viewed as paralleling the Secure, Avoidant, Resistant, and Disorganized infant classifications, respectively, and are structured similarly: like the Disorganized infant classification, the adult Unresolved/disorganized classification is assigned along with a secondary organized classification (*Dismissing*, *Autonomous*, or *Preoccupied*) that best describes the underlying structure of the individual's state of mind. Empirically, the respective maternal and infant categories have been found to be consistently linked in a theoretically predicted fashion, with effect sizes for the association between state of mind and security approaching $d = 1.0$ and beyond (van IJzendoorn, 1995). The specific mechanism via which this association takes place is currently unclear: while theory suggests that these patterns are linked via maternal interactive style – whereby state of mind influences the extent to which a mother responds sensitively to her child's needs, which in turn shapes the quality of the relationship (Ainsworth, Bell, & Stayton, 1971; Main, 2000) – this mechanism has not been entirely supported empirically (van IJzendoorn, 1995; Atkinson et al., 2005). All the same, systematic associations between these classifications are robust and consistent, even when assessed prenatally (Fonagy, Steele, & Steele, 1991), suggesting that state of mind has an important influence on the quality of mother-infant attachment (van IJzendoorn, 1995).

While numerous dyadic studies have explored the extent to which maternal state of mind corresponds to and shapes the quality of the mother-infant relationship, no work has investigated the extent to which state of mind is linked in expected ways with attachment security across children in a family. Given that state of mind is viewed as relatively stable (George & Solomon, 2008), one would predict that mothers with an Autonomous state of mind will tend to form Secure relationships with both of their children, those classified Dismissing will form Avoidant relationships with both children, and so on. These hypotheses, however, are likely overly straightforward – especially given that similarly clear-cut hypotheses describing expected patterns of attachment across siblings have not been supported empirically (e.g., van IJzendoorn et al., 2000). Currently, the extent to which links between maternal state of mind and sibling attachment relationships present as theoretically expected is entirely unknown, representing a critical gap in the field’s understanding of the ways in which attachment manifests in a family context. Thus, empirical work that comprehensively characterizes patterns of attachment within the family would be a clear step towards building and strengthening the foundation of sibling attachment research.

Over the years, the Child Development Centre at Western University has used the most well-validated measures within the field of attachment to collect data on state of mind and infant attachment security from two community samples composed of mothers and their two children. In the present study, data from both samples were collapsed to create a unique dataset that a) is characterized by psychometrically strong assessments classifying state of mind and infant attachment security according to the full spectrum of classifications currently recognized within the field; and b) has a sample size that is substantial within this area of research, thus allowing for patterns of attachment to be

comprehensively described according to broad and specific distinctions in the quality of attachment. In utilizing this dataset, the present study aimed to contribute to sibling attachment research – and the field of attachment, more generally – in two main ways. First, it replicated previous research by exploring patterns of attachment among siblings in a new sample, thus providing further information about typical rates of concordance among siblings in low-risk samples. Second, it uniquely contributed to the literature by exploring patterns of attachment within the family as they exist across generations, examining the extent to which maternal state of mind is associated with the quality of mother-infant relationships within the family.

To summarize, this descriptive study set out to fulfill the following objectives:

1. To describe the patterns of mother-infant attachment within the family, including
 - a) the degree of concordance in the attachment relationships between a mother and each of her two children; and b) the extent to which concordance varies as a function of the manner in which relationships are categorized (i.e., broad versus specific classifications).
2. To describe the associations between state of mind and mother-infant attachment relationships within the family, including
 - a) the extent to which state of mind is theoretically consistent with the relationships a mother shares with her children; and b) the extent to which this association varies depending on how state of mind and relationships are categorized (i.e., broad and specific classifications).

Methods

Participants

Participants were drawn from two samples: an archival sample of families that had participated in research through the Child Development Centre approximately 20 years

ago; and a sample of families that were in the process of participating in a longitudinal study of attachment through the Child Development Centre at the time of the present study. These samples were similar in several ways: participants in both studies had participated in assessments of state of mind and infant attachment security using the most well-validated, widely recognized measures currently in use within the field; and both were low-risk groups with similar demographic characteristics. These groups were combined to produce an overall sample that was large enough for patterns of attachment within the family to be comprehensively explored and characterized.

Recruitment. The archival sample included 46 families who had participated in various studies of attachment with one child, and subsequently had another child with whom they agreed to participate in a parallel study exploring siblings' attachment relationships. These families were drawn from three different studies that had been conducted through the Child Development Centre in the late 1980s and early 1990s: one exploring attachment relationships in infants born prematurely versus those born full-term, and two exploring attachment in community samples. In 1989, all mothers who had previously participated these studies were contacted by phone to inquire as to whether they had had a second child and, if so, to invite them to participate in the sibling study. A second wave of recruitment took place in 1993 for all mothers who had participated in these studies since the first wave. Researchers successfully contacted a total of 115 families from two of the three studies listed above (the total number contacted for one community sample was not available). Of these, 10 had had a subsequent child but refused to participate in the sibling study due to other commitments, and 55 had not yet had a second child. The remaining 50 mothers agreed to participate in the sibling study.

Four were not included in the present study as they were teenagers and were thus unsuitable for inclusion in a study focused on attachment in low-risk families.

The recent sample included 37 mothers who were recruited into a longitudinal study of attachment by volunteers on hospital maternity wards in London, ON shortly after having given birth to their firstborn child. Mothers who agreed to participate were re-contacted when their infant was two months old with further information and to arrange their first visit, which took place approximately one month later. Mothers then agreed to participate in three additional home-based assessments when their child was between the ages of 4 and 21 months, as well as laboratory-based assessments between the ages of 12 and 42 months. Only data from the 3- and 12-month time points were used in this study. In total, 83 mothers participated in these two assessment points.

During the course of their participation in this longitudinal study, 57 mothers reported that they had had a second child and were invited to participate in a parallel longitudinal study with him/her. Five mothers declined when contacted to set up their first visit, reporting that they were too busy. Another 15 mothers had moved and/or could not be contacted by the time their second-born child was old enough to participate. Ultimately, 37 mothers and their two children participated in the present sibling study, which included a home-based assessment when the second-born child was approximately 12 months of age and three laboratory-based assessments beginning at 12 months of age. Only data from the 12-month laboratory-based assessment point were used in this study. Thirty-six mothers and their second-borns completed this assessment; one mother expressed concern about her child tolerating the procedure and declined to participate.

Demographic characteristics. Demographic information was collected upon participants' initial participation and updated at all subsequent visits. Household incomes

ranged from \$10 000 - \$20 000 to more than \$80 000 ($M = \$40\ 000 - \$50\ 000$ CDN). On average, both parents' highest level of education was some college or university (ranging from less than high school to a post-graduate degree). All were married or in common-law relationships, with the exception of one mother who was initially living common-law but became single by the time her second child was 12 months old. On average, mothers were 29.90 years old at their first child's birth ($SD = 3.73$), while fathers were 32.75 years old ($SD = 5.07$). Seventy-two mothers had experienced an uneventful pregnancy and delivery with their firstborn; 11 in the archival sample had delivered prematurely (i.e., at less than 37 weeks gestation) but without any gross physical or neurological anomalies. These infants participated at their corrected age (see Pederson & Moran, 1996). All younger siblings were full-term and healthy at birth.

Participating siblings included 29 boy-girl, 20 boy-boy, 21 girl-girl, and 13 girl-boy pairs. Sixty-eight sibling pairs were the only children in the family at the time of the present study; 11 were the youngest of three siblings, and 4 were the youngest of four.³ Spacing between siblings ranged from 0.67 to 5.70 years ($M = 2.47$ years, $SD = 0.97$).

Tests of significance were used to compare archival and recent samples on the demographic characteristics presented above. There were no significant differences between samples on any characteristic.

Measures

Maternal state of mind. The Adult Attachment Interview (AAI; George, Kaplan, & Main, 1996) is a semi-structured interview that assesses state of mind regarding

³ For ease of reference, all siblings are referred to throughout this paper as “firstborn” and “second-born” to signify their position in relation to each other. “Older” and “younger” were not used because these labels may lead to the impression that infants were different ages when participating in the study, when in fact all infants were 12 months old.

attachment. Interviews typically took approximately 45 to 85 minutes to administer, and were audio-taped and transcribed verbatim with the exception of any identifying information. Each transcript was then rated on 17 nine-point scales: 5 “experience” scales, assessing experiences with attachment figures; and 12 “state of mind” scales, reflecting current state of mind regarding each attachment figures. Based on these scale scores, raters classified each transcript as Dismissing (Ds), Autonomous (F), or Preoccupied (E). Raters also assigned a classification of Unresolved/disorganized (U/d) to transcripts that were characterized by lapses in monitoring of reasoning or discourse (i.e., received a score of 5 or higher on a 9-point scale). For those classified as U/d, their organized classification (i.e., Ds, E, or F) is considered a secondary classification that best fits the underlying quality of their state of mind.

Psychometric properties. Extensive psychometric research (see Hesse, 2008; van IJzendoorn, 1995) indicates that the AAI is independent of differences among participants in IQ, social desirability, personality, and autobiographical memory unrelated to attachment. Moreover, this measure has demonstrated strong reliability over time and across interviewers (Bakermans-Kranenburg & van IJzendoorn, 1993). A meta-analysis (van IJzendoorn, 1995) revealed a large effect size (Cohen’s $d = 1.06$) for the association between AAI classifications and the security of mother-infant attachment relationships, with no systematic influence attributable to study characteristics (e.g., AAI training). This meta-analysis also indicated that the AAI has strong predictive validity, not only in terms of broad classifications (i.e., Secure versus non-Secure), but also in terms of three- and four-way classifications where non-Secure and Disorganized groups are considered separately; these findings are considered especially exceptional given the component of error involved in coding the AAI and SSP (van IJzendoorn, 1995; van IJzendoorn, 1992).

Reliability. As previously outlined, the present study utilized data that was originally collected during families' participation in a larger longitudinal study of attachment. Twenty-one percent of AAI transcripts for the full samples from which these participants were drawn were checked for inter-rater reliability. Agreement on the three primary classifications (Ds, E, and F) was 83%, $\kappa = .77, p < .05$. Agreement among four-way classifications (Ds, E, F, and U/d) was 97%, $\kappa = .96, p < .01$. At that time, however, it was impossible to determine which firstborn infants would go on to have a younger sibling and ultimately participate in the sibling study. Sixteen percent of the AAIs used in the present study happened to be among those checked for reliability. Inter-rater reliability within this sub-sample was 100% for both four- and three-way classifications.

Attachment security. The Strange Situation Procedure (SSP; Ainsworth et al., 1971; Ainsworth, Blehar, Waters, & Wall, 1978) is a standardized laboratory procedure that assesses the quality of the mother-infant attachment relationship. Its eight episodes range from low-stress, where the mother and infant are together in a room with several toys; to high-stress, where the baby is left alone. Episodes are intended to last three minutes each, but were terminated if the infant became extremely upset.

SSPs were videotaped and coded on 7-point scales of Avoidance, Resistance, Proximity-Seeking, and Contact Maintenance. The number of 15-second intervals in each episode during which the infant was crying was also recorded. Scores on these scales, along with qualitative observations of infant behavior, were used to classify each relationship as Avoidant (A), Secure (B), or Resistant (C). Infants were also classified as Disorganized (D) if they were assigned a score of 5 or higher on a 9-point scale of Disorganized/disoriented behavior. For children classified as D, their organized (i.e.,

A/B/C) classification became a secondary classification that best described the organized strategy underlying the primarily Disorganized quality of their attachment behavior.

Psychometric properties. The SSP is widely viewed as the ‘gold standard’ for assessing attachment security in infancy because of the large body of work supporting its validity (Cassidy & Shaver, 2008; van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen Walraven, 2004). Briefly, SSP classifications are consistently predicted by maternal interactive style; are relatively stable across development; and are linked with differences in other aspects of development across the lifespan (e.g., social-emotional functioning, peer and romantic relationships; see Solomon & George, 2008).

Reliability. Twenty-seven percent of SSPs in this study were checked for reliability. For four-way classifications (Avoidance, Secure, Resistant, and Disorganized), concordance among coders was 85% ($\kappa = .70, p < .01$); for three-way classifications (i.e., using secondary classifications for those primarily classified as D), concordance among coders was 95% ($\kappa = .90, p < .01$). These values are considered substantial and outstanding, respectively (Viera & Garrett, 2005).

Procedure

All mothers were provided with a letter of information regarding the study (see Appendices A and B for the archival and recent samples, respectively) and consented to their own involvement and that of their children (see Appendices C and D). Participants were treated in compliance with the Canadian Code of Ethics for Psychologists (Canadian Psychological Association, 2000) and institutional standards pertaining to research with human subjects (see Appendices E and F).

Archival Sample. Thirty-eight mothers completed the AAI (this measure was not yet in use when nine mothers from the archival sample were involved with the Child Development Centre). Thirty mothers completed the AAI when their second-born child was approximately 12 months old; the remaining 8 mothers, who were involved with the Child Development Centre at a later time when the AAI was fully in use, completed the AAI when their firstborn child was between eight and 12 months old. Mothers participated in the SSP at the Child Development Centre with each of their children when he/she was approximately 12 months old.

Recent Sample. Mothers and their firstborn children participated in a home visit when children were approximately three months of age. Mothers completed the AAI at this visit, as well as other measures and activities with their children. Mothers participated in the SSP at the Child Development Centre with each of their children when he/she was approximately 12 months old.

Results

Sample Characteristics – Attachment Distributions

Maternal state of mind. AAI classification distributions were depicted in four ways, as shown in Table 1. First, frequencies were calculated by classifying mothers as Dismissing (Ds), Autonomous (F), Preoccupied (E), or Unresolved/disorganized (U/d). Second, because they occurred relatively infrequently, the two non-Autonomous classifications (Ds and E) were collapsed; thus, classifications were represented as Autonomous, non-Autonomous, and Unresolved/disorganized. Next, mothers were classified according to their organized classification; that is, those classified as U/d were

Table 1

*Maternal State of Mind Regarding Attachment: Distribution of Adult Attachment**Interview (AAI) Classifications*

Four-way Primary			Three-way Primary			Three-way Secondary			Two-way Secondary		
Class.	<i>n</i>	%	Class.	<i>n</i>	%	Class.	<i>n</i>	%	Class.	<i>n</i>	%
Ds	14	18.7	non-Auton.	21	28.0	Ds	17	22.7	non-Auton	31	41.3
F	39	52.0	Auton.	39	52.0	F	44	58.7	Auton.	44	58.7
E	7	9.3	U/d	15	20.0	E	14	18.7			
U/d	15	20.0									

Note. “Ds” = Dismissing, “F” = Autonomous, “E” = Preoccupied, and “U/d” =

Unresolved/disorganized. “Non-Auton” = non-Autonomous, representing Dismissing and

Preoccupied groups combined.

re-categorized into their secondary, best-fitting classification. Finally, the two non-Autonomous secondary classifications were collapsed again, resulting in two groups: Autonomous versus non-Autonomous. Regardless of how state of mind was classified, the majority of mothers had either a primary or secondary classification of Autonomous. As expected from this low-risk sample, there were fewer mothers with a primary non-Autonomous classification and fewer still with a primary classification of U/d. Those who did receive a primary classification of U/d most often had an underlying classification of Preoccupied ($n = 7$), while five mothers and three mothers had underlying classifications of Autonomous and Dismissing, respectively.

Chi-square goodness-of-fit tests were conducted to determine whether the AAI classification distributions in this sample were consistent with those reported in the only existing meta-analysis involving middle-class, non-clinical samples (van IJzendoorn & Bakermans-Kranenburg, 1996). The distribution of AAIs in this sample was not significantly different from that of the reference sample when characterized according to four-way primary classifications ($\chi^2[3] = 0.47, p = 0.93$) or three-way secondary classifications ($\chi^2[2] = 0.08, p = .96$). These analyses were repeated for the archival and recent datasets separately; again, distributions of AAIs in both samples were consistent with those described by van IJzendoorn and Bakermans-Kranenburg (1996).

Infant attachment security. Distributions of attachment classifications for first- and second-born children were calculated in several ways, as shown in Table 2. First, frequencies were calculated by classifying infants as Avoidant (A), Secure (B), Resistant (C), and Disorganized (D). Second, non-Secure classifications (i.e., A and C) were collapsed due to their relatively small sizes. Third, infants classified as Disorganized

Table 2

*Infant Attachment Security: Distribution of Strange Situation Procedure (SSP)**Classifications for First- and Second-Born Infants.*

Four-way Primary			Three-way Primary			Three-way Secondary			Two-way Secondary		
Class.	<i>n</i>	%	Class.	<i>n</i>	%	Class.	<i>n</i>	%	Class.	<i>n</i>	%
Firstborn siblings (<i>n</i> = 83)											
A	11	13.3	non-Secure	17	20.5	A	17	20.5	non-Secure	32	38.6
B	43	51.8	Secure	43	51.8	B	51	61.4	Secure	51	61.4
C	6	7.2	D	23	27.7	C	15	18.1			
D	23	27.7									
Second-born children (<i>n</i> = 82)											
A	7	8.5	non-Secure	13	15.9	A	12	14.6	non-Secure	27	32.9
B	47	57.3	Secure	47	57.3	B	55	67.1	Secure	55	67.1
C	6	7.3	D	22	26.8	C	15	18.3			
D	22	26.8									

Note. The number of first- and second-born siblings is not equal because one mother declined to participate in the SSP with her second-born child. “A” represents infants in Avoidant relationships, “B” represents infants in Secure relationships, “C” represents infants in Resistant relationships, and “D” represents infants in Disorganized relationships. “non-Secure” represents Avoidant and Resistant groups combined.

were re-classified according to their secondary, best-fitting classifications. Finally, the two non-Secure secondary classifications were collapsed again to create one non-Secure group. Similar to the patterns of AAI classifications described above, most infants were in Secure relationships regardless of whether patterns of attachment were categorized according to primary or secondary classifications. The secondary classifications of infants in Disorganized relationships were primarily Secure or Resistant ($n = 8$ and 9 infants, respectively, with 5 Avoidant; this distribution was the same across birth order).

Chi-square goodness-of-fit tests were conducted to determine whether the SSP classification distributions in this sample were consistent with those reported in existing meta-analyses involving middle-class, non-clinical samples (van IJzendoorn, 1992; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). The distribution of SSP classifications among first- and second-borns in this sample was significantly different from that of the reference sample when characterized according to four-way primary classifications ($\chi^2[3] = 12.50, p = .001$; and $\chi^2[3] = 15.32, p = .001$); more specifically, the present study's sample included fewer infants in Avoidant relationships and more in Disorganized relationships as compared to the reference sample. When four-way classification distributions were examined for the archival and recent samples separately, chi-square analyses revealed that the classification distribution of firstborn siblings in the archival sample was nearly significantly different from that of the reference sample ($\chi^2[3] = 7.03, p = .07$), while the distribution of second-born siblings was significantly different ($\chi^2[3] = 10.78, p = .01$); in both cases, there were fewer infants in Avoidant relationships and more in Disorganized relationships than expected. There were, however, no

significant differences in four-way classification distributions between the recent and reference samples.

In contrast, the distribution of three-way primary classifications in this sample did not differ significantly from the reference sample for first-born siblings ($\chi^2[2] = 2.94, p = .23$) or second-born siblings ($\chi^2[2] = 4.29, p = .12$). Furthermore, no significant differences between samples emerged when SSP classification distributions in the archival and present samples were examined separately.

A final set of chi-square analyses was conducted to determine whether classification distributions of first- and second-born siblings differed across archival and recent samples. The distribution of four-way primary classifications was not significantly different across first-born siblings in the archival and recent samples ($\chi^2[3] = 0.46, p = .92$), nor was the distribution of four-way secondary classifications ($\chi^2[2] = 0.99, p = .61$). Similarly, second-borns' four- and three-way classification distributions were not different across archival and recent samples ($\chi^2[3] = 0.76, p = .86$; $\chi^2[2] = 0.77, p = .67$).

Sibling Attachment Concordance

Contingency table analyses were performed to evaluate rates of concordance in siblings' attachment relationships. Separate analyses were conducted based on the classification groupings depicted in Table 2.

Forty-three percent of sibling attachment relationships were concordant when attachment relationships were classified as Avoidant, Secure, Resistant, or Disorganized (see Table 3); 45.1% of relationships were concordant when classified as Secure, non-Secure, or Disorganized (see Table 4); 54.9% were concordant when classified as

Table 3

*Patterns of Attachment across First- and Second-Born Siblings, as per Four-Way**Primary SSP Classifications*

		SSP Classification – second-born sibling				
		Avoidant	Secure	Resistant	Disorg.	Total
SSP	Avoidant	1 (0.9)	6 (5.7)	1 (0.7)	2 (2.7)	10
Classification –		0.2, 1.2%	0.2, 7.3%	0.3, 1.2%	-0.5, 2.4%	
firstborn sibling	Secure	3 (3.7)	25 (24.6)	3 (3.1)	12 (11.5)	43
		-0.5, 3.7%	0.2, 30.5%	-0.1, 3.7%	0.2, 14.6%	
	Resistant	1 (0.5)	2 (3.4)	2 (0.4)	1 (1.6)	6
		0.7, 1.2%	-1.2, 2.4%	2.5, 2.4%	-0.6, 1.2%	
	Disorg.	2 (2.0)	14 (13.2)	0 (1.7)	7 (6.2)	23
		0.0, 2.4%	0.4, 17.1%	-1.6, 0%	0.5, 8.5%	
	Total	7	47	6	22	82

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages, are presented below the observed/expected values. Cells representing concordance among siblings are bolded. Fisher's Exact Test, $p = .42$. Cells with adjusted standardized residuals above or below ± 2.0 are italicized.

Table 4

Patterns of Attachment across First- and Second-Born Siblings, as per Three-Way

Primary SSP Classifications

		SSP Classification – second-born sibling			
		non-Secure	Secure	Disorg.	Total
SSP	non-Secure	5 (2.5)	8 (9.2)	3 (4.3)	16
Classification –		1.9, 6.1%	-0.7, 9.8%	-0.8, 3.7%	
firstborn sibling	Secure	6 (6.8)	25 (24.6)	12 (11.5)	43
		-0.5, 7.3%	0.2, 30.5%	0.2, 14.6%	
	Disorg.	2 (3.6)	14 (13.2)	7 (6.2)	23
		-1.1, 2.4%	0.4, 17.1%	0.5, 8.5%	
	Total	13	47	22	82

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages, are presented below the observed/expected values. “non-Secure” represents Avoidant and Resistant groups combined. Cells representing concordance among siblings are bolded. Pearson $\chi^2[4] = 3.96, p = .43$.

Avoidant, Secure, or Resistant (see Table 5); and 65.9% were concordant when classified as Secure or non-Secure (see Table 6). Classifications were only significantly associated across siblings when two-way secondary classifications were used (i.e., Secure or non-Secure; see Table 6).

Together, these results indicated that approximately half the sibling pairs in this study were in concordant relationships when attachment quality was classified according to four-way primary classifications, or three-way primary or secondary classifications. The rate of concordance increased to nearly two-thirds of siblings when relationships were classified more broadly as Secure or non-Secure; indeed, this configuration was the only one in which siblings' relationships were significantly associated.

Associations between Maternal State of Mind and Sibling Attachment Concordance

Further contingency table analyses were conducted to evaluate links between maternal state of mind and sibling attachment concordance. More specifically, these analyses aimed to evaluate the extent to which patterns of attachment are consistent with a straightforward interpretation of the dyadic literature, which would suggest that mothers classified Autonomous will tend to be in two Secure relationships, non-Autonomous mothers will be in two non-Secure relationships (with more specific links between the Dismissing-Avoidant and Preoccupied-Resistant categories), and Unresolved/disorganized mothers will be in two Disorganized relationships.

An analysis using four-way primary classifications was not conducted as the number of different combinations of infant SSP classifications across siblings ($n = 16$), coupled with the number of maternal AAI classifications ($n = 4$), would result in insufficient power given sample size. Thus, analyses began with 3-way primary AAI classifications (Autonomous, non-Autonomous, and Unresolved/disorganized) and six

Table 5

*Patterns of Attachment across First- and Second-Born Siblings, as per Three-Way
Secondary SSP Classifications*

		SSP Classification – second-born sibling			
		Avoidant	Secure	Resistant	Total
SSP	Avoidant	2 (2.3)	9 (10.7)	5 (2.9)	16
Classification –		-0.3, 2.4%	-1.0, 11.0%	1.5, 6.1%	
firstborn sibling	Secure	6 (7.5)	39 (34.2)	6 (9.3)	51
		-0.9, 7.3%	2.3, 47.6%	-2.0, 7.3%	
	Resistant	4 (2.2)	7 (10.1)	4 (2.7)	15
		1.5, 4.9%	-1.9, 8.5%	0.9, 4.9%	
	Total	12	55	15	82

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages, are presented below the observed/expected values. Cells representing concordance among siblings are bolded. Fisher's Exact Test, $p = .11$. Cells with adjusted standardized residuals above or below ± 2.0 are italicized.

Table 6

*Patterns of Attachment across First- and Second-Born Siblings, as per Two-Way
Secondary SSP Classifications*

		Second-born sibling		
		non-Secure	Secure	Total
Firstborn sibling	non-Secure	15 (10.2) <i>2.3, 18.3%</i>	<i>16 (20.8)</i> <i>-2.3, 19.5%</i>	31
	Secure	<i>12 (16.8)</i> <i>-2.3, 14.6%</i>	39 (34.2) 2.3, 47.6%	51
	Total	27	55	82

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages, are presented below the observed/expected values. “non-Secure” represents Avoidant and Resistant groups combined. Cells representing concordance among siblings are bolded. Pearson $\chi^2[1] = 5.39, p = .02$. Cells with adjusted standardized residuals above or below ± 2.0 are italicized.

possible patterns of sibling attachment concordance, as based upon 3-way primary SSP classifications (non-Secure, Secure, and Disorganized). When classified in this way, patterns of attachment were consistent with theoretical prediction in 24.3% of families (see Table 7). There was no significant association between maternal state of mind and siblings' attachment relationships.

Next, a similar analysis was conducted using three-way secondary AAI and SSP classifications (Dismissing, Autonomous, and Preoccupied; Avoidant, Secure, and Resistant) as the basis for sibling attachment concordance. This analysis allowed for an exploration of whether underlying patterns of attachment (i.e., non-U/d and non-D) were consistent across mothers and infants/siblings. In this analysis, within-family patterns of attachment were consistent with theory in 32.4% of families (see Table 8). Here, the association between maternal state of mind and sibling attachment concordance bordered very closely on significance ($p = .05$). An examination of standardized residuals, however, indicated that significance did not arise because maternal and infant classifications were particularly concordant in ways that would be predicted by theory (e.g., Dismissing with concordant/Avoidant, etc.). Rather, it appeared related to certain patterns of non-concordance: Preoccupied mothers were in fewer non-concordant relationships consisting of one Avoidant and one Secure child than expected, and in more non-concordant relationships consisting of one Avoidant and one Resistant relationship than expected. Moreover, Autonomous mothers were in fewer non-concordant relationships consisting of one Avoidant and one Resistant relationship than anticipated.

A final analysis was conducted using two-way secondary AAI classifications (Autonomous and non-Autonomous) and two-way secondary SSP classifications (Secure and non-Secure) as the basis for concordance. This analysis collapsed the two non-

Table 7

Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Three-Way Primary AAI and SSP Classifications.

		Sibling attachment concordance						
		C/ non-Secure	C/ Secure	C/ Disorganized	Non-C/ Secure & non- Secure	Non-C/ Secure & Disorg.	Non-C/ non-Secure & Disorg.	Total
A	Non-	2 (1.4)	3 (5.7)	4 (2.0)	3 (4.0)	8 (7.1)	1 (0.9)	21
A	Autonomous	-0.6, 2.7%	-1.6, 4.1%	1.8, 5.4%	-0.6, 4.1%	0.5, 10.8%	0.2, 1.4%	
I	Autonomous	2 (2.6)	15 (10.3)	2 (3.6)	9 (7.2)	8 (12.8)	2 (1.5)	38
		-0.5, 2.7%	2.5, 20.3%	-1.3, 2.7%	1.1, 12.2%	-2.4, 10.8%	0.5, 2.7%	
	U/d	1 (1.0)	2 (4.1)	1 (1.4)	2 (2.8)	9 (5.1)	0 (0.6)	15
		0, 1.4%	-1.3, 2.7%	-0.4, 1.4%	-0.6, 2.7%	2.4, 12.2%	-0.9, 0%	
	Total	5	20	7	14	25	3	74

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages are presented below the observed/expected values. “C” represents siblings in concordant relationships, “Non-C” represents infants in non-concordant relationships. “non-Secure” represents Avoidant and Resistant groups combined, “U/d” represents mothers classified Unresolved/disorganized. Cells representing concordance within the family are bolded. Fisher’s Exact Test, $p = .14$. Cells with adjusted standardized residuals above or below ± 2.0 are italicized.

Table 8

Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Three-Way Secondary AAI and SSP Classifications

		Sibling attachment concordance						Total
		C/ Avoidant	C/ Secure	C/ Resistant	Non-C/ Avoidant & Secure	Non-C/ Secure & Resistant	Non-C/ Avoidant & Resistant	
A	Dismissing	1 (0.5)	7 (7.4)	0 (0.9)	4 (3.7)	2 (1.6)	4 (3.0)	17
A		0.9, 1.4%	-0.2, 9.5%	-1.1, 0%	0.2, 5.4%	-0.6, 1.4%	0.7, 5.4%	
I	Autonomous	1 (1.2)	21 (18.6)	2 (2.3)	12 (9.3)	3 (4.1)	4 (7.6)	43
I		-0.2, 1.4%	1.1, 28.4%	-0.3, 2.7%	1.5, 16.2%	-0.9, 4.1%	-2.2, 5.4%	
	Preoccupied	0 (0.4)	4 (6.1)	2 (0.8)	0 (3.0)	3 (1.3)	5 (2.5)	14
		-0.7, 0%	-1.2, 5.4%	1.6, 2.7%	-2.2, 0%	1.7, 4.1%	2.0, 6.8%	
	Total	2	32	4	16	7	13	74

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages are presented below the observed/expected values. “C” represents siblings in concordant relationships, “Non-C” represents infants in non-concordant relationships. Cells representing concordance within the family are bolded. Fisher’s Exact Test = 16.02, $p = .05$. Cells with adjusted standardized residuals above or below ± 2.0 are italicized.

Autonomous and two non-Secure groups, which were relatively smaller than the Autonomous and Secure groups, in an effort to mitigate the impact of sample size discrepancies among groups. Within-family patterns of attachment appeared consistent with theory in 39.2% of families (see Table 9) but the association between maternal state of mind and sibling attachment concordance was again non-significant.

Overall, these findings indicate that relatively few families were characterized by patterns of attachment that were consistent with a straightforward extrapolation of attachment theory. One exception was that many families fell into the Autonomous/concordant-Secure category, although these cells' residuals were typically not significant (except for when family concordance was based upon three-way primary classifications, as in Table 7). Aside from this trend, patterns tended to be more variable, with no significant associations between state of mind and infant attachment regardless of the manner in which classifications were represented. That is, while maternal state of mind was sometimes consistent with patterns of attachment across siblings, this association was non-significant and there were a substantial number of families in which state of mind was consistent with one or neither mother-infant relationship.

Discussion

To date, the field of attachment has largely assumed that the traditional model describing the processes by which relationships develop could be extended to account for patterns of attachment within the family – despite the fact that this model was founded primarily on between-family designs (O'Connor et al., 2000). Not unexpectedly, early research exploring attachment within the family has clearly demonstrated that the patterning of attachment relationships within the family is more complex than theory

Table 9

Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Two-Way Secondary AAI and SSP Classifications

		Sibling attachment concordance			
		Concordant/ non-Secure	Concordant/ Secure	Non-concordant	Total
AAI	non-Autonomous	8 (5.9) 1.3, 10.8%	10 (13.0) -1.4, 13.5%	13 (12.1) 0.4, 17.6%	31
	Autonomous	6 (8.1) -1.3, 8.1%	21 (18.0) 1.4, 28.4%	16 (16.9) -0.4, 21.6%	43
Total		14	31	29	74

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages are presented below the observed/expected values. “non-Secure” represents Avoidant and Resistant groups combined. “non-Autonomous” represents Dismissing and Preoccupied groups combined. Cells representing concordance within the family are bolded. Pearson $\chi^2(2) = 2.62, p = .26$.

would predict (van IJzendoorn et al., 2000; Ward et al., 1988): while concordance (i.e., similarity) in the quality of attachment siblings' relationships is indeed common, so is non-concordance.

The present study aimed to build upon the limited existing research to further explore and characterize patterns of attachment within the family, including a) the extent to which the relationships shared between siblings and their common mother are similar; and b) the extent to which the quality of a mother's state of mind corresponds to the quality of her relationships with her children in theoretically predicted ways. At its broadest level, this descriptive study was intended to act as a foundation for future theoretical and empirical work within the field, providing a starting point for further investigation into the roots of attachment within the family.

Patterns of Attachment across Siblings: Variability is the Norm

Although traditional attachment theory proposes that siblings experience a similar quality of attachment within their common mother (van IJzendoorn et al., 2000), early empirical research exploring attachment across siblings indicates that non-concordance is observed in approximately one-third to one-half of families, depending on how relationships are classified (Ward et al., 1988; van IJzendoorn et al., 2000). A similar pattern of results emerged in the present study, with estimates of concordance ranging from 43% when relationships were classified according to four-way primary classifications (Avoidant, Secure, Resistant, Disorganized) to nearly 66% when relationships were classified according to secondary classifications and the two non-Secure groups were collapsed (i.e., as Secure or non-Secure). These findings are remarkably consistent with those reported in other research (e.g., van IJzendoorn et al., 2000), suggesting that concordance rates are relatively stable across low-risk samples.

A key point when interpreting results from sibling attachment research to date is the fact that most work, including the present study, explores attachment across siblings when both are the *same age*, not at the same point in time. Thus, estimates of concordance described in this study and others do not reflect the quality of relationships that mothers and their children share concurrently, but rather reflect similarities and differences in relationships that, in many cases, are assessed years apart. It is probable that concordance estimates could change if siblings were assessed at the same point in time – a possibility that will be explored further in Chapter 4. However, studies of twin attachment, in which both infants are assessed at the same age, have reported rates of concordance similar to those reported from sibling designs (see Bokhorst et al., 2003). Based on this work, it appears that rates of non-/concordance across siblings are not entirely dependent on whether relationships are assessed at the same time or same age; rather, they may be a relatively stable feature of attachment relationships within families.

Although beyond the scope of this descriptive study, a logical question emerging from the findings above relates to the factors that underlie sibling attachment concordance; that is, what shapes similarities and differences in siblings' attachment relationships? As described previously, several preliminary studies have explored the extent to which maternal interactive behavior, as displayed in interaction with each child, corresponds with differences in the quality of their relationships (van IJzendoorn et al., 2000; Teti & Ablard, 1988; Ward et al., 1988), but little definitive insight has been gained to date. Further possibilities will be explored in later sections of this dissertation.

Patterns of Attachment Within the Family: Further Complexity Emerges

The present study's second objective was to move beyond patterns of mother-sibling relationships to explore the quality of attachment *within the family*, investigating

the extent to which state of mind was consistent with patterns of attachment across siblings. Results indicated that the quality of attachment across mothers and siblings was consistent with theoretical prediction in only approximately 25% of families when based upon the most fine-grained classifications of state of mind and mother-infant attachment, but increased to nearly 40% when broader attachment categories were used (i.e., Autonomous vs. non-Autonomous; Secure vs. non-Secure). These estimates are substantially lower than the rate of correspondence between state of mind and the quality of mother-infant attachment in between-family research; for instance, a meta-analysis of studies evaluating correspondence between one mother and one infant reported rates of correspondence of 63% and 74% based on four-way and two-way (Secure versus non-Secure) classifications, respectively (van IJzendoorn, 1995). On one hand, it is likely unreasonable to expect that these rates be carried over to represent concordance between maternal state of mind and attachment security across siblings – given, for instance, that each assessment is associated with an element of measurement error (Carlson & Sroufe, 1993) and that concordance estimates based on three assessment points (i.e., mothers and their two children) may be more susceptible to error-related ‘noise’ than those involving only two assessments (i.e., one mother, one child). Still, these results clearly demonstrate several key points. First, contrary to a linear interpretation of attachment theory, they suggest that both concordance and non-concordance in maternal state of mind and sibling attachment relationships are typical. Second, they highlight that the link between state of mind and infant security may be weaker within versus between families, giving rise to further questions about the processes underlying the transmission of attachment from mother to child and how these may vary across different children within a given family.

Although the pathways underlying concordance within the family are likely highly complex and varied, two possibilities are immediately apparent. First, mothers may not always interact as (in)sensitively as their state of mind might predict; that is, mothers classified as Autonomous may interact relatively insensitively with one or both of their children, while those classified non-Autonomous may interact sensitively with one or both. One study exploring correspondence between maternal state of mind and attachment security found that ‘mismatches’ (i.e., cases where mothers classified Autonomous were in non-Secure relationships, and vice versa) tended to occur when mothers displayed levels of sensitivity that were inconsistent with their AAI classification, but consistent with their dyad’s SSP classification (Atkinson et al., 2005). Extending these findings to the present study, maternal state of mind may have been concordant with sibling attachment relationships when sensitivity was stable and consistent with that predicted by the mother’s state of mind, while non-concordance between state of mind and one or both siblings’ relationships may have occurred when mothers interacted with one or both children in such a way that was inconsistent with state of mind. Work exploring the roots of variability in sensitivity within mothers indicates that fluctuation over time may occur as a function of numerous contextual and personal factors, including changes to mothers’ social-emotional well being, social support, and marital relationship quality (Levendosky, Bogat, Huth-Bocks, Rosenblum, & von Eye, 2011). However, this potential mechanism assumes that sensitivity across siblings is a key determinant of the patterning of siblings’ relationships – a process that has not been fully supported in previous research (van IJzendoorn et al., 2000); thus, the extent to which it accounts for the present study’s findings remain to be explored.

Another potential explanation for (non-)concordance within the family relates to the assumption that state of mind is a stable characteristic that would not be expected to shift substantially throughout adulthood (George & Solomon, 2008). Indeed, there is empirical evidence to suggest that maternal state of mind, particularly when assessed using the AAI, is stable over time even in the face of significant life events; for instance, Crowell, Treboux, and Waters (2002) reported that 78% of adults' three-way AAI classifications remained stable before and after marriage, which is a significant life event for most individuals. However, no research to date has evaluated the extent to which maternal state of mind remains stable across the trajectory of parenthood, which includes a range of impactful attachment-related experiences that may affect mothers' views of themselves as an attachment figure, their other significant relationships, their perspectives on their own childhood, and so on (Touris, Kromelow, & Harding, 1995). Thus, one might expect that change in state of mind could be even more prevalent than reported by Crowell et al. (2002) if assessed throughout one's life as a parent (Thompson, 2008).

In the present study, estimates of concordance among family members were based upon only one assessment of maternal state of mind; moreover, these assessments took place at varying points in family life as the AAI was only being introduced as an assessment tool at the time that the archival study was taking place. It is possible that concordance estimates would be different if state of mind had been assessed more than once: to illustrate, a mother may have been classified non-Autonomous prior to the birth of her first child, with whom she went on to share a non-Secure relationship. Ongoing attachment-related experiences, however, could have shifted her state of mind towards Autonomy, which could have then shaped a Secure relationship with her second child. In this case, assessing state of mind only once would give the impression of non-

concordance within the family (non-Autonomous/non-Secure/Secure); assessing state of mind more than once, however, would have revealed concordance. Thus, it is possible that patterns of concordance within the family, as reported in the present study, could be related – at least in part – to possible changes in maternal state of mind over time.

Although relatively few associations between state of mind and attachment across siblings emerged as predicted, two related trends could be identified when within-family patterns of attachment were examined overall: a) infants in Secure relationships tended to have siblings who were also in Secure relationships; and b) mothers of these concordant/Secure infants tended to be classified as Autonomous; that is, these classifications appeared to “hang together”. In contrast, patterns of attachment in families where one or both siblings’ relationships were non-Secure, and/or maternal state of mind was non-Autonomous, tended to be more variable. Links between Autonomy and security across siblings – which were statistically significant in some cases, but arose from an examination of trends in others – are consistent with dyadic research suggesting that Security tends to be a more robust dyadic characteristic than non-Security; for instance, some studies suggest that relationships classified Secure when infants are 12 months old tend to be similarly classified six months later, while those initially classified non-Secure display more instability over time (Edwards, Eiden, & Leonard, 2004; Levendosky et al., 2011). The present study is the first to extend the finding of longitudinal stability among Secure dyads to the family context, demonstrating that Security may also be more stable than non-Security among family members. However, it is important to note that although these links appeared relatively more stable, they were not entirely consistent. Again, more research is needed to understand the circumstances under which each of these patterns emerges within the family.

Beyond Categorical Concordance: Measurement in Sibling Attachment Research

One issue that has been mentioned only briefly – both within the present study and within the attachment literature to date – concerns the impact of measurement on estimates of concordance. First, it is difficult to be confident about the ‘expected’ rate of concordance within families given that test-retest reliability on the SSP and AAI is not entirely consistent, even when constructs are assessed by experienced coders (Carlson & Sroufe, 1993; Baldwin & Fehr, 1995). Given these psychometric limitations, what rate of concordance should act as a threshold for determining whether family members’ relationship patterns are consistent with theory or not?

Even more fundamentally, challenges associated with the use of categories for representing psychological constructs have long been recognized both within and outside the field of attachment (Cohen, 1983; Kraemer, Noda, & O’Hara, 2004; MacCallum, Zhang, Preacher, & Rucker, 2002). In the case of the SSP, a categorical approach was selected by Ainsworth et al. (1978) to help “retain the picture of patterns of behavior” (p. 57) and to highlight the developmental origins of the various patterns of attachment “rather than burying [them] in a welter of refined statistics” (p. 57). A similar categorical approach was also utilized for the AAI because this measure was originally developed to describe mothers whose infants had already been classified in the SSP (George & Solomon, 1996). While both instruments have displayed remarkable utility within the field, many have expressed concern that a categorical approach is not the most appropriate way of representing individual differences in attachment; indeed, a growing body of empirical work exploring the underlying structure of security and state of mind suggests that these constructs are better captured by dimensional (not taxonic) models (Fraley & Spieker, 2003; Roisman, Fraley, & Belsky, 2007).

In the present study, and in sibling research overall, the use of categories as a basis for comparison within families has several important implications. First, assigning individuals and relationships to attachment categories may be masking important subtleties in the quality and nature of attachment (Fraley & Waller, 1998). For instance, infants classified as belonging to certain Secure subgroups may display behaviors that overlap with those displayed by infants in Resistant relationships; in sibling research, relatively small differences among siblings in the quality and degree of these behaviors may result in the pair being classified non-concordant, despite the fact that their relationships are functionally quite similar. If these constructs are best represented continuously, a categorical approach may be resulting in inaccurate representations of the extent to which relationships within the family actually converge.

A second, related consideration associated with categorical approaches relates to their tendency to restrict statistical power (Kraemer et al., 2011). This issue is salient within attachment research overall because the non-Secure and non-Autonomous classifications are assigned less frequently than the Secure and Autonomous classifications (Fraley & Waller, 1998; Fraley & Spieker, 2003), but is especially problematic in within-family work because group assignment is typically based on a greater number of classifications (i.e., two or three, versus one or two). Thus, the size discrepancy between the most and least common groups is heightened even further, especially when utilizing more fine-grained classifications. In the present study, the fact that most infants were classified as Secure and most mothers were classified Autonomous – as expected in a low-risk sample (van IJzendoorn, 1995) – limited the extent to which patterns could be comprehensively explored, despite the fact that this sample was large in comparison to previous sibling attachment studies.

As previously mentioned, the present study adopted a traditional approach to exploring patterns of attachment within the family for various reasons (e.g., consistency with similar research and the field at large). While this study contributed to sibling attachment research in meaningful ways, its findings are subject to the likelihood that the measurement issues described above are limiting the extent to which patterns of attachment within the family are fully represented. As noted by Fraley and Waller (1998), “even if the types themselves were responsible for advancing the field in the beginning, they have the potential to cripple the field in the long run” (p. 105) – a possibility that may be especially threatening within the field of sibling attachment, where the lack of a substantive body of empirical work is likely due at least in part to the methodological and measurement issues outlined above. While novel approaches to sibling attachment research are explored in Chapters 3 and 4, further efforts – including those focused on fundamental methodological issues within the field – will likely be required to support a more refined view of attachment that is conducive to further complex theoretical and empirical work.

References

- 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.
- 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.
- 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.
- Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (1993). A psychometric study of the Adult Attachment Interview: Reliability and discriminant validity. *Developmental Psychology, 29*, 870-879.
- Baldwin, M. W., & Fehr, B. (1995). On the instability of attachment style ratings. *Personal Relationships, 2*, 247-261.
- Bernier, A., & Dozier, M. (2003). Bridging the attachment transmission gap: The role of maternal mind-mindedness. *International Journal of Behavioral Development, 27*, 355-365.
- 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.
- Canadian Psychological Association. (2000). *Canadian code of ethics for psychologists* (3rd Ed.). Ottawa, ON: Canadian Psychological Association.
- Carlson, E., & Sroufe, L. A. (1993, Spring). Reliability in attachment classifications. *Newsletter of the Society for Research in Child Development*, pp. 4, 12.
- Cassidy, J., & Shaver, P. R. (Eds.). (2008). *Handbook of attachment: Theory, research, and clinical applications*. New York: Guilford Press.
- Cohen, C. E. (1983). Inferring the characteristics of other people: Categories and attribute accessibility. *Journal of Personality and Social Psychology, 44*, 34-44.
- Crowell, J. A., Treboux, D., & Waters, E. (2002). Stability of attachment representations: The transition to marriage. *Developmental Psychology, 38*, 467-479.
- Edwards, E. P., Eiden, R. D., & Leonard, K. E. (2004). Impact of fathers' alcoholism and

associated risk factors on parent-infant attachment stability from 12 to 18 months. *Infant Mental Health Journal*, 25, 556-579.

- Fearon, R. M. P., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2010). Jealousy and attachment: The case of twins. In S. L. Hart & M. Legerstee (Eds.), *Handbook of jealousy: Theories, principles, and multidisciplinary approaches*. United States: Wiley-Blackwell Publishing.
- Fonagy, P., Steele, H., & Steele, M. (1991). Maternal representations of attachment during pregnancy predict the organization of infant-mother attachment at one year of age. *Child Development*, 62, 891-905.
- Fraley, R. C., & Spieker, S. J. (2003). Are infant attachment patterns continuously or categorically distributed? A taxometric analysis of Strange Situation behavior. *Developmental Psychology*, 39, 387-404.
- Fraley, R. C., & Waller, N. G. (1998). Adult attachment patterns: A test of the typological model. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 77-114). New York: Guilford Press.
- George, C., Kaplan, N., & Main, M. (1996). *Adult Attachment Interview protocol* (3rd ed.). Unpublished manuscript, University of California at Berkeley.
- George, C., & Solomon, J. (1996). Representational models of relationships: Links between caregiving and attachment. *Infant Mental Health Journal*, 17, 198-216.
- 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.
- 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.
- Kraemer, H. C., Noda, A., & O'Hara, R. (2004). Categorical versus dimensional approaches to diagnosis: Methodological challenges. *Journal of Psychiatric Research*, 38, 17-25.
- Levendosky, A. A., Bogat, G. A., Huth-Bocks, A. C., Rosenblum, K., & von Eye, A. (2011). The effects of domestic violence on the stability of attachment from infancy to preschool. *Journal of Clinical Child and Adolescent Psychology*, 40, 398-410.
- MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods*, 7, 19-40.

- 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., 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.
- Main, M., & Solomon, J. (1990). Procedure for identifying infants as Disorganized/disoriented during the Ainsworth Strange Situation. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the Preschool Years* (pp. 121-160). Chicago, IL: University of Chicago Press.
- O'Connor, T. G., Croft, C., & Steele, H. (2000). The contributions of behavioral genetics studies to attachment theory. *Attachment and Human Development*, 2, 107-122.
- Pederson, D. R., & Moran, G. (1996). Expressions of the attachment relationship outside of the Strange Situation. *Child Development*, 67, 915-927.
- Richters, J. E., Waters, E., & Vaughn, B. (1988). Empirical classification of infant mother relationships from interactive behavior and crying during reunion. *Child Development*, 59, 512-522.
- Roisman, G. I., Fraley, R. C., & Belsky, J. (2007). A taxometric study of the Adult Attachment Interview. *Developmental Psychology*, 43, 675-686.
- Solomon, J., & George, C. (2008). The measurement of attachment security and related constructs in infancy and early childhood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 383-418). New York: Guilford Press.
- Teti, D. M., & Ablard, K. E. (1989). Security of attachment and infant-sibling relationships: A laboratory study. *Child Development*, 60, 1519-1528.
- Thompson, R. A. (2008). Early attachment and later development: Familiar questions, new answers. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 348-365). New York: Guilford Press.
- Touris, M., Kromelow, S., & Harding, C. (1995). Mother-firstborn attachment and the birth of a sibling. *American Journal of Orthopsychiatry*, 65, 293-297.
- van IJzendoorn, M. H. (1992). Intergenerational transmission of parenting: A review of studies in nonclinical populations. *Developmental Review*, 12, 76-99.
- 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., & Bakermans-Kranenburg, M. J. (1996). Attachment representations in mothers, fathers, adolescents, and clinical groups: A meta-analytic search for normative data. *Journal of Consulting and Clinical Psychology*, *64*, 8-21.
- 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.
- Viera, A. J., & Garrett, J. M. (2005). Understanding interobserver agreement: The kappa statistic. *Family Medicine*, *37*, 360-363.
- 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.

Chapter 3

Patterns of Maternal Mentalization across Siblings: How are they Linked with State of Mind and the Quality of Siblings' Relationships?

Since the field's earliest days, attachment researchers have sought to understand the processes underlying individual differences in relationships. As previously described, decades of theoretical and empirical work have resulted in a widely-held model for the development of attachment relationships: state of mind, as shaped by the mother's own experiences in relationships, influences the quality of her interactions with her child (Main, Kaplan, & Cassidy, 1985); her interactive style, in turn, shapes the quality of their relationship (Ainsworth, Blehar, Waters, & Wall, 1978). In this way, interactive style (specifically maternal sensitivity, which refers to the mother's ability to tailor her interactions to suit her child's needs) is traditionally viewed as the primary mediator of the link between state of mind and infant attachment security (Pederson, Gleason, Moran, & Bento, 1998).

To date, this model has provided a useful framework for conceptualizing the roots of individual differences in attachment, with its theoretical basis strengthened further by the substantial body of empirical research supporting each of its constituent links (see van IJzendoorn, 1995). However, other work – particularly that exploring this model in its entirety – suggests that the overall mechanism described above is not as straightforward as it may appear. In particular, a meta-analysis conducted by van IJzendoorn (1995) reported that while state of mind and infant attachment security were indeed associated, only 12% of the variance in sensitivity was attributable to state of mind, and only 10% of the variance in attachment security was attributable to sensitivity. Other research exploring the association between state of mind and security found no evidence that this link was mediated by sensitivity (Atkinson et al., 2005). These theoretically-unexpected

findings have been noted across samples (Atkinson et al., 2005) and are not entirely attributable to measurement issues, given that much variance remains unaccounted for across measures and procedures (de Wolff & van IJzendoorn, 1997). Together, this research points to a gap in the intergenerational transmission of attachment (van IJzendoorn, 1995): while sensitivity is associated with both state of mind and attachment, it does not adequately account for the association between them (Grienenberger, Kelly, & Slade, 2005). Consequently, many researchers have adopted the perspective that “sensitivity has lost its privileged position as the only causal factor” in shaping security (De Wolff & van IJzendoorn, 1997, p. 585; George & Solomon, 2008) and turned their attention to other factors that have not been the focus of traditional research, but that may shed light on the processes underlying individual differences in attachment and its transmission from mother to child.

Accounting for Individual Differences in Attachment: Beyond Maternal Sensitivity

When the transmission gap was initially identified, efforts to expand the scope of research beyond sensitivity focused primarily on state of mind, which was (and continues to be) the strongest identified predictor of attachment security (Bernier & Dozier, 2003). In exploring mothers’ responses on the Adult Attachment Interview (AAI), a research group led by Fonagy and colleagues (Fonagy, Steele, Moran, Steele, & Higgitt, 1991) observed that mothers differed in their capacity to conceptualize and talk about complex, unobservable mental states (for instance, when responding to questions such as “why do you think your parents behaved the way they did?”; Slade, 2005). Parents who displayed strong *reflective functioning* (Fonagy, Steele, Steele, Moran, & Higgitt, 1991) were able to distinguish between their parents’ mental states and their parents’ behavior, as well as between their parents’ experiences and their own experiences. Those with poor reflective

functioning, in contrast, appeared to have minimal awareness of the internal states underlying their parents' behavior and displayed a shallow, non-cohesive sense of the role that emotions play(ed) in their relationships (Fonagy et al., 1991b). Abilities in this domain were viewed as a sub-component of one's ability to engage in meta-cognitive monitoring, which forms the basis for characterizing state of mind on the AAI (Main, 1991; 2000): while meta-cognitive monitoring is broadly conceptualized as an individual's ability to distinguish between their representations of attachment-related experiences and the validity of these representations (Main, 1991; Allen, 2013), the concept of reflective functioning focused more specifically on one's ability to understand his/her own behavior, and that of others, in terms of underlying mental states (Slade et al., 2005; Grienberger et al., 2005).

In exploring these concepts empirically, early research by Fonagy et al. (1991a/b) demonstrated that individuals who displayed high reflective functioning on the AAI (that is, when discussing their own attachment history) were likely to be classified Autonomous, while those who displayed low levels were likely to be classified non-Autonomous; moreover, parents who displayed high reflective functioning on the AAI were likely to be in Secure relationships with their infants, while those who displayed low levels were likely to be in non-Secure relationships. This seminal work drew the field's attention to the possibility that mothers' ability to use their understanding of mental states to explain behavior may play a role in the intergenerational transmission of attachment from mother to child (Berlin, Zeanah, & Lieberman, 2008).

Propelled by Fonagy et al.'s (1991a/b) initial work, research exploring reflective functioning and its role in the development of attachment relationships has since expanded in both breadth and depth. Conceptually, this capacity has been refined to focus

more specifically on the child rather than on relationships overall; that is, on the “parental capacity to consider and treat the child as a psychological agent – motivated by mental states, such as thoughts, beliefs, intentions, feelings, and desires” (Shai & Belsky, 2011, p. 173). Similar constructs have also been proposed by other research groups, with terms including *mind-mindedness* (Meins, 1999) and *maternal insightfulness* (Oppenheim & Koren-Karie, 2002; Koren-Karie, Oppenheim, Doley, Sher, & Etzion-Carasso, 2002). Although these terms are defined slightly differently, each is rooted in the same concepts: all reflect the intersection of representational and behavioral principles, requiring the parent to first formulate a model of the infant’s internal state and then apply this representation to inform their understanding of the child’s behavior, characteristics, and needs (Grienberger et al., 2005; Meins et al., 2013). It is important to note that this capacity does not reflect the content of mothers’ discourse (e.g., their explanations of why their children engage in certain behaviors); rather, it reflects the emotional complexity and openness with which the mother discusses her impressions of her child’s inner experience (Koren-Karie et al., 2002).

Empirical approaches to mentalization (an umbrella term describing this capacity across its more specific definitions; Fonagy & Allison, 2012) have also been refined since Fonagy et al.’s (1991a/b) early research. As mentioned above, Fonagy et al.’s work assessed mentalization within the context of mothers’ discourse regarding their own childhoods; their capacity to display the same abilities in relation to their child was assumed rather than assessed directly (Fonagy & Target, 2005). However, more recent empirical work has focused on assessing this construct as it relates to the mother’s relationship with her child, specifically (e.g., via interviews concentrating on the mother’s impressions of the child and their relationship, as discussed further below). This shift has

allowed for a more targeted investigation of this construct's associations with maternal state of mind and infant attachment security, providing an opportunity for more focused research exploring the extent to which mentalization relates to each and, even further, bridges the gap between them.

Mentalization: Examining the Processes Underlying Its Role in Attachment

As might be expected, early work around mentalization has given rise to a large body of in-depth research exploring the extent to which this construct is associated with the two end-points of the traditional attachment model described above: state of mind and infant attachment security. As predicted, several studies have reported strong associations between maternal state of mind and maternal mentalization, in that mothers classified Autonomous typically display higher levels of mentalization than those classified non-Autonomous (Fonagy & Target, 2005); and between mentalization and infant attachment security, in that mothers who display high levels of mentalization are typically in Secure relationships with their infants, while those who display low levels are typically in non-Secure relationships (Koren-Karie et al., 2002; Meins, Ferryhough, Fradley, & Tuckey, 2001; Meins et al., 2012; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005)⁴. Some have suggested that the latter findings may be attributable to the possibility that infants in Secure relationships are more open about their emotional needs, making it easier for mothers to be insightful about their perspectives (Koren-Karie et al., 2002). This argument, however, seems less plausible in light of intervention programs

⁴ The adult U/d and infant D classifications will not be addressed in the present study (other than in sections describing the sample's characteristics) for two reasons. First, mentalization has primarily been conceptualized and researched in relation to the organized attachment classifications. Second, the proposed study involved a low-risk sample where relatively few were classified U/d and D; thus, this study was unlikely to provide empirically sound findings in relation to these groups.

reporting that improving mothers' ability to mentalize is associated with (and predates) corresponding changes in attachment security (Marvin, Cooper, Hoffman, & Powell, 2002; Murphy, Steele, & Steele, 2013). Moreover, other research has successfully predicted infant attachment security from prenatal assessments of mentalization, again suggesting that this maternal characteristic plays a significant role in shaping the quality of the attachment relationship (Arnott & Meins, 2007).

Given these promising associations, research has also explored the extent to which mentalization accounts for the transmission of attachment from mother to infant. For instance, Bernier and Dozier (2003) simply asked mothers to describe their child, operationalizing mentalization as the ratio of mental descriptors (i.e., references to the child's 'mental life') to total descriptors that mothers used in reference to him/her. The results of a mediation analysis were striking: mentalization fully accounted for the relationship between state of mind on attachment security. This effect was not attributable to a reciprocal relationship between mentalization and security, with further mediation analyses indicating that links between state of mind and mentalization were not a consequence of infant attachment security. Further, this effect was not replicated when other maternal scales (e.g., Commitment to or Acceptance of the child) were entered as mediators of the relationship between state of mind and security; thus, the effect appeared driven by mentalization, specifically, and not by how mothers talked about their children in a more general sense. Similar effects have been replicated in other studies (Slade et al., 2005; Arnott & Meins, 2007), promoting widespread recognition of mentalization as a central factor in explaining individual differences in attachment security and the transmission of attachment from mother to child.

A logical question arising from these compelling results is *how* mentalization might be related to state of mind and attachment security, especially in pre-verbal stages of development when a mother's capacity to mentalize would not be directly accessible by the infant (Arnott & Meins, 2007; Bernier & Dozier, 2003). First, state of mind and mentalization are thought to be related because both reflect the mother's ability to regulate and organize her thoughts and emotions regarding relationships – with her childhood attachment figures, as reflected in her state of mind, or with her own child, as reflected in assessments of mentalization (Slade, 2005). Specifically, Autonomous mothers' capacity to explore their own mental states is thought to facilitate a similarly open, exploratory stance towards their child's experience (Fonagy & Target, 2005), while the 'defended' approaches of non-Autonomous mothers are thought to make it difficult for them to mirror their child's internal state (in the case of Dismissing mothers) or to represent the infant's mental state in a non-amplified, contained manner (as with Preoccupied mothers; Fonagy & Target, 1997; Rosenblum, McDonough, Sameroff, & Muzik, 2008). Thus, on a basic level, the various 'types' of non-Autonomy are thought to represent different patterns of the same underlying failure to mentalize (Slade et al., 2005; Arnott & Meins, 2007).

Several potential mechanisms have also been proposed to account for the link between mentalization and attachment security. On a relatively distal level (yet more proximal than state of mind), the capacity to mentalize is thought to provide the child with a forum for processing and integrating his internal experiences without becoming overwhelmed (Slade, 2005), including opportunities to “begin to explore what it means to that others have mental states, and to have a dawning sense that they too possess mental states” (Jurist & Meehan, 2009, p. 72; Arnott & Meins, 2007; Fonagy & Target, 1997;

Rosenblum et al., 2008). Ongoing experiences within this “dyadic regulatory system” (Fonagy, Gergely, Jurist, & Target, 2004, p. 37) allow the child to develop a sense of mastery over their internal experiences and the perspective that mental states are subjective and can be responded to adaptively (Fonagy, Gergely, & Target, 2007) – thus fostering the emergence of Secure relationships (Fonagy & Allison, 2012).

Clearly, however, mentalization must impact the child on an even closer level - one that can be experienced even at very early stages in development (Arnott & Meins, 2007). In fact, the most proximal avenue via which mentalization is thought to shape attachment security is the extent to which a mother’s interactions with her infant are well-suited to his attachment needs – that is, the extent to which they are sensitive (Ainsworth, Bell, & Stayton, 1971). The capacity to interact sensitively is thought to rely heavily on the mentalization because it requires the mother to be aware of the infant’s mental state, including the possibility that his/her experience might be different from her own; and to use this awareness to interpret his behavior so that she can respond appropriately (Bernier & Dozier, 2003; Koren-Karie et al., 2002; Lundy, 2003). The role of sensitivity as a mediator of the link between mentalization and security has been supported empirically (Grienenberger et al., 2005; Laranjo, Bernier, & Meins, 2008; Lundy, 2003), but only when mothers’ mental-state comments were used as an index of mentalization and not when other types of mind-related comments were used (e.g., talking on the infant’s behalf); again, these findings indicate that mentalization plays a unique role in influencing the quality of maternal behavior and, consequently, the quality of the attachment relationship (Grienenberger et al., 2005; Laranjo et al., 2008).

Based on this model, one might expect that sensitivity – as a proximal influence on attachment – would account for more variability in attachment than mentalization, an

aspect of the relationship that may appear rather removed from its moment-to-moment functioning. The opposite, however, appears to be true. For instance, Koren-Karie et al. (2002) reported that 68.3% of five-way infant attachment classifications (Avoidant, Secure, Resistant, Disorganized, or Unclassifiable) could be correctly predicted by maternal sensitivity, but that prediction significantly increased to 76.2% when a measure of mentalization was included in their model. Other research suggests that mentalization accounts for greater variability in security than sensitivity; for example, Meins et al. (2001) reported that mentalization accounted for approximately twice the variance in attachment security than did sensitivity (12.7% and 6.5%, respectively). At first glance, these findings are puzzling: why might mentalization, a relatively distal factor compared to sensitivity, be more effective at explaining individual differences in relationships?

Mentalization's capacity to account for more variability in attachment relationships as compared to sensitivity likely relates to two main issues. First, although both factors are thought to arise from state of mind, mentalization is often viewed as a more stable influence on the relationship as compared to the quality of maternal interaction. For instance, Meins, Fernyhough, Arnott, Turner, and Leekam (2011) reported that mothers' mind-related comments were stable across their infant's first year of life and were minimally associated with changes in contextual and personal factors (e.g., life stress, marital relationship quality); sensitivity, in contrast, fluctuated across the same time period and did appear impacted by these effects. These results converge with other research indicating that mentalization is not systematically influenced by factors that typically influence the quality of maternal interaction (Rosenblum et al., 2008). Taken together, these findings suggest that assessments of mentalization are more closely linked with attachment security because they index an underlying, stable influence on the

attachment relationship, while assessments of sensitivity may be more reflective of maternal well-being at a specific point in time (Meins et al., 2011).

Second, mentalization may be more closely linked with security than sensitivity because it is thought to serve as the foundation for maternal behaviors that go beyond what is directly experienced by the child (and by researchers) as sensitive. For instance, a child may not be aware that mother is setting limits when he is dysregulated or restricting his exposure to threatening environments – likely because her ability to engage in these behaviors prevents certain situations from even happening. Similarly, these maternal behaviors – some of which are only evident via the absence of negative interactions – are not captured by many measures of sensitivity. Still, they impact the child's emerging sense of security because they reflect the mother's capacity to manage distress and arousal, and to reference the child's developmental and emotional needs (Fonagy et al., 1991a/b; George & Solomon, 1999; Solomon & George, 1996; Rosenblum et al., 2008). In this way, mentalization – the common thread running through all aspects of mother-infant interaction, both explicit and implicit – may reflect a deeper level of influence on attachment beyond maternal behaviors that can be directly observed or experienced.

Taken together, the research outlined above has important implications for the future of attachment research. While mentalization has yet to reach the level of widespread recognition traditionally afforded to maternal sensitivity, researchers have increasingly expressed that focusing on the role of mentalization will be especially important in moving the field towards a deeper understanding of the processes involved in the development of attachment relationships – especially in work exploring phenomena that have not been successfully accounted for by maternal sensitivity (Bernier & Dozier, 2003; Fonagy & Target, 2005; Meins et al., 2012).

Sibling Attachment Research: A Useful Model for Exploring Mentalization?

As previously described, sibling attachment research is in its very early stages, with research primarily focusing on two main issues. First, as described in Chapter 2, early studies examined attachment theory's assertion that siblings' relationships should be similar has consistently revealed that both concordance and non-concordance in siblings' relationships are common (van IJzendoorn et al., 2000), highlighting the need to move beyond the assumption that traditional theories based primarily on dyads may be directly extended to represent processes occurring within the family (Fearon, Bakermans-Kranenburg, & van IJzendoorn, 2010).

Emerging from this work, a second (and even more limited) research programme has attempted to account for variability in within-family relationships. Not surprisingly, these efforts have focused primarily on the role of maternal sensitivity, with a particular focus on searching for parallel differences in sensitivity and attachment security across siblings (van IJzendoorn et al., 2000). The literature exploring these hypotheses will be reviewed more extensively in Chapter 4; overall, however, this research highlighted that focusing primarily on sensitivity as the main determinant of sibling differences in attachment is unlikely to fully account for variability in siblings' relationships. Rather, the processes shaping attachment within the family appear to be complex and unexpected, requiring intensive exploration in their own right (Fearon et al., 2010).

Although mentalization is widely viewed within the dyadic literature as a strong predictor of individual differences in attachment, no direct efforts have been made to examine this construct as it relates to concordance in siblings' relationships. Aside from the typical barriers to sibling attachment research, interest in exploring within-family differences in mentalization has been dampened by the belief that this construct is a

relatively stable maternal characteristic that does not vary substantially across relationships and over time. This position has been reinforced by previously-described results suggesting that mothers' capacity to mentalize is remarkably stable when assessed before and after their child's birth (Arnott & Meins, 2007) and across the child's first year of life (Meins et al., 2011); as well as research indicating that mentalization is not related to child factors that would be expected to evoke different responses from mothers (e.g., child temperament; Meins et al., 2001; Huth-Bocks, Theran, Levendosky, & Bogat, 2011). Further, recent work suggests that mothers display similar levels of mentalization in relation to their children as they do towards romantic partners (Meins, Fernyhough, & Harris-Waller, 2014). Together, these findings have been interpreted as evidence that mentalization is a "cognitive-behavioral trait in the mother" (Meins et al., 2011, p. 159) arising from her own history in relationships and the ways in which this history has been integrated into her overall state of mind (Fonagy et al., 1991b). By extension, this perspective suggests that comparing mentalization across siblings would not be an effective approach to accounting for within-family patterns of attachment: if the capacity to mentalize is a stable trait, levels of mentalization should not vary across siblings and, consequently, should not account for variability in their relationships.

These assumptions, however, may not be entirely beyond question. For instance, research by Meins et al. (2011) found that a mother's capacity to mentalize might indeed be affected by personal, experiential, and contextual effects. Specifically, mothers who described their pregnancy as planned were more likely to engage in 'appropriate' mentalization (as judged by observers, who observed mother-infant interactions and noted the extent to which mothers' mentalizing comments matched the child's presumed emotional state or behavior) as compared to those who stated their pregnancy was

unplanned. Similarly, mothers who described their pregnancies as ‘easy’ engaged in more appropriate mentalization than those who described their pregnancies as difficult. While preliminary, these findings are noteworthy because they suggest that mentalization may vary across relationships depending on aspects of mothers’ experiences. In the case of siblings, mothers’ experiences with each child could differ substantially in terms of objective factors (e.g., whether the pregnancy was planned) as well as subjective factors (e.g., whether their pregnancy felt ‘easy’; Touris, Kromelow, & Harding, 1995). Together, these differences could result in mentalization also differing across siblings which, in turn, could be meaningfully associated with differences in the quality of their relationships. These hypotheses, however, remain to be explored.

The Present Study

As discussed above, support for the role of mentalization in accounting for patterns of attachment within the family is preliminary and indirect, at best. Despite the strong dyadic literature supporting links between mentalization and mother-infant attachment (Koren-Karie et al., 2002; Meins et al., 2001; Meins et al., 2012; Slade, 2005), no previous research has explored patterns of mentalization across siblings and the ways in which these patterns are associated with attachment within the family. Thus, much remains to be learned about the nature of variation in mentalization and its links with similarity in siblings’ relationships.

In addition to these unanswered questions, no research has even gone so far as to explore links between patterns of mentalization across siblings and maternal state of mind. Again, this absence likely reflects the longstanding assumption that mentalization is a stable characteristic that would not be expected to fluctuate within mothers and across relationships (Meins et al., 2011). Based on this perspective, mothers classified as

Autonomous would be expected to engage in high levels of mentalization across siblings, while those classified non-Autonomous should engage in consistently low levels. Indeed, this may be the case; however, other outcomes are also plausible. For instance, mothers classified as Autonomous – who, as previously described, are characterized by openness to attachment-related experiences (George & Solomon, 2008) – may display more stability in their capacity to mentalize across siblings regardless of each child’s characteristics, the specific experiences and circumstances surrounding their pregnancy, and so on; in contrast, those classified as non-Autonomous – and, accordingly, who are more defended in their approach to relationships (George & Solomon, 2008) – may display more variability across siblings as their capacity to reflect on each child may be more deeply influenced by any number of experiential factors. Clearly, these hypotheses are largely speculative; however, at this point, they are no more or less empirically supported than those based on the status quo. More research is needed to explore these hypotheses and to provide a basis for further theoretical and empirical work.

Currently, there are several compelling reasons for exploring the role of mentalization in shaping the quality of siblings’ relationships, as well as links between maternal state of mind and patterns of mentalization across siblings. Since early efforts to account for variation in siblings’ relationships via parallel patterns of maternal sensitivity (van IJzendoorn et al., 2000), research exploring the roots of attachment within the family has entered an era in which exploration has slowed substantially (Fearon et al., 2010). Thus, exploring the role of new constructs (such as mentalization) could not only provide new insight into the underpinnings of family attachment relationships, but also renewed impetus for further research in this field. Even more broadly, exploring mentalization and its links with attachment *within* mothers – as opposed to *between* mothers, as in dyadic

research – may provide a particularly apt context for extending our understanding of the fundamentals of mentalization as a construct, particularly its patterning within mothers over time and associated developmental consequences.

The present study took sibling attachment research in a previously-unexplored direction by examining the extent to which patterns of mentalization are associated with patterns of attachment within the family. Specifically, this work revolved around two basic objectives that explore whether mentalization demonstrates early promise in accounting for within-family attachment relationships:

1. This study began by examining associations between maternal state of mind and mentalization within the family. First, it aimed to replicate dyadic research indicating that mothers classified as Autonomous display higher levels of mentalization overall as compared to mothers classified as non-Autonomous. Second, this study explored patterns of mentalization across siblings within Autonomous and non-Autonomous groups. As described above, at least two possible outcomes are feasible: levels of mentalization may be similar across siblings for both Autonomous and non-Autonomous mothers, as would be predicted by traditional attachment theory; or they may differ across siblings to varying degrees depending on classification (e.g., non-Autonomous mothers may display more variability across siblings than Autonomous mothers).
2. This study will also investigate the extent to which patterns of mentalization across siblings are linked with the quality of mothers' relationships with each child. Here, this work will explore a paradox arising from aspects of the dyadic and sibling attachment literatures. That is, dyadic research suggests that mothers' capacity to mentalize is relatively stable across time and relationships (Meins et

al., 2011), with those in Secure relationships with their infants tending to engage in higher levels than those in non-Secure relationships (Koren-Karie et al., 2002; Meins et al., 2001; Meins et al., 2012; Slade et al., 2005). On the other hand, however, the sibling literature suggests that variability in the quality of siblings' relationships is relatively common; that is, mothers often form Secure relationships with one child and non-Secure relationships with the other. This paradox begs the question of whether a) contrary to predictions from traditional theory and dyadic research, the link between mentalization and security is less strong than expected; *or* b) mothers do, in fact, engage in variable degrees of mentalization across relationships (i.e., in relation to each child). Based on the limited available literature, we expect that when mentalization is assessed in relation to each sibling separately, mothers in concordant relationships (whether Secure or non-Secure) will display similar levels of mentalization across siblings. In contrast, mothers in non-concordant relationships will display diverging levels of mentalization across siblings, such that mentalization will be comparatively high in relation to the sibling in the Secure relationship versus the sibling in the non-Secure relationship.

Methods

Participants

Participants were 37 mothers who were recruited into a longitudinal attachment study upon the birth of their firstborn child, and subsequently had a second child with whom they agreed to participate in a parallel study exploring siblings' attachment relationships. Recruitment procedures are described in detail in Chapter 2 (see "Participants").

Demographic information was initially collected at the firstborn's three-month home visit and updated at all subsequent appointments. Siblings were 10 boy-boy, 10 girl-girl, 10 boy-girl, and 7 girl-boy pairs. All participants were Caucasian. Household income ranged from \$10 000-\$19 000 to over \$80 000 CDN ($M = \$60\ 000-69\ 000$). Most parents ($n = 33$) were married or living common-law ($n = 4$) throughout the study, with the exception of one mother who had been living common-law but then identified as single at her second-born's visits. On average, mothers were 29.64 years old at their firstborn's birth ($SD = 3.73$), while fathers were 31.39 years old ($SD = 4.47$). Spacing between siblings ranged from 15.12 to 68.40 months ($M = 31.08$ months, $SD = 11.64$).

The present study drew from interview data collected at a home visit conducted for the firstborn study, and another home visit conducted for the second-born study. At the firstborn study visit, infant ages ranged from 3.80 to 6.15 months ($M = 4.40$ months, $SD = 0.41$). At the sibling study's home visit, second-born siblings' ages ranged from 10.80 to 19.56 months ($M = 14.38$ months, $SD = 2.13$). At the SSP, firstborns' ages ranged from 11.75 to 16.25 months ($M = 13.25$, $SD = 0.70$) and second-born ages ranged from 11.06 to 20.35 months ($M = 15.18$ months, $SD = 2.01$).

Measures

Maternal State of Mind. See Chapter 2 ("Measures").

Speech sample for assessing mentalization. Mentalization was coded from the Working Model of the Child Interview (WMCI; Zeanah & Benoit, 1995), a structured interview that explores parents' representations of their relationship with a specific child. Mothers were asked to recall their impression of their child before and after he/she was born; and to describe situations in which their child was hurt, ill, and emotionally upset. They were also asked to provide five adjectives describing their child's personality and

their relationship with him/her, as well as a specific memory that exemplified each word. Finally, they were asked to describe their child's emerging behavior and personality and how he/she was similar or different to various family members.

Interview questions were modified slightly for the sibling study due to practical considerations (e.g., time constraints). Only questions common to both the first- and second-born interviews were coded for the present study. Both interviews – the original WMCI questions that mothers responded to in relation to firstborn children, and the modified version for second-borns – are presented in Appendix G. This interview has previously been used in other published work as a speech sample for assessing mentalization via a coding scheme very similar to that described below (see “Mentalization”; e.g., Rosenblum et al., 2008).

Mentalization. WMCIs were coded according to a scheme that assesses the nature of statements or attributions that a mother makes about her child (Jenkins et al., 2011). Mentalization was operationalized in three ways:

Mental attributes. Frequency counts were determined for three types of child attributes reflecting the mother's awareness of her child's mental states: 1) Intellect, Will, and Cognition (“Intellect”); 2) Desires, Wishes, and Preferences (“Desires”); and 3) Emotions. A score for each attribute type was generated by counting the number of attributes in each category (only unique instances of each attribute were counted) and then dividing this value by the total number of attributes.

Mental child and relationship descriptors. As part of the WMCI, mothers were asked to provide 5 words that described their child, and another 5 words that described their relationship with him/her. Child and relationship descriptors relating to the attributes types above were counted; next, a score for each category (i.e., child and

relationship) was generated by dividing the number of mental descriptors used by the total number of descriptors.

Global mentalization scores. The second component of this coding scheme involves assigning an overall score for each interview that reflects the overall quality of mentalization. Scores range from -1 (*Negative Reflective Parenting*) to 9 (*Exceptional Reflective Parenting*). The coder assigning this score was not the coder who completed the attribute coding; moreover, coders did not have access to attribute ratings while coding for overall reflection to ensure that their assessment of the quality of maternal reflection was not entirely influenced by attribute frequencies.

Reliability. Nineteen interviews (25%; 7 first-born and 12 second-born interviews) were checked for reliability by correlating frequency counts for each attribute category, as well as overall reflection ratings, across coders. Frequency scores and global scores were significantly correlated across coders for interviews pertaining to firstborns ($r = 0.94, p < .01$) and for those pertaining to second-borns ($r = 0.95, p < .01$).

Attachment security - Categorical. See Chapter 2 (“Measures – Attachment security”).

Attachment security – Continuous. Traditionally, the field has adopted a categorical model of attachment for primarily conceptual reasons (Ainsworth et al., 1978; see Chapter 2 [“Discussion”]). However, modern statistical techniques indicate that dimensional models may, in fact, be more representative of individual differences in security than the traditional categories. For instance, when Fraley and Spieker (2003) used taxonomic techniques to investigate the latent structures of SSP data (i.e., the continuous rating scales), they found no evidence for a categorical, tripartite model for organized attachment; rather, attachment behavior appeared more consistent with a

continuous approach. Given the benefits of utilizing continuous versus categorical approaches – for instance, increasing measurement precision, construct validity, reliability, and accuracy, and reducing the likelihood of Type II error (Fraley & Waller, 1998) – methods for operationalizing security as a continuous dimension have become increasingly popular within the literature.

As with most sibling attachment research, an important consideration is that the present study's sample size was fairly modest (although comparable to other attachment research involving a sibling design). As demonstrated below (see "Results"), this issue had a particular impact on the number of infants classified non-Secure as this classification tends to be less common in low-risk samples (van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), and consequently on the relative size of concordant/non-Secure and non-concordant groups. To address this issue, analyses using the traditional classifications were replicated using a continuous measure of attachment security. This step was intended to conserve power and minimize the statistical challenges associated with characterizing attachment categorically.

One recognized approach for generating continuous attachment scores was developed by Richters, Waters, and Vaughn (1988), who used ratings from the SSP's continuous scales during Episodes 5 and 8 (i.e., mother-infant reunions) to generate a discriminant function that distinguished between infants in Secure and non-Secure relationships. Based on this analysis, continuous attachment scores are calculated by applying Richters et al.'s (1988) weighted composites of the SSP scales to an infant's own behavioral ratings during Episodes 5 and 8. Richters et al.'s (1988) approach has been used in several published studies requiring that attachment security be represented continuously for methodological reasons (e.g., Kochanska, 2001; Laurent & Ablow,

2012; van den Dries, Juffer, van IJzendoorn, Bakermans-Kranenburg, & Alink, 2012). Cross-validation research conducted by Richters et al. (1988) indicated that scores on the Secure vs. non-Secure dimension correctly corresponded to attachment categories nearly 90% of the time. Moreover, research conducted within our group indicates that scores on Richters et al.'s (1988) Secure vs. non-Secure dimension significantly predict maternal sensitivity, accounting for approximately 20% of the variance; in contrast, attachment categories only accounted for 12% (Dumas, 2009). Overall, this approach is viewed as appropriate for use with low-risk community samples (Richters et al., 1988) and is considered a strong alternative to categorical approaches due to its capacity to conserve variance that would otherwise be lost (Dumas, 2009).

As noted above, continuous attachment scores were generated by summing weighted composites of each infant's continuous SSP scores, as per Richters et al. (1988).

Procedure

All mothers were provided with a letter of information regarding the study (see Appendix B) and consented to their own involvement and that of their children (see Appendix D). Participants were treated in compliance with the "Ethical Principles of Psychologists" (Canadian Psychological Association, 2000) and the standards in place at Western University pertaining to research with human subjects (see Appendix F).

Aspects of the procedure related to the AAI and SSP are described in Chapter 2 ("Procedure").

Mothers participated in a laboratory visit when their firstborn child was approximately four months old. After completing other measures, mothers were administered the WMCI while their infant was supervised by a researcher. Mothers were contacted again when their second-born child was approximately 12 months of age to

arrange a home visit involving her two children and herself. Two visitors attended each visit, which included a number of activities for mothers and their two children. One visitor administered the WMCI while the other visitor interacted with the children.

Results

Descriptive Analyses

Maternal state of mind. Frequencies of AAI classifications were calculated in three ways (see Table 1), similar to the approach adopted in Chapter 2. First, mothers were classified as Dismissing (Ds), Autonomous (F), Preoccupied (E), or Unresolved/disorganized (U/d). Second, because they occurred relatively infrequently, the two non-Autonomous classifications (Ds and E) were collapsed; thus, mothers were re-classified as Autonomous, non-Autonomous, or Unresolved/disorganized. Finally, mothers were re-classified according to their secondary classifications – that is, those originally classified as U/d were re-categorized into their best-fitting organized group (see Chapter 2, “Methods” for further information about the process of classifying according to primary and secondary categories).

Although mothers’ four- and three-way primary classifications are provided in Table 1 for descriptive purposes, only organized classifications were used in the present study’s main analyses for reasons described previously. Furthermore, the two non-Autonomous classifications were collapsed in the present study due to sample size limitations. Thus, for the primary analyses in this study, mothers in this study were classified into one of two groups reflecting their state of mind: Autonomous ($n = 25$, 67.6%) and non-Autonomous ($n = 12$, 32.4%).

Table 1

*Maternal State of Mind Regarding Attachment: Distribution of Adult Attachment**Interview (AAI) Classifications*

Four-way			Three-way Primary			Three-way Secondary		
Class.	<i>n</i>	%	Class.	<i>n</i>	%	Class.	<i>n</i>	%
Ds	2	5.4	non-Autonomous	6	16.2	Ds	5	13.5
F	23	62.2	Autonomous	23	62.2	F	25	67.6
E	4	10.8	U/d	8	21.6	E	7	18.9
U/d	8	21.6						

Note. “Ds” = Dismissing, “F” = Autonomous, “E” = Preoccupied, and “U/d” =

Unresolved/disorganized. “Non-Autonomous” = Dismissing and Preoccupied groups combined.

Infant attachment security. Frequencies of attachment classifications for first- and second-born siblings were calculated in three ways (see Table 2). First, frequencies were calculated by classifying relationships as Avoidant (A), Secure (B), Resistant (C), or Disorganized (D). Second, the two non-Secure classifications were collapsed and relationships were classified as non-Secure, Secure, and Disorganized. Finally, those in Disorganized relationships were re-classified according to their secondary classification.

As with maternal AAI classifications, only organized classifications were used for the present study's main analyses. Additionally, the two non-Secure groups were collapsed due to limited sample size. Thus, for the purposes of this study, attachment relationships were classified as Secure (22 firstborns [59.5%] and 25 [67.6%] second-borns) or non-Secure (15 firstborns [40.5%] and 11 second-borns [29.7%]).

Sibling attachment concordance. A two-way contingency table was constructed to analyze concordance in siblings' relationships. Although concordance can be estimated in numerous ways (as in Chapter 2), only concordance based on two-way secondary classifications (i.e., Secure versus non-Secure) is presented here as these classifications formed the basis for this study's main analyses. This approach yielded a concordance rate of 69.4%, which is slightly higher than estimates reported in previous work (see Chapter 2). Attachment classifications were significantly associated across siblings ($p = .04$; see Table 3).

Concordance within the family. A final contingency table analysis was performed to evaluate concordance between two-way secondary AAI classifications (Autonomous versus non-Autonomous) and three-way sibling attachment concordance (concordant/Secure, concordant/non-Secure, and non-concordant) as based on two-way secondary patterns of attachment (Secure versus non-Secure). Sixteen families (44.4%)

Table 2

*Infant Attachment Security: Distribution of Strange Situation Procedure (SSP)**Classifications for First- and Second-Born Infants*

Four-way			Three-way Primary			Three-way Secondary		
Class.	<i>n</i>	%	Class.	<i>n</i>	%	Class.	<i>n</i>	%
First-born children (<i>n</i> = 37)								
A	6	16.2	non-Secure	8	21.6	A	7	18.9
B	18	48.6	Secure	18	48.6	B	22	59.5
C	2	5.4	D	11	29.7	C	8	21.6
D	11	29.7						
Second-born children (<i>n</i> = 36)								
A	3	8.1	non-Secure	5	13.5	A	4	10.8
B	22	59.5	Secure	22	59.5	B	25	67.6
C	2	5.4	D	9	24.3	C	7	18.9
D	9	24.3						

Note. The number of first- and second-born siblings is not equal because one mother declined to participate in the SSP with her second-born child. “A” represents infants in Avoidant relationships, “B” represents infants in Secure relationships, “C” represents infants in Resistant relationships, and “D” represents infants in Disorganized relationships. “non-Secure” = Avoidant and Resistant groups combined.

Table 3

Concordance in the Quality of First- and Second-Born Siblings' Relationships, as per Two-Way Secondary SSP Classifications

		Second-born sibling		Total
		non-Secure	Secure	
Firstborn sibling	non-Secure	7 (4.3)	7 (9.7)	14
		<i>2.0, 19.4%</i>	<i>-2.0, 19.4%</i>	
	Secure	4 (6.7)	18 (15.3)	22
		<i>-2.0, 11.1%</i>	2.0, 50.0%	
Total		11	25	36

Note. Expected values are presented in parentheses beside observed values. Adjusted standardized residuals, followed by concordance rates in percentages are presented below the observed/expected values. Cells representing concordance among siblings are bolded. “non-Secure” represents Avoidant and Resistant groups combined. Fisher’s Exact Test $p = .04$. Cells with adjusted standardized residuals above or below ± 2.0 are italicized.

shared relationships that were consistent with theoretical prediction: in 13 families (36.1%), mothers classified as Autonomous were in Secure relationships with both of their children; and in 3 families (8.3%), mothers classified as non-Autonomous were in non-Secure relationships with both children. Two-way AAI classifications and three-way sibling attachment concordance were not significantly associated ($p = .60$; see Table 4).

Preliminary Analyses

Associations between variables and potential covariates. Intercorrelations among all variables of interest were calculated for the sample overall as a preliminary analytic step. Results (see Table 5) revealed that mothers' use of the three types of mental attributes were not significantly correlated⁵; thus, for instance, a mother's tendency to describe her child in terms of his Intellect, Cognition, and Will ("Intellect") was not associated with her tendency to comment on his Emotion attributes. Contrary to expectation, mothers' use of these attributes was not associated with infant SSP classification, or with maternal AAI classifications. Only one – mothers' use of attributes referencing the child's Desires, Wishes, and Preferences ("Desires") – was significantly associated with continuous security scores, albeit in an unexpected direction; that is, greater use of these attributes was linked with lower security.

The extent to which mothers chose mental child descriptors was positively associated with the extent to which they chose mental relationship descriptors, suggesting

⁵ In these analyses, multiple statistical tests were performed simultaneously on the same data set. Given that this practice carries an increased risk for Type I error, some researchers choose to apply a correction (e.g., the Bonferroni method) so that the alpha level over *all* tests is 0.05. No correction was applied in the present study, however, as per guidelines outlined by Armstong (2014); specifically, corrections are not advised in exploratory studies involving a small number of planned comparisons as they may increase the chance of significant effects going undetected (Perneger, 1998).

Table 4

Associations between Maternal State of Mind and Sibling Attachment Concordance, as per Two-Way Secondary AAI and SSP Classifications

		Pattern of sibling attachment concordance			Total
		Concordant/ non-Secure	Concordant/ Secure	Non- Concordant	
AAI	Not F	3 (2.3)	5 (6.0)	4 (3.7)	12
Classifications		0.9, 8.3%	-0.8, 13.9%	0.2, 11.1%	33.3%
	F	4 (4.7)	13 (12.0)	7 (7.3)	24
		-0.9, 11.1%	0.8, 36.1%	-0.2, 19.4%	66.7%
	Total	7	18	11	36
		19.4%	50.0%	30.6%	

Note. One family was not included in this analysis as the mother declined to participate in the SSP with her second-born child. Adjusted standardized residuals, followed by concordance rates in percentages are presented below the observed/expected values. Cells representing concordance among siblings are bolded. “F” represents an Autonomous state of mind; “not F” represents a non-Autonomous state of mind (i.e., Dismissing and Preoccupied groups combined). Fisher’s Exact Test $p = .60$.

Table 5

Intercorrelations among Study Variables

	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Intellect, cognition, will	.16	-.04	.26*	.20	.42*	-.06	.07	.10	.08
2. Desires, wishes, preferences	-	-.06	.03	-.16	.12	.22	-.26*	.12	.04
3. Emotion		-	.30*	.24*	.03	.04	-.14	-.06	-.12
4. Child descriptors			-	.23*	.00	-.16	-.14	-.26*	.51*
5. Relationship descriptors				-	.07	.05	.15	-.03	-.12
6. Global mentalization score					-	.02	.15	.24*	.06
7. SSP ¹						-	-.20	.09	.06
8. Security ²							-	.11	.04
9. AAI ³								-	-.04
10. Age									-

Note. $N = 73$; one second-born sibling's WMCI was not available due to difficulties with audio recording.

¹SSP represents two-way secondary classifications; children in non-Secure relationships were represented by "0" and children in Secure relationships were represented by "1". ²Security represents continuous security score. ³AAI represents two-way classifications; mothers classified as non-Autonomous were represented by "0" and mothers classified as Autonomous were represented by "1".

* $p < .05$.

that mothers overall displayed a consistent pattern for conceptualizing the fundamental characteristics of their children and relationships. Use of mental child descriptors was positively associated with higher use of Intellect and Emotion attributes (but not attributes related to Desires) overall. Use of mental relationship descriptors was positively associated with higher use of Emotion attributes only. Use of mental child descriptors was not associated with infant attachment security (categorical or continuous), nor was use of mental relationship descriptors. Unexpectedly, greater use of mental child descriptors was associated with non-Autonomy on the AAI; use of mental relationship descriptors, however, was not associated with AAI classification.

Finally, global mentalization scores were positively associated with use of Intellect attributes (but not Desires or Emotion attributes). These findings suggest that mothers' ability to reflect on their child's mental states in an insightful, coherent way may tend to reference the child's intellectual and cognitive abilities and processes. Global scores were not associated with the tendency to choose mental child or relationship descriptors, or with infant attachment security. They were, however, associated with a classification of Autonomous on the AAI.

Child age was examined as a potential covariate in this study's main analyses because the average age of first- and second-borns differed by several months at the time that the WMCI was administered. Child age proved to be correlated with only one variable, mental child descriptors. Thus, child age was controlled for in all analysis using this variable.

Test assumptions. To test their suitability for parametric analyses, all scores (including differences scores) were tested for normality using the Shapiro-Wilk test. All scores were normally distributed with the exception of those reflecting mothers' use of

Desires attributes in relation to firstborns ($p = .002$) and mothers' use of mental relationship descriptors in relation to first- and second-borns ($p = .03$ and $.01$, respectively). However, given that the analyses below are thought to be robust to relatively minor violations to the assumption of normality (Field, 2009), parametric analyses proceeded as planned.

Assumptions were tested for all analyses below (as per Field, 2009), including Levene's tests for homogeneity of variances for t -tests and ANOVAs; and Levene's tests and Box's Test for the homogeneity of covariance matrices for MANOVAs. All tests were non-significant, indicating that assumptions were adequately met.

Links between Mentalization and Maternal State of Mind

The first objective of this study was to explore the extent to which state of mind was associated with patterns of mentalization within the family. More specifically, this component of the present study examined the well-established hypothesis that mothers classified Autonomous should engage in relatively high levels of mentalization across siblings, while those classified non-Autonomous should engage in relatively low levels across siblings (Slade et al., 2005); and explored the possibility that mentalization might vary across siblings as a function of the mother's state of mind.

First, links between state of mind and patterns of mentalization within the family were explored by correlating mentalization scores across siblings overall, and for Autonomous and non-Autonomous mothers separately (see Table 6). In general, mothers' use of mental attributes in relation to each of their children followed a similar pattern in the sample overall, and within Autonomous and non-Autonomous groups separately; that is, mothers referred to the majority of mental attributes to a similar degree across siblings regardless of whether they were classified Autonomous or non-

Table 6

Associations among Siblings on Mothers' Use of Mental Attributes, Use of Mental Child and Relationship Descriptors, and Global Mentalization Scores within the Sample Overall, and by State of Mind

	Overall sample	Autonomous	Non-Autonomous
Aspect of Mentalization	<i>n</i> = 36	<i>n</i> = 25	<i>n</i> = 11
Intellect	.34*	.29	.48
Desires	.04	.07	.26
Emotions	.17	.21	.03
Child descriptors	.59**	.63**	.60*
Relationship descriptors	.34*	.45*	.14
Global	.35*	.43*	-.06

Note. *Ns* represent the number of mothers in each group. "Non-Autonomous" represents Dismissing and Preoccupied groups combined. One non-Autonomous mother could not be included in this analysis due to difficulties with the audio recording of one WMCI.

* $p < .05$.

Autonomous (these correlations were not significant, likely due to sample size). Mothers' use of mental child descriptors and, to a lesser extent, mental relationship descriptors were also similar among siblings for both Autonomous and non-Autonomous groups. Associations among siblings on mothers' global mentalization scores appeared more variable across AAI groups: while Autonomous mothers' scores were strongly associated across siblings, non-Autonomous mothers' scores showed little association. However, these correlations were not significantly different from each other (Fisher's $Z = 1.26, p = .21$).

Second, repeated-measures analyses of variance explored whether mothers' scores across siblings (as shown in Table 7) varied to differing extents depending on state of mind. Pillai's Trace was used as a test statistic in all multivariate analyses.

Mental attributes. The first MANOVA included the three mental attributes (Intellect; Desires; and Emotions). Siblings' scores on each of these attributes represented dependent variables and maternal AAI classification (i.e., Autonomous or non-Autonomous) represented between-family independent variables. The multivariate effect representing differences between families (i.e., Autonomous versus non-Autonomous) was not significant ($V = .06, F [3, 31] = 0.70, p = .56; \text{partial } \eta^2 = .06$), nor was the multivariate effect representing differences within families (i.e., first- versus second-born; $V = .08, F [3, 31] = 0.91, p = .45; \text{partial } \eta^2 = .08$). Univariate tests were still examined despite the non-significant multivariate results due to the exploratory nature of this research (Tabachnick & Fidell, 2007). These tests, however, were not significant, indicating that both Autonomous and non-Autonomous mothers' use of each specific mental attribute was similar across siblings.

Table 7

Means and Standard Deviations for Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores within the Sample Overall, and by AAI Classification

		Overall	Auton.	Non-Autonomous		
Aspect of				Overall	Dismissing	Preoccupied
Mentalization			<i>n</i> = 25	<i>n</i> = 12	<i>n</i> = 4	<i>n</i> = 7
Intellect	First	.10 (.05)	.11 (.06)	.10 (.04)	.10 (.04)	.09 (.04)
	Second	.11 (.05)	.12 (.05)	.11 (.05)	.11 (.06)	.11 (.05)
Desires	First	.12 (.04)	.12 (.04)	.11 (.05)	.12 (.04)	.11 (.07)
	Second	.12 (.06)	.12 (.06)	.10 (.05)	.08 (.06)	.11 (.04)
Emotions	First	.08 (.03)	.08 (.03)	.08 (.03)	.09 (.03)	.08 (.03)
	Second	.07 (.03)	.07 (.03)	.08 (.02)	.07 (.02)	.08 (.02)
Child descriptors	First	.53 (.26)	.45 (.24)	.68 (.24)	.80 (.20)	.60 (.23)
	Second	.49 (.21)	.48 (.19)	.51 (.26)	.48 (.32)	.52 (.24)
Relationship descriptors	First	.35 (.25)	.34 (.24)	.38 (.28)	.54 (.31)	.26 (.21)
	Second	.28 (.18)	.29 (.16)	.27 (.23)	.38 (.31)	.21 (.16)
Global	First	3.68 (1.69)	3.94 (1.78)	3.13 (1.42)	3.90 (.89)	2.57 (1.51)
	Second	3.91 (1.51)	4.20 (1.50)	3.36 (1.43)	2.50 (1.29)	3.86 (1.35)

Note. *Ns* represent the number of mothers in each group. One mother, who was classified as Dismissing, could not be included in this analysis due to difficulties with the audio recording of her second-born child's WMCI.

Mental child and relationship descriptors. The next MANOVA examined differences in mothers' use of mental child and relationship descriptors across siblings by state of mind. The multivariate effect representing differences within families (i.e., first-versus second-born) was not significant ($V = .06$, $F [3, 31] = 0.87$, $p = .43$; partial $\eta^2 = .06$); however, the multivariate effect for differences between families (Autonomous vs. non-Autonomous) approached significance ($V = .16$, $F [2, 30] = 2.89$, $p = .07$; partial $\eta^2 = .16$). Univariate tests revealed that differences among AAI groups on mental child descriptors approached significance ($F [1, 31] = 3.27$, $p = .08$, partial $\eta^2 = .10$). Further examination of group means revealed that non-Autonomous mothers used a higher ratio of mental descriptors to describe their children than did Autonomous mothers ($p = .08$).

Global mentalization scores. A final repeated-measures ANOVA explored differences in global mentalization scores across siblings by state of mind. There were no significant differences on global scores across first- and second-born siblings ($V = .03$, $F [1, 31] = 0.78$, $p = .38$; partial $\eta^2 = .03$), nor were there differences for Autonomous and non-Autonomous groups ($V = .02$, $F [1, 33] = 0.07$, $p = .80$; partial $\eta^2 = .00$).

In summary, mothers' use of mental attributes, their use of mental relationship descriptors, and their global mentalization scores did not vary significantly across siblings in either Autonomous or non-Autonomous groups. Use of mental child descriptors did not vary differentially among siblings, but was higher overall for mothers classified non-Autonomous as compared to those classified Autonomous.

Links between Mentalization, Attachment Security, and Attachment Concordance

This study's second objective explored links between mentalization and patterns of attachment across siblings and their common mother. Specifically, these analyses examined whether mentalization differed among those in Secure relationships (from both

concordant and non-concordant families) and those in non-Secure relationships (again, from both concordant and non-concordant families). Second, analyses explored whether patterns of mentalization within the family distinguished between those in concordant/Secure, concordant/non-Secure, and non-concordant relationships.

Associations across concordance groups: Categorical analyses. First, categorical analyses explored the hypotheses that mentalization would be relatively high in relation to those in Secure relationships (regardless of whether they came from concordant/Secure or non-concordant families), and low in relation to those in non-Secure relationship (again, regardless of family pattern). Prior to conducting analyses, each infant was re-categorized into one of four groups: ‘SS’, indicating that the infant and his/her sibling were in Secure relationships (i.e., a Secure infant in a concordant/Secure family); ‘Ss’, indicating that the infant was in a Secure relationship and his sibling was in a non-Secure relationship (i.e., the Secure infant in a non-concordant family); ‘sS’, indicating that the infant was in a non-Secure relationship and his sibling was in a Secure relationship (i.e., the non-Secure infant in a non-concordant family); and ‘ss’, indicating that both the infant and his sibling were in non-Secure relationships (i.e., a non-Secure infant in a concordant/non-Secure family). This approach to classifying infants is consistent with that used in previous work examining the role of maternal sensitivity in patterns of attachment within the family (van IJzendoorn et al., 2000). Infants’ scores were compared to others of the same position within the family; that is, levels of mentalization associated with first-born infants were compared to each other in one set of analyses, and then levels associated with second-borns were compared in separate analyses. This approach was adopted to ensure that the most appropriate comparison group was used for each infant, especially given that mentalization data was collected

when first- and second-borns were different ages, and to ensure that all data points within one analysis were independent from each other. Descriptive statistics for the following analyses are presented in Table 8.

Mental attributes. MANOVAs were conducted to investigate whether mothers' use of mental attributes differed across four-way concordance groups, as described above, for first- and second-born children. The multivariate effect for first-borns was significant ($V = .56$, $F [9, 93] = 2.38$, $p = .02$, partial $\eta^2 = .19$); tests of univariate effects revealed significant differences among concordance groups on mothers' use of attributes reflecting their perception of infants' Desires ($F [3, 31] = 6.66$, $p = .001$, partial $\eta^2 = .39$). Post-hoc Tukey's tests revealed that mothers of non-Secure infants in non-concordant families used significantly more of these attributes than did mothers of Secure infants in concordant/Secure families ($p = .001$), and mothers of infants in concordant/non-Secure families ($p = .01$). A second MANOVA examined mothers' use of mental attributes in relation to second-born infants across concordance groups. There were no significant multivariate ($V = .19$, $F [9, 93] = 0.71$, $p = .70$, partial $\eta^2 = .06$) or univariate effects, indicating that mothers' use of mental attributes did not distinguish between second-born infants in any of the concordance groups.

Child and relationship descriptors. Two MANOVAs examined mothers' use of mental child and relationship descriptors across the four concordance groups. The multivariate effect for first-borns was not significant ($V = .10$, $F [6, 62] = 0.56$, ns , partial $\eta^2 = .05$), nor were any univariate effects. Similarly, the multivariate effect for second-borns was not significant ($V = .16$, $F [6, 60] = 0.86$, ns , partial $\eta^2 = .08$), nor were any significant univariate effects.

Table 8

Means and Standard Deviations for Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores by Birth Order and Four-Way Concordance Group

	Concordance	Intellect	Desires	Emotion	Child	Relationship	Global
Birth order	group				descriptors	descriptors	
Firstborn	SS ($n = 18$)	.10 (.05)	.10 (.02)	.09 (.02)	.50 (.23)	.35 (.25)	3.81 (1.67)
	Ss ($n = 4$)	.09 (.08)	.12 (.02)	.10 (.03)	.50 (.32)	.42 (.17)	3.63 (2.06)
	sS ($n = 6$)	.09 (.05)	.17 (.06)	.08 (.03)	.62 (.26)	.41 (.31)	3.50 (0.87)
	ss ($n = 7$)	.12 (.02)	.11 (.05)	.06 (.02)	.55 (.35)	.22 (.23)	3.07 (2.01)
	Total ($n = 35$)	.10 (.05)	.12 (.05)	.08 (.03)	.53 (.26)	.35 (.25)	3.58 (1.61)
Second-born	SS ($n = 18$)	.12 (.06)	.11 (.06)	.07 (.03)	.47 (.23)	.34 (.21)	3.94 (1.39)
	Ss ($n = 6$)	.13 (.05)	.13 (.03)	.07 (.02)	.44 (.27)	.26 (.15)	4.50 (1.76)
	sS ($n = 4$)	.06 (.02)	.15 (.06)	.08 (.04)	.54 (.15)	.16 (.11)	3.50 (1.29)
	ss ($n = 7$)	.11 (.03)	.12 (.07)	.07 (.03)	.52 (.16)	.21 (.10)	3.28 (1.38)
	Total ($n = 35$)	.11 (.05)	.12 (.06)	.07 (.03)	.48 (.21)	.28 (.18)	3.85 (1.44)

Note. Two families could not be included in this analysis as one second-born did not participate in the SSP and one WMCI could not be coded due to audio recording difficulties. Concordance was based on two-way secondary attachment classifications, with “SS”

representing infants in Secure relationships whose sibling was also in a Secure relationship; “Ss” representing infants in Secure relationships with a non-Securely attached sibling; “sS” representing infants in non-Secure relationships with a Securely attached sibling; and “ss” representing infants in non-Secure relationships with a non-Securely attached sibling.

Global mentalization scores. One-way ANOVAs were used to explore mothers' global mentalization scores across concordance groups. There were no significant differences across concordance groups for first-borns ($F [3, 31] = 0.18, ns, \text{partial } \eta^2 = .02$) or second-borns ($F [3, 30] = 1.22, ns, \text{partial } \eta^2 = .11$)

Next, analyses examined whether within-family variability on the various aspects of mentalization differed across concordance groups – that is, they explored the hypotheses that within-family mentalization would be relatively stable across siblings in concordant/Secure and concordant/non-Secure families, and more variable in non-concordant families. Although similar results were expected for concordant/Secure and concordant/non-Secure families in terms of the extent to which mentalization was expected to vary across siblings, these groups were examined separately to explore whether different patterns emerge from each group.

A series of Pearson correlations, shown in Table 9, was conducted to explore associations on various aspects of mentalization across siblings in concordant/Secure, concordant/non-Secure, and non-concordant relationships. In general, few clear differences emerged among concordance groups. Mothers' use of mental attributes tended to be positively associated across concordant/Secure siblings, while positive associations across siblings emerged less consistently in concordant/non-Secure and non-concordant groups. However, none of the correlations for any of the specific mental attributes were significantly different from each other; moreover, some (e.g, those emerging from the concordant/non-Secure group) were based on very small samples, limiting the extent to which strong conclusions could be drawn from them. Mothers' use of mental child and relationship descriptors were positively associated across all concordance groups, indicating similar patterns across siblings regardless of their attachment relationships.

Table 9

Associations among Siblings in Concordant/Secure, Concordant/non-Secure, and Non-concordant Relationships on Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores

Aspect of Mentalization	Concordant		Non-concordant
	Secure <i>n</i> = 18	Non-secure <i>n</i> = 7	<i>n</i> = 10
Intellect	.51*	-.66	.29
Desires	.15	-.07	-.40
Emotions	.01	.31	.42
Child descriptors	.51*	.87*	.70*
Relationship descriptors	.25	.28	.60
Global	.36	-.22	.43

Note. Ns represent number of sibling pairs. Concordance was based on two-way secondary attachment classifications (i.e., Secure or non-Secure). Two sibling pairs were excluded from this analysis for reasons previously discussed (see Note, Table 8).

Finally, mothers' global mentalization scores were positively associated across siblings in concordant/Secure and non-concordant families, and negatively associated in concordant/non-Secure families. Again, however, these correlations were not significantly different.

Next, associations across siblings by concordance group were compared via analyses of variance. Attribute scores pertaining to second-born siblings were subtracted from scores pertaining to firstborn siblings, resulting in a difference score for each family. Absolute difference scores were used because the objective was to determine whether the magnitude of the differences among siblings varied across concordance groups (e.g., to determine whether mothers' use of a certain type of attribute differed more across siblings in non-concordant versus concordant families). Descriptive statistics for this analysis, and the analyses below, are presented in Table 10.

Mental attributes. A MANOVA examined whether differences among siblings on the three mental attributes varied among concordant/Secure, concordant/non-Secure, and non-concordant groups. The multivariate effect was not significant ($V = .08$, $F [6, 60] = 0.41$, $p = .87$; partial $\eta^2 = .04$), nor were any univariate effects. That is, mothers' use of mental attributes did not differ across siblings in any concordance group.

Mental child and relationship descriptors. A second MANOVA revealed that differences among siblings on mothers' use of mental attributes in describing their children and their relationships did not vary significantly across concordance groups ($V = .06$, $F [4, 64] = .47$, $p = .86$; partial $\eta^2 = .03$). In other words, mothers' use of mental child and relationship descriptors did not differ across siblings in any concordance group.

Table 10
Means and Standard Deviations for Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores, as well as Differences in these Values among Siblings by Birth Order and Concordance Group

Variable		Concordant			Non-concordant
		Overall <i>n</i> = 25	Secure <i>n</i> = 18	Non-Secure <i>n</i> = 7	<i>n</i> = 10
Intellect	First	.10 (.04)	.10 (.05)	.12 (.02)	.09 (.06)
	Second	.12 (.05)	.07 (.08)	.11 (.03)	.11 (.05)
	Diff.	-.01 (.05)	-.02 (.05)	.05 (.03)	-.01 (.07)
Desires	First	.10 (.03)	.10 (.02)	.11 (.05)	.16 (.05)
	Second	.11 (.06)	.12 (.06)	.12 (.07)	.13 (.04)
	Diff.	-.01 (.07)	-.01 (.06)	.06 (.08)	.03 (.08)
Emotions	First	.08 (.03)	.09 (.02)	.06 (.23)	.09 (.03)
	Second	.07 (.03)	.07 (.03)	.07 (.03)	.07 (.03)
	Diff.	.01 (.04)	.01 (.04)	.03 (.01)	.01 (.03)
Child descriptors	First	.52 (.26)	.50 (.23)	.55 (.35)	.57 (.27)
	Second	.49 (.21)	.47 (.23)	.52 (.16)	.48 (.22)
	Diff.	.03 (.22)	.03 (.23)	.15 (.15)	.05 (.18)
Relationship descriptors	First	.32 (.25)	.35 (.25)	.22 (.23)	.42 (.26)
	Second	.30 (.20)	.34 (.21)	.21 (.10)	.22 (.14)
	Diff.	.02 (.26)	.02 (.28)	.21 (.05)	.14 (.15)
Global	First	3.60 (1.76)	3.81 (1.67)	3.07 (2.01)	3.55 (1.31)
	Second	3.76 (1.39)	3.94 (1.39)	3.29 (1.38)	4.1 (1.60)
	Diff.	-.16 (1.20)	-.14 (1.74)	2.08 (1.28)	-.60 (1.60)

Note. Two sibling pairs were excluded from this analysis for reasons previously discussed (see *Note*, Table 8).

Global mentalization scores. As per a one-way ANOVA, differences among siblings on mothers' global scores did not vary across three-way concordance groups ($F[2, 32] = 1.92, p = .30, \text{partial } \eta^2 = .11$).

Overall, these analyses suggested that, in general, mentalization scores did not differ in relation to infants in Secure versus non-Secure relationships, regardless of whether their sibling was in a concordant or non-concordant relationship. The only exception related to mothers' use of attributes referring to their children's Desires; that is, when describing their first-born infants, mothers of non-Secure infants in non-concordant families referred to these attributes more frequently than mothers of concordant/Secure children, or mothers of concordant/non-Secure children. However, mothers' use of this attribute in relation to non-Secure infants in non-concordant families was not significantly different from that of mothers of Secure infants in non-concordant families; that is, even this attribute was not able to distinguish between differing qualities of attachment. These analyses also indicated that the extent to which mentalization differed across siblings did not vary along with differences in their attachment relationships; in other words, mentalization was generally similar across siblings regardless of the extent to which their relationships were concordant.

Associations across concordance groups – Continuous analyses. As described previously, the objectives described above were re-examined using a continuous approach to attachment in an effort to compensate for the present study's modest sample size and associated statistical concerns. For these analyses, difference scores were also used to explore whether differences in mentalization among siblings were associated with comparable differences in attachment security. However, unlike the difference scores

used for the categorical analyses, non-absolute difference scores were used in all regression analyses to provide information about whether the magnitude *and* direction of the difference between siblings' attribute scores predicted comparable differences in their security scores (e.g., to determine whether a positive change from first- to second-born sibling on a particular attribute was associated with a similarly positive change in their attachment security). Key assumptions were checked for each regression analysis, with variance inflation factors and tolerance statistics used to test multicollinearity; Durbin-Watson tests used to evaluate independence of residuals; Levene's tests used to examine heteroscedasticity; and residual plots used to examine normality (as per Field, 2009). None of these tests revealed issues of concern for any analysis. Intercorrelations among difference scores were examined to determine whether siblings' age difference should be entered as a covariate in the following analyses; this, however, was not the case.

Mental attributes. Collectively, differences among siblings on the three mental attributes significantly predicted differences in attachment security ($R^2 = .23$, $F [3, 31] = 3.04$, $p = .04$). When examined individually, differences among siblings on mothers' use of Desires attributes was a significant predictor of differences in attachment security ($t [31] = 2.66$, $p = .01$). Differences on mothers' use of Emotion attributes approached significance as a predictor ($t [31] = 1.71$, $p = .09$). However, differences among siblings on mothers' use of Intellect attributes did not significantly predict differences in attachment security ($t [31] = .32$, $p = .75$). Regression coefficients for these analyses, and all subsequent regressions, are shown in Table 11; as reflected in the β -values shown in this table, *larger* differences among siblings' attachment security were associated with

larger differences among siblings on Desire, Will, and Preferences and Emotion attributes. Scatterplots depicting the relationship between sibling differences in

Table 11

Regression Statistics for the Prediction of Differences in Siblings' Continuous Security Scores from Sibling Differences on Mothers' Use of Mental Attributes, Use of Child and Relationship Descriptors, and Global Mentalization Scores

	b	SE	β	Correlations	
				Partial	Part
Intellect	5.71	17.80	.05	.06	.05
Desires	39.59*	14.88	.44	.43	.42
Emotion	49.82 [†]	29.23	.28	.29	.27
Child descriptors	.60	5.48	.02	.12	.12
Relationship descriptors	5.62	4.86	.20	.20	.20
Global	-0.59	.63	-.16	-.16	-.16

Note. $n = 35$. The statistics above were generated through three separate analyses; the three mental attributes were entered together in one analysis, child and relationships descriptors were entered together in a second analysis, and global mentalization scores were entered alone in a third analysis. "SE" represents standard error.

* $p < .05$. [†] $p < .10$.

attachment security and differences on these two attribute categories are presented in Figures 1 and 2, respectively.

Child and relationship descriptors; Global scores. Additional regression analyses were conducted to explore the extent to which differences in sibling attachment security could be predicted by differences on other variables of interest. Differences in siblings' security scores were not significantly predicted by differences on mothers' use of mental child or relationship descriptors, ($R^2 = .04$, $F [2, 32] = 0.71$, $p = .50$). Differences in security were also not predicted by differences in mothers' global mentalization scores ($R^2 = .02$, $F [1, 33] = .89$, $p = .35$).

To summarize, the association between mentalization and sibling attachment concordance seemed to differ depending on how analyses were approached. When analyses were formulated around categories (i.e., concordant/Secure, concordant/non-Secure, and non-concordant), mentalization in relation to each child did not distinguish between patterns of attachment within the family. However, when analyses were based upon continuous security scores, differences in mothers' use of mental attributes (specifically those related to children's Desires, Wishes, and Preferences and their Emotions) predicted differences in their attachment security. On the other hand, differences in security were not predicted by differences in mothers' mental child and relationship descriptors, nor by differences in their global mentalization scores.

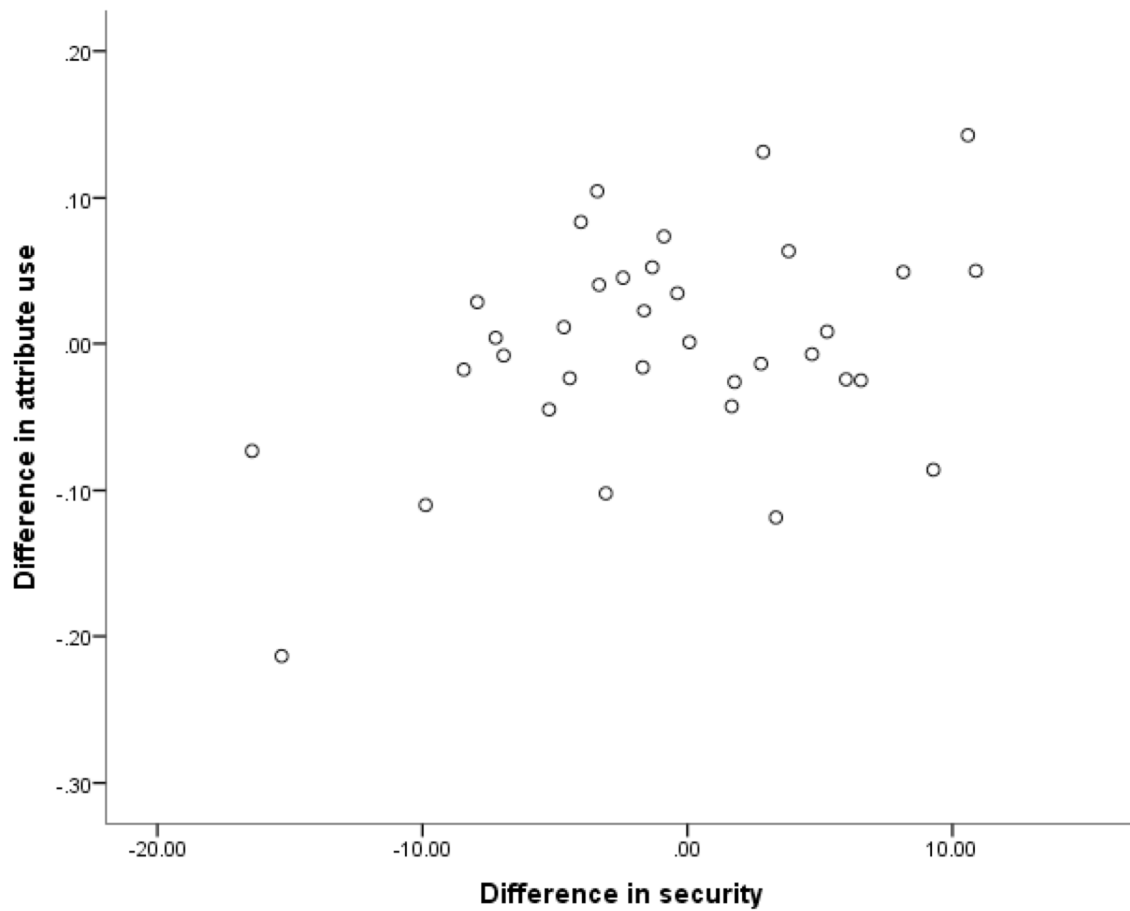


Figure 1. Scatterplot depicting the association between sibling differences on attachment security and on mothers' use of attributes referencing child Desires, Wishes, and Preferences.

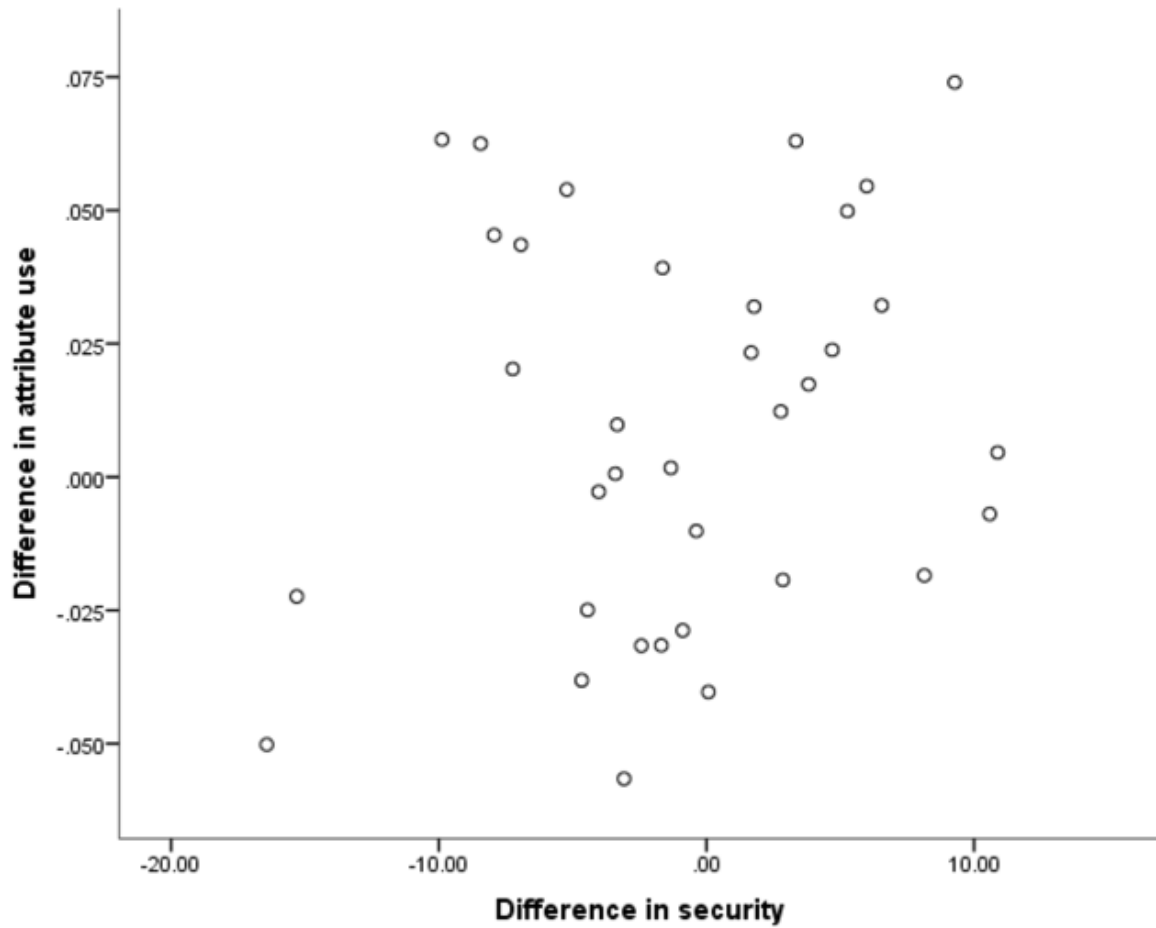


Figure 2. Scatterplot depicting the association between sibling differences on attachment security and on mothers' use of attributes referencing child Emotions.

Discussion

The purpose of this study was to explore the extent to which mentalization is associated with patterns of attachment within the family, as would be predicted by extant attachment theory. Beyond demonstrating that both similarities and differences in siblings' attachment relationships are common, the existing body of research has not been very successful in providing insight into the factors underlying within-family relationships (van IJzendoorn et al., 2000). Consequently, research efforts within this field have largely slowed (Fearon et al., 2010) – despite widespread recognition of a pressing need to shift the focus of research towards the family context (Kozłowska & Hanney, 2002). To this end, the present study attempted to introduce a new direction in sibling attachment research by exploring the role of *mentalization* in a within-family context. In dyadic studies, this construct has demonstrated promise even beyond that shown by maternal sensitivity in accounting for individual differences in attachment relationships (Bernier & Dozier, 2003). By applying it to the field of sibling attachment, the present study aimed to generate further insight into the processes underlying patterns of attachment within the family and, in doing so, to lay the foundation for future work within this underserved branch of research.

Returning to the Study's First Major Objective: Exploring Associations between Mentalization and State of Mind

This study's first major objective was to examine links between patterns of mentalization across siblings and state of mind regarding attachment. This aspect of the present study involved two sub-goals. First, this study investigated relative levels of mentalization displayed by mothers classified Autonomous versus non-Autonomous. Based upon numerous dyadic studies (Fonagy & Target, 2005), mothers classified

Autonomous were expected to display higher mentalization overall as compared to those classified non-Autonomous. Contrary to expectation, however, Autonomous and non-Autonomous mothers' use of mental attributes did not differ overall, nor did their use of mental relationship descriptors or the overall quality of their mentalization. A possible account for the contrast between these findings and those reported in the dyadic literature relates to sample size: as described in Chapter 2, the number of families participating in sibling attachment research tends to be smaller than that participating in dyadic research; consequently, patterns observed in larger samples are often difficult to replicate.

Furthermore, as observed in most studies utilizing community samples (van IJzendoorn & Bakermans-Kranenburg, 1996), the number of mothers classified non-Autonomous was substantially smaller than that classified Autonomous, which likely compounded the difficulties associated with a smaller sample size overall. It is of note, however, that even a simple comparison of patterns in mothers' use of mental attributes and relationship descriptors failed to suggest even a trend in support of the hypotheses (with the exception of overall mentalization scores, which did trend in the expected direction).

There was one aspect of mentalization that did vary according to state of mind, although not in a direction that was obviously predicted by theory: when asked to provide five single words to describe their children, non-Autonomous mothers provided *more* mental-state descriptors than did Autonomous mothers. As described above, this pattern was not observed in mothers' use of mental attributes throughout the interview; rather, it only emerged when mothers were asked to provide five individual words to describe their impressions of the child, perhaps targeting mothers' perceptions of their child's defining features rather than their use of mental attributes more generally. This finding was unexpected given that mothers classified as non-Autonomous tend to display *lower* levels

of mentalization as compared to those classified Autonomous (Fonagy & Target, 2005). However, similar trends to those uncovered in the present study have been reported in some research. For instance, Bernier & Dozier (2003) found that mothers in non-Secure relationships – who tend to be classified non-Autonomous (Pederson et al., 1998) and who would also be expected to display lower levels of mentalization (Slade et al., 2005) – displayed unexpectedly higher levels of mentalization than mothers in Secure relationships. In accounting for these findings, Bernier and Dozier (2003) noted that describing very young children primarily in terms of mental states may actually indicate a lack of attunement to the child because he is likely too young to engage in behaviors that clearly point to what his mental state might be. In these cases, high levels of mentalization may reflect a distorted view of the child's mental states as influenced by the mother's own biases. This explanation is consistent with the concept of *pseudomentalization* (Allen, Fonagy, & Bateman, 2008), a term used within the clinical literature to describe individuals who appear to engage in high levels of mentalization, but are driven primarily by their own needs rather than true curiosity about others' experiences (Jurist & Meehan, 2009; Rossouw, 2012). Thus, higher 'mentalization' may not necessarily reflect appropriate, balanced interpretation of others and relationships.

Bernier and Dozier's (2003) work, as well as the literature on pseudomentalization, converges with the present study's findings in several ways. In particular, non-Autonomous states of mind are inherently defined by the tendency to interpret attachment-related experiences according to one's own biases (George & Solomon, 2008); from this perspective, mothers classified as non-Autonomous would indeed display a higher tendency to characterize their infants' characteristics in ways that are unlikely to be supported by behavioral evidence. This possibility is further supported

by trends emerging from mothers' average use of mental child descriptors by birth order, which indicated that non-Autonomous mothers used substantially more mental child descriptors in reference to their firstborn children (who were only four months old at the time of the interview) than they did to describe their second-born children (who were, on average, eight months older). Indeed, non-Autonomous mothers' use of mental child descriptors in relation to their first-born children was higher than that displayed by Autonomous mothers in relation to either their first- or second-born children. Although the interaction between state of mind and birth order was not significant, this pattern suggests that not only do non-Autonomous mothers tend to 'over-perceive' their infants' mental states, they may be especially susceptible to doing so in the context of little behavioral evidence (here, due to the child's developmental stage).

The present study's second sub-goal relating to state of mind was to investigate variability in mentalization across siblings, comparing the extent to which mothers classified Autonomous or non-Autonomous displayed different levels of mentalization in relation to each of their children. Specific hypotheses related to this sub-goal were difficult to make given that no previous research has explored this association; however, two possibilities based primarily on theory were suggested. First, consistent with the field's view of mentalization as a stable maternal trait (Meins et al., 2011), mothers might be expected to display stable mentalization across siblings regardless of state of mind. On the other hand, one might expect Autonomous mothers to display more stability across siblings as compared to non-Autonomous mothers, whose defended approach to attachment (George & Solomon, 2008) could render them more susceptible to the influence of child-specific factors that hinder or facilitate their ability to mentalize

towards each child. Both possibilities were equally speculative, with this sub-goal of the present study representing a true exploration of patterns emerging from the data.

Overall, results from the present study entirely supported the first hypothesis outlined above: associations across siblings were generally similar within the sample overall, and in Autonomous and non-Autonomous groups. In other words, mothers engaged in similar patterns of mentalization in relation to each of their children regardless of their underlying state of mind. These findings are in keeping with attachment theory's traditional view of mentalization as a stable maternal characteristic applied similarly across relationships (Meins et al., 2011; Meins et al., 2014). Moreover, they suggest that state of mind does not influence the extent to which mentalization is impacted by inevitable differences in mothers' experiences in their relationship with each child – that is, contrary to the predictions above, a non-Autonomous state of mind does not appear to influence the mother's capacity to mentalize in light of experiential factors that vary across siblings (Meins et al., 2011). Again, however, these results may be related to small sample size, and to the size discrepancy between groups. Larger samples are typically recommended for uncovering significant effects using analyses of variance (Tabachnick & Fidell); consequently, the present study's small sample size may have resulted in important differences within and between groups going undetected.

Returning to the Study's Second Major Objective – Exploring Associations Between Mentalization, Infant Attachment Security, and Patterns of Attachment Within the Family

This study's second major objective was to explore links between mentalization, infant attachment security, and concordance in siblings' attachment relationships.

Concordance among siblings in the present study was slightly higher (69%) than that

reported in previous research grouping infants according to two-way attachment classifications (e.g., Ward et al., 1988; Teti et al., 1991, as cited in van IJzendoorn et al., 2000), which may have been related to the relatively large number of mothers in Secure relationships with both their children; for instance, 50% of families in the present study were concordant/Secure, in contrast to only 41% of Ward et al.'s (1988) sample. The prevalence of concordant/Secure relationships in the present sample may be related to demographic characteristics, particularly the fact that most families were solidly low risk (van IJzendoorn et al., 1999). Additionally, mothers initially participating with their older child may have been more likely to participate with their second-born if their first experience had been positive: for instance, if their firstborn was easily soothed and/or appeared to enjoy the exploratory elements of the study (e.g., engaging with strangers) – in other words, if he or she displayed characteristics of an infant in a Secure relationship.

Sub-goals relating to this second objective essentially paralleled those described above in relation to associations between mentalization and state of mind. First, the present study examined mentalization in relation to infants in Secure versus non-Secure relationships, with the expectation that mothers would display higher levels in relation to those in Secure relationships and lower levels in relation to those in non-Secure relationships - regardless of whether the overall pattern of attachment within the family was concordant or non-concordant (Fonagy & Target, 2005). Levels of mentalization were indeed similar among those in Secure relationships and among those in non-Secure relationships, regardless of concordance group. Crucially, however, mentalization was not higher overall in relation to infants in Secure relationships, regardless of how it was operationalized (i.e., attribute scores, descriptors, or global mentalization scores). The fact that this basic trend did not emerge is puzzling, especially given that it has been

identified in other research using similar methodologies. For instance, Bernier and Dozier (2003) reported meaningful links between state of mind, attachment security, and mentalization as assessed via attribute frequency counts, with mothers' responses elicited through a single question ("could you describe [child] for me, what he [or she] is like?"). Similarly, Rosenblum et al. (2008) reported expected associations between sensitivity and mentalization based on both global ratings of mentalization and attribute frequency counts assessed via the Working Model of the Child Interview – an approach that was nearly identical to the present study's. Again, it is important to note that most dyadic studies involved a substantially larger sample than the present study; for instance, Bernier & Dozier's (2003) was nearly twice as large ($n = 64$), while Rosenblum et al.'s (2008) was nearly three times as large ($n = 95$). The present study's ability to replicate effects – and, even further, find significant differences among even smaller sub-groups – may have been limited by its sample size (Fraley & Waller, 1998).

Second, the present study aimed to explore links between patterns of mentalization and patterns of attachment within the family. Attachment theory (van IJzendoorn et al., 2000), in combination with results from dyadic research (Fonagy & Target, 2005), would predict similar levels of mentalization across siblings who share similar relationships (i.e., two Secure or two non-Secure), and different levels across those in different relationships (i.e., one Secure and one non-Secure, with higher levels of mentalization associated with the child in the Secure relationship). Overall, the extent to which results supported these hypotheses was mixed. When siblings were separated into concordance groups – that is, when a categorical approach to attachment was used – mentalization was similar across siblings regardless of whether they were in two Secure relationships, two non-Secure relationships, or non-concordant relationships. However, it

is important to note that the present study found no differences in mentalization towards Secure and non-Secure infants overall, perhaps making it unlikely that differences among siblings in Secure and non-Secure relationships within non-concordant families might be identified. Given that mentalization and security are typically robustly associated in dyadic research (Fonagy & Target, 2005; Slade et al., 2005), it is important that the role of mentalization in accounting for attachment within a family context be further explored in a sample where these basic links are present before being discounted.

In support of this need for further research, another set of findings from the present study *did* indicate that patterns of mentalization across siblings might, in fact, be meaningfully related to patterns of attachment within the family. These findings emerged when a continuous measure of security was utilized rather than the traditional categorical approach: here, similarity in mothers' use of mental attributes across siblings predicted similarity in the quality of their relationships, while differences in mentalization predicted differences in security. These findings are consistent with theoretical prediction *and* with the dyadic literature, which suggests that a) higher levels of mentalization should correspond with higher security scores (Fonagy & Target, 2005); and b) across siblings, more variability in mentalization in relation to each child should be associated with more variability in their attachment security. These findings represent important steps for the attachment literature on several levels. First, they support previous research indicating that adopting a continuous approach to attachment may be a viable adjunct or alternative to categorical approaches (Fraley & Spieker, 2003; Richters et al., 1988; Dumas, 2009), especially in studies impacted by sample size concerns (Fraley & Waller, 1998). Second, they add to the broader literature pointing to the role of mentalization as an important

determinant of the quality of the attachment relationship, indicating that this factor may be a key determinant of the quality of relationships across siblings.

At first glance, it may appear that the promising findings described above are called into question by the fact that parallel results did not emerge when attachment was examined categorically. However, it is important to note that categorical versus continuous approaches to attachment are different on numerous levels – methodological and statistical, but also conceptual (Fraley & Waller, 1998). In particular, classifying relationships into categories tends to occur on the basis of *differences* in behavior, minimizing the aspects that may be similar across infants in different groups (Fraley & Spieker, 2003). A continuous approach to attachment, in contrast, simply reflects variability in the extent to which infants display attachment behavior consistent with security (Richters et al., 1988), including differences within *and* between the groups imposed by a categorical structure. Thus, the absence of parallel categorical and continuous results in the present study does not necessarily point to a critical inconsistency; rather, this divergence likely reflects fundamental differences in how attachment security and its underlying factors are measured and conceptualized.

Links between Mentalization and Sibling Attachment Concordance: What Remains Unaccounted For?

Thus far, this discussion has focused primarily on sample size as an explanation for many of this study's results, particularly those that were contrary to theory and/or the existing dyadic literature. This explanation is not unreasonable, especially given that sample size was indeed smaller than that found in most dyadic studies and that other approaches known to mitigate the effects of small sample size (i.e., continuous analyses) seemed more successful in uncovering meaningful results. Still, attributing results (or

lack thereof) primarily to sample size is not entirely satisfying because it ignores the potential role of two other issues: the intervening role of other factors; and the challenges associated with gaining valid assessments of mentalization.

Overall, this study has focused primarily on the factors included explicitly in attachment theory's classic model for the development of attachment relationships; that is, maternal state of mind, infant security, and the attachment-related factors that bridge the gap between them (e.g., mentalization). However, as discussed further elsewhere in this dissertation, research increasingly points to the possibility that security is influenced by factors beyond the quality of state of mind and interactive style, in and of themselves. For instance, research suggests that attachment is shaped not only by mothers' responses to their infants, but also by the complex interaction between child characteristics (i.e., temperament) and the dynamic arising from other relationships in the family, including infants' awareness of how their mother responds to their siblings (Hart, Field, Del Valle, & Letourneau, 1998; Fearon et al., 2006; Fearon et al., 2010). It is possible that these processes weaken the predictive link between security and maternal factors (e.g., mentalization) to an extent that varies across children and families; that is, weak associations between mentalization and the quality of attachment may reflect the fact that the target outcome (i.e., security) is influenced by a range of complex factors, including those arising from the child and from other within-family processes.

A second issue that may have influenced this study's results are the challenges associated with obtaining valid and accurate assessments of mentalization – that is, of the degree to which they truly reflect an understanding of infants' mental states and behavior, not of mothers' capacity to 'pseudomentalize'. Some research groups have approached this issue by assessing mentalization in conjunction with the child's behavior; that is, via

the comments mothers make about their children's mental states while directly engaged in interaction with the child ("on-line" assessments), or via mothers' commentaries on videotaped interactions between themselves and their child ("off-line" assessments; Fonagy & Target, 2005). Mothers' comments in these contexts are then coded *appropriate* or *inappropriate*, depending on the extent to which they reasonably correspond with the child's behavior and thus form the basis for a Secure relationship (Meins et al., 2012). As might be expected, research indicates that mothers of Secure infants tend to engage in more appropriate mentalization than mothers of infants classified non-Secure (Meins et al., 2012). Further, only appropriate mind-related comments appear to be associated with sensitivity and security (Arnott & Meins, 2007; Meins et al., 2001; Laranjo et al., 2008); inappropriate comments, in contrast, appear unrelated to either construct (Meins et al., 2012).

The distinction between appropriate versus inappropriate mentalization, and their differential links with attachment security, may be relevant to the present study for several reasons. The interview format utilized in this study was selected for well-supported reasons: some literature suggests that assessing mentalization as it arises during specific interactions poses similar challenges to assessing sensitivity during a play paradigm; that is, these measures are episodic, reflecting mentalization as it arises within a specific interaction (Fonagy & Target, 2005, p. 335). In contrast, assessing mentalization via global interviews is thought to give a "more stable, cross-situational index of individual differences in mentalizing, [estimating] mentalization as an aggregate across many episodes of interaction" (Fonagy & Target, 2005, p. 335; Rosenblum et al., 2008). There is the possibility, however, that results from the present study could have yielded additional insight if the distinction between appropriate and non-appropriate

comments had been made; for instance, while mothers in non-concordant relationships may have engaged in similar levels of overall mentalization across siblings, they may have made more “appropriate” comments in relation to the child in the Secure relationship versus the child in the non-Secure relationship. Exploring the distinction between appropriate and inappropriate mentalization may shed light on more refined differences in the factors underlying siblings’ relationships, and ultimately on contributors to attachment concordance within the family.

Limitations and Future Directions

Although this study’s sample size is well within the standards for sibling attachment research, especially considering that it involves in-depth measures of attachment, it did limit the analyses that could be performed. Some research suggests that patterns of mentalization related to infants in Avoidant versus Resistant relationships may be different, especially when the distinction between appropriate and non-appropriate comments is made (Meins et al., 2012). Moreover, patterns of mentalization displayed by mothers classified as Unresolved/disorganized on the AAI, and by those in Disorganized relationships, may be distinct from those associated with the organized classifications (Slade et al., 2005). These distinctions could not be meaningfully examined within the present study, but should be explored in future research. Collecting enough data to make this research possible would be an intensive process; thus, this goal would best be achieved by pooling resources across research groups with similar objectives.

Given the demands associated with collecting gold-standard measures of attachment, especially for sibling studies, further work examining the development of a continuous scale for state of mind would also be beneficial. As seen in the present study, exploring security as continuous dimension appeared to be a useful way of addressing the

limitations posed by sample size issues. Conducting parallel analyses using a continuous measure of state of mind may also provide further insight into links between Autonomy and mentalization, both dyadically and within the family. Developing a comparable metric for state of mind may be a useful way of addressing sample size issues that will inevitably arise in attachment research, especially sibling studies.

As much of this research was exploratory, many ideas put forth in this study require further investigation. First, significant results typically emerged only in relation to one aspect of mentalization and were not supported by corresponding patterns in other aspects. For example, the argument that non-Autonomous mothers may engage in pseudomentalization to a greater extent than Autonomous mothers would have been strengthened if non-Autonomous mothers had displayed higher levels of mental attributes, more use of mental relationship attributes, and/or higher global mentalization scores in addition to higher use of mental child descriptors – especially given that other research indicates that these aspects of mentalization tend to be linked (Rosenblum et al., 2008). Thus, the present study's conclusions should be interpreted with caution. Second, the possibility that the distinction between appropriate and non-appropriate mentalization may play a role in the processes shaping attachment within the family requires further investigation, as does the possibility that factors outside the direct attachment model (e.g., child characteristics) may be impacting the strength of the association between factors shaping attachment and the ultimate security of attachment relationship(s).

Overall, the present study represented a new direction for exploring ways in which mentalization is related to patterns of attachment within the family. First, it revealed that both Autonomous and non-Autonomous mothers engaged in similar patterns of mentalization in relation to each of their children, supporting the traditional view of

mentalization as a relatively stable characteristic. Second, it indicated that when security was represented according to traditional classifications (i.e., Secure or non-Secure), patterns of mentalization were similarly associated across siblings regardless of concordance in their relationships; thus, patterns of mentalization within the family did not distinguish between concordance groups as based upon a categorical model of attachment. Links between mentalization and attachment security within the family only emerged when security was viewed as dimensional; here, differences in mentalization did indeed predict differences in attachment security in a theoretically- and empirically-predicted manner. Together, these findings indicate that patterns of mentalization across siblings may well play a role in the extent to which siblings' attachment relationships are similar; however, this relationship may be dependent on how attachment is conceptualized and whether patterns are examined between groups versus across the sample overall. Ideally, the range of possibilities that this study presents for further conceptual and empirical work will set the foundation for further exploration into this branch of attachment research, as well as ongoing collaboration among research groups in performing the intensive, high-quality work needed to meet this important goal.

References

- 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.
- 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.
- Allen, J. G. (2013). *Mentalizing in the development and treatment of attachment trauma*. London: Karnac Books Ltd.
- Allen, J. G., Fonagy, P., & Bateman, A. W. (2008). *Mentalizing in clinical practice*. Arlington, VA: American Psychiatric Publishing.
- Armstrong, R. A. When to use the Bonferroni correction. *Ophthalmic and Physiological Optics*, doi: 10.1111/opo.12131.
- Arnott, B., & Meins, E. (2007). Links among antenatal attachment representations, postnatal mind-mindedness, and infant attachment security: A preliminary study of mothers and fathers. *Bulletin of the Menninger Clinic*, 71, 132-149.
- 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.
- Berlin, L. J., Zeanah, C. H., & Lieberman, A. F. (2008). Prevention and intervention programs for supporting early attachment security In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 745-761). New York: Guilford Press.
- Bernier, A., & Dozier, M. (2003). Bridging the attachment transmission gap: The role of maternal mind-mindedness. *International Journal of Behavioral Development*, 27, 355-365.
- Canadian Psychological Association. (2000). *Canadian code of ethics for psychologists* (3rd Ed.). Ottawa, ON: Canadian Psychological Association.
- 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.
- Dumas, T. M. (2009). Utilizing a dimensional model of infant attachment behavior: Implications for relations with maternal sensitivity, mothers' attachment representations and sensitivity to intervention outcomes (Unpublished manuscript). University of Western Ontario: London, ON.

- 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.
- Fearon, R. M. P., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2010). Jealousy and attachment: The case of twins. In S. L. Hart & M. Legerstee (Eds.), *Handbook of jealousy: Theories, principles, and multidisciplinary approaches*. United States: Wiley-Blackwell Publishing.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: SAGE Publications Ltd.
- Fonagy, P., & Allison, E. (2012). What is mentalization? The concept and its foundations in developmental research. In N. Midgley & I. Vrouva (Eds.), *Minding the child: Mentalization-based interventions with children, young people and their families* (pp. 11-34). New York: Routledge/Taylor & Francis Group.
- Fonagy, P., Gergely, G., Jurist, E. L., & Target, M. (2004). *Affect regulation, mentalization, and the development of the self*. London: Karnac Books.
- Fonagy, P., Gergely, G., & Target, M. (2007). The parent-child dyad and the construction of the subjective self. *Journal of Child Psychology and Psychiatry, 48*, 288-328.
- Fonagy, P., Steele, M., Steele, H., Moran, G. S., & Higgitt, A. C. (1991b). The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. *Infant Mental Health Journal, 12*, 201-218.
- Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self organization. *Development and Psychopathology, 9*, 679-700.
- Fonagy, P., & Target, M. (2005). Bridging the transmission gap: An end to an important mystery of attachment research? *Attachment and Human Development, 7*, 333-343.
- Fraley, R. C., & Spieker, S. J. (2003). Are infant attachment patterns continuously or categorically distributed? A taxometric analysis of Strange Situation behavior. *Developmental Psychology, 39*, 387-404.
- Fraley, R. C., & Waller, N. G. (1998). Adult attachment patterns: A test of the typological model. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 77-114). New York: Guilford Press.
- George, C., & Solomon, J. (1999). Attachment and caregiving: The caregiving behavioral

- system. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 649-670). New York: Guilford Press.
- 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.
- Grienenberger, J., Kelly, K., & Slade, A. (2005). Maternal reflective functioning, mother infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment and Human Development, 7*, 299-311.
- Hart, S., Field, T., Del Valle, C., & Letourneau, M. (1998). Infants protest their mothers' attending to an infant-size doll. *Social Development, 7*, 54-61.
- Huth-Bocks, A. C., Theran, S. A., Levendosky, A. A., & Bogat, G. A. (2011). A social contextual understanding of concordance and discordance between maternal prenatal representations of the infant and infant-mother attachment. *Infant Mental Health Journal, 32*, 405-426.
- Jenkins, J., Astington, J. W., Moore, C., Cheung, C., Wade, Gass, K. (2011, April). The development of theory of mind understanding: Treating children as mental beings. In C. Cheung (Chair), *The influence of micro- and macro-level family characteristics on children's theory of mind development*. Symposium conducted at the meeting of the Society for Research in Child Development, Montreal, Canada.
- Jurist, E. L., & Meehan, K. B. (2009). Attachment, mentalization, and reflective functioning. In J. H. Obegi & E. Berant (Eds.), *Attachment theory and research in clinical work with adults* (pp. 71-93). New York: Guilford Press.
- Kochanska, G. (2001). Emotional development in children with different attachment histories: The first three years. *Child Development, 72*, 474-490.
- Koren-Karie, N., Oppenheim, D., Dolev, S., Sher, E., & Etzion-Carasso, A. (2002). Mothers' insightfulness regarding their infants' internal experience: Relations with maternal sensitivity and infant attachment. *Developmental Psychology, 38*, 534-542.
- Kozłowska, K., & Hanney, L. (2002). The network perspective: An integration of attachment and family systems theories. *Family Process, 41*, 285-312.
- Laranjo, J., Bernier, A., & Meins, E. (2008). Associations between maternal mind mindedness and infant attachment security: Investigating the mediating role of maternal sensitivity. *Infant Behavior and Development, 31*, 688-695.

- Laurent, H. K., & Ablow, J. C. (2012). The missing link: Mothers' neural response to infant cry related to infant attachment behaviors. *Infant Behavior and Development, 35*, 761-772.
- Lundy, B. L. (2003). Father- and mother-infant face-to-face interactions: Differences in mind-related comments and infant attachment? *Infant Behavior and Development, 26*, 200-212.
- Main, M. (1991). Metacognitive knowledge, metacognitive monitoring, and singular (coherent) vs. multiple (incoherent) model of attachment: Findings and directions for future research. In C. M. Parkes, J. Stevenson-Hinde, & P. Marris (Eds.), *Attachment across the life cycle* (pp. 127-159). London: Routledge.
- 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., 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., Cooper, G., Hoffman, K., & Powell, B. (2002). The Circle of Security project: Attachment-based intervention with caregiver-preschool child dyads. *Attachment and Human Development, 4*, 107-124.
- Meins, E. (1999). Sensitivity, security, and internal working models: Bridging the transmission gap. *Attachment and Human Development, 1*, 325-342.
- Meins, E. (2013). Sensitive attunement to infants' internal states: Operationalizing the construct of mind-mindedness. *Attachment and Human Development, 15*, 524-544.
- Meins, E., Fernyhough, C., Arnott, B., Turner, M., & Leekam, S. (2011). Mother- versus infant-centered correlates of mind-mindedness in the first year of life. *Infancy, 16*, 137-165.
- Meins, E., Fernyhough, C., de Rosnay, M., Arnott, B., Leekam, S. R., & Turner, M. (2012). Mind-mindedness as a multidimensional construct: Appropriate and nonattuned mind-related comments independently predict mother-infant attachment in a socially diverse sample. *Infancy, 17*, 393-415.
- Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry, 42*, 637-648.
- Meins, E., Fernyhough, C., & Harris-Walker, J. (2014). Is mind-mindedness trait-like or

a quality of close relationships? Evidence from descriptions of significant others, famous people, and works of art. *Cognition*, 130, 417-427.

- Murphy, A., Steele, M., & Steele, H. (2013). From out of sight, out of mind to in sight and in mind: Enhancing reflective capacities in a group attachment-based intervention. In J. E. Bettmann & D. D. Friedman (Eds.), *Attachment-based clinical work with children and adolescents* (pp. 237-257). New York: Springer.
- Oppenheim, D., & Koren-Karie, N. (2002). Mothers' insightfulness regarding their children's internal worlds: The capacity underlying secure child-mother relationships. *Infant Mental Health Journal*, 23, 593-605.
- 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.
- Perneger, T. V. (1998). What's wrong with Bonferroni's adjustment. *British Medical Journal*, 316, 1236-1238.
- Richters, J. E., Waters, E., & Vaughn, B. (1988). Empirical classification of infant mother relationships from interactive behavior and crying during reunion. *Child Development*, 59, 512-522.
- Rosenblum, K. L., McDonough, S. C., Sameroff, A. J., & Muzik, M. (2008). Reflection in thought and action: Maternal parenting reflectivity predicts mind-minded comments and interactive behavior. *Infant Mental Health Journal*, 29, 362-376.
- Rossouw, T. (2012). Self-harm in young people: Is MBT the answer? In N. Midgley & I. Vrouva (Eds.), *Minding the child: Mentalization-based interventions with children, young people and their families* (pp. 131-144). New York: Routledge/Taylor & Francis Group.
- Shai, D., & Belsky, J. (2011). When words just won't do: Introducing parental embodied mentalizing. *Child Development Perspectives*, 5, 173-180.
- Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment and Human Development*, 7, 269-281.
- Slade, A., Grienenberger, J., Bernbach, E., Levy, D., & Locker, A. (2005). Maternal reflective functioning, attachment, and the transmission gap: A preliminary study. *Attachment and Human Development*, 7, 283-298.
- Solomon, J., & George, C. (1996). Defining the caregiving system: Toward a theory of caregiving. *Infant Mental Health Journal*, 17, 183-197.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Pearson Education, Inc.

- Touris, M., Kromelow, S., & Harding, C. (1995). Mother-firstborn attachment and the birth of a sibling. *American Journal of Orthopsychiatry*, *65*, 293-297.
- van den Dries, L., Juffer, F., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Alink, L. R. A. (2012). Infants' responsiveness, attachment, and indiscriminate friendliness after international adoption from institutions or foster care in China: Application of Emotional Availability Scales to adoptive families. *Development and Psychopathology*, *24*, 49-64.
- 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., & Bakermans-Kranenburg, M. J. (1996). Attachment representations in mothers, fathers, adolescents, and clinical groups: A meta-analytic search for normative data. *Journal of Consulting and Clinical Psychology*, *64*, 8-21.
- 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.
- 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.
- Zeanah, C. H., & Benoit, D. (1995). Clinical applications of a parent perception interview in infant mental health. *Child and Adolescent Psychiatric Clinics of North America*, *4*, 539-554.

Chapter 4

Expanding on Sensitivity: How do its Shared and non-Shared Components Shape the Quality of Siblings' Attachment Relationships?

Parenting has long been recognized as having a substantial impact on child health and development (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). Within the field of attachment, maternal sensitivity – or a mother's ability to tailor her interactive style to suit her child's characteristics (Ainsworth, Bell, & Stayton, 1971) – has traditionally been viewed as the most important determinant of the quality of the attachment relationship because it impacts the extent to which a mother is able to meet her child's attachment needs (Fearon et al., 2006). Indeed, a substantial body of theoretical and empirical work has been devoted to exploring links between sensitivity and security across social groups and clinical populations (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2008; deWolff & van IJzendoorn, 1997; Tamis-LeMonda, 1996). Despite these wide-ranging efforts, however, results emerging from these studies have not been as promising as initially anticipated: although links between sensitivity and security are fairly reliable, they are not very robust (Thompson, 1997; de Wolff & van IJzendoorn, 1997). While mothers who interact sensitively with their infants tend to be in Secure relationships, and those who interact insensitively tend to be in non-Secure relationships, the strength of these associations leaves much variability in the quality of attachment unaccounted for.

Theoretically-unexpected findings have also been reported in research exploring the extent to which sensitivity accounts for patterns of attachment within the family. To date, this line of work has been based primarily on a straightforward extension of the framework typically utilized in between-family work; that is, mothers should interact

similarly sensitively across siblings in families where relationships are concordant/Secure; similarly insensitively in families where relationships are concordant/non-Secure; and with diverging sensitivity in families where relationships are non-concordant, whereby higher levels of sensitivity are directed towards the child in the Secure relationship (O'Connor, Croft, & Steele, 2000; van IJzendoorn et al., 2000). Empirically, however, the picture appears much more complex. For instance, Pederson, Moran, Bailey, and Bento (1999) found that sensitivity directed towards each sibling was correlated at a level of .57 for those in concordant relationships, while the correlation for non-concordant pairs was even higher ($r = .66$). More recently, van IJzendoorn et al. (2000) found that the theoretically-predicted association between sensitivity and attachment security only appeared in families where both children were in non-Secure relationships; in these families, mothers displayed relatively low levels of sensitivity towards each child. However, mothers of infants in Secure relationships – irrespective of whether their sibling was Securely or non-Securely attached – and mothers of infants in non-Secure relationships whose siblings were Securely attached displayed similar levels of sensitivity across siblings, all of which tended to be higher than those in concordant/non-Secure relationships. In both studies, similar levels of sensitivity across siblings appeared linked with concordant relationships in some families, but with non-concordant relationships in others. Together, these findings suggest that simply comparing the level of sensitivity directed towards each child is unlikely to be an effective approach to accounting for concordance in siblings' attachment relationships.

New Directions for the Study of Sibling Attachment Concordance: Where to Next?

In considering next steps for sibling attachment research – and by extension, for the field more broadly – those within the field have generally proposed two potential

avenues for further exploration. First, it may be that the key to understanding patterns of attachment within the family lies within other constructs that have not yet received the same attention as sensitivity (e.g., mentalization, as discussed in Chapter 3). Thus, further work exploring the roles of these factors may provide more insight into the roots of attachment than could be gained via sensitivity alone.

A second possibility is that maternal sensitivity is indeed as central in shaping patterns of attachment within the family as traditional perspectives would suggest; however, the multifaceted ways in which this construct shapes siblings' relationships with their common mother may not be sufficiently captured by the approaches typically utilized within the field. As outlined in Chapter 2, sibling attachment research has generally been conducted in similar ways across studies: sensitivity and attachment security are assessed when each child is the same age, and attachment outcomes are then compared across siblings in search of parallels that may explain similarities and differences in their relationships (van IJzendoorn et al., 2000). This approach was likely selected for several reasons. First, attachment researchers have generally preferred to assess the quality of attachment via the Strange Situation Procedure (SSP; Ainsworth et al., 1971), the most widely recognized tool for assessing individual differences in mother-infant relationships. One limitation of this paradigm, however, is that it is most psychometrically sound when infants are between 12 and 18 months old – making it impossible to assess siblings' relationships with their mother at the same point in time. To accommodate this restriction, research to date has assessed the quality of each child's relationship – and associated predictors – independently, even though this approach results in relationships being compared on assessments conducted months to years apart.

Another line of reasoning informing the practice of assessing each child's relationship separately arises from the behavioral genetics literature – particularly a seminal study by Plomin and Daniels (1987), which reported that siblings were often “no more similar to each other than to children picked at random from the general population” (Plomin, Asbury, & Dunn, 2001; p. 225) on characteristics spanning cognitive ability, psychopathology, and social-emotional functioning. These emergent patterns initially led researchers to propose that shared influences – that is, environmental factors experienced by all siblings – must not exert a substantial influence on development (Hoffman, 1991). Rather, most of the variance in siblings' outcomes was attributed to their non-shared experience, or to environmental effects experienced uniquely by each child (Anderson, Hetherington, Reiss, & Howe, 1994; Plomin & Daniels, 1987). Stemming largely from the arguments presented in this paper, researchers exploring the underpinnings of psychological development generally reached the consensus that “in trying to understand why siblings are so different... it is reasonable first to investigate experiences that differ within families” (Plomin et al., 2001; p. 227). Studies exploring links between siblings' non-shared experiences and the quality of their relationships have represented a rather parsimonious extension of this reasoning; that is, if a) siblings' non-shared experiences are most important in accounting for differences between them (Plomin & Daniels, 1987); and b) the level of sensitivity experienced by the child is a key determinant of the quality of attachment (Moran, Pederson, & Tarabulsky, 2010), then comparing each child's experience independently – that is, via the overt differences in parenting directed towards each sibling – should account for differences in their relationships.

Not only has this approach been less effective than anticipated in accounting for differences in siblings' relationships, as outlined above, it has also limited the extent to

which patterns of attachment within the family can be fully explored. First, examining siblings' relationships when each child is the same age does not provide a complete picture of the ways in which patterns of attachment present within a true 'family context' where several mother-infant relationships are unfolding concurrently. Indeed, assessing siblings' relationships at different points in time reflects two very different family contexts: one consisting of only one child, and consequently only one attachment relationship; and the other consisting of two children, each of whom are in a relationship with the same mother. The approach typically adopted within sibling attachment research – in which each child's relationship is examined separately, without assessing the quality of the other's relationship (if applicable) at the same point in time – implicitly suggests that these fundamental differences in family context are not very impactful; that is, if the most important determinant of the quality of attachment is the level of sensitivity experienced by the child in direct interaction with his mother (Ainsworth et al., 1971), the relationships she shares with others (including other children in the family) should not substantially affect the quality of her relationship with each child.

Empirical work, however, calls this assumption into question. For instance, some research suggests that the birth of a sibling is associated with significant shifts in security for firstborns, although the directionality of these changes varies among studies: while some report that the birth of a sibling is associated with decreases in attachment security (Teti, Sakin, Kucera, Corns, & Das Eiden, 1996), others report bi-directional change (Touris, Kromelow, & Harding, 1995). While these changes may be attributable in part to changes in firstborns' experience of maternal sensitivity with the arrival of a second child (Volling, 2012), some suggest that merely observing one's mother in interaction with a sibling evokes attachment behavior designed to re-distribute parental resources,

including comfort- and various attention-seeking strategies (e.g., trying to engage the parent in play; Fearon, Bakermans-Kranenburg, & van IJzendoorn, 2010; Volling, Kennedy & Jackey, 2010). Consequently, estimates of concordance as based on relationships formed within two different family contexts do not necessarily reflect patterns that would appear if relationships were assessed at the same time. The absence of this descriptive information within the existing literature represents an important gap in the field's understanding of how attachment presents within a family context – which, in most cases, represents the setting within which children's early relationships develop.

A second (and related) limitation of conventional designs in sibling attachment research is their capacity to explore the multidimensional pathways via which sensitivity shapes the quality of siblings' relationships. Researchers, clinicians, and laypeople alike have long recognized that “parenting does not operate in a vacuum” (Tamrouti-Makkink, Dubas, Gerris, & van Aken, 2004, p. 1405); that is, children experience – and can be shaped by – aspects of parenting that extend beyond those displayed within the dyad. According to family systems theory, which has long served as a framework for the broader literature exploring links between parenting and adjustment in domains beyond the realm of attachment, children growing up in the same family are exposed to parenting on numerous levels: not only do they experience the quality of parenting directed at themselves, they are also exposed to a) the quality of parenting directed towards each of their siblings (Minuchin, 1985); and b) the “holistic” quality of parenting within the family system, which exerts its own effects in addition to those arising from the family's component parts (Boyle et al., 2004; Jenkins & Biscaglia, 2011). Together, these levels more comprehensively reflect the ways in which parenting is actually experienced by the

child – not in isolation, but as an experience inextricably shaped by the quality of family relationships on dyadic, triadic, and holistic levels (Boyle et al., 2004).

How might re-conceptualizing sensitivity according to a family systems perspective lend itself to new directions for understanding the processes underlying sibling attachment relationships? First, as described above, sibling attachment research's predominant conceptualization of sensitivity as an overtly non-shared factor represents only a limited view of the ways in which sensitivity may shape patterns of attachment within the family (van IJzendoorn et al., 2000). In contrast, a family systems approach is fundamentally rooted in the notion that both shared *and* non-shared environmental effects contribute to siblings outcomes; that is, siblings uniquely experience some aspects of the family environment, including (for instance) their exposure to the quality of parenting directed towards their sibling; while experiencing other aspects that are shared across siblings, including the quality of parenting characterizing the family as a whole.

To date, the literature that comes closest to assessing how sensitivity operates as a shared versus non-shared factor is the small body of behavioral genetics studies exploring the underpinnings of attachment among twins. In general, this work suggests that the effects of sensitivity are primarily shared; that is, mothers tend to interact with a similar level of sensitivity towards each child, which contributes to similarity in their relationships (Fearon et al., 2006; Roisman & Fraley, 2008). These conclusions, however, may not be fully generalizable to a family context consisting of non-twin siblings (O'Connor & Croft, 2001). For instance, mothers may be more likely to interact similarly with twins for several reasons, including their perceptions of greater similarity in twins' characteristics; the fact that twins' needs are developmentally more similar than siblings'; and/or the role of genetically-mediated characteristics that may evoke more

similar styles of responding (Caspi et al., 2004; Deater-Deckard et al., 2001).

Consequently, sensitivity may appear more shared in relation to twins versus siblings, who may evoke greater differences in mothers' interactive styles (Plomin & Daniels, 1987). This possibility, however, remains to be investigated; to date, no research has actually explored the relative contributions of shared versus non-shared sensitivity to patterns of attachment across siblings, representing a key gap in the field's understanding of how this factor operates within a family context.

Conceptualizing Shared and Non-shared Effects on Attachment across Siblings:

Where does Sensitivity Fit In?

Another avenue for further research that emerges when links between sensitivity and sibling attachment are re-formulated according to a family systems perspective relates to the way in which this framework conceptualizes siblings' non-shared environments – which, as previously mentioned, are thought to be especially key in shaping differences in their outcomes (Anderson et al., 1994; Plomin & Daniels, 1987). Within conventional sibling attachment research, siblings' non-shared environments are solely captured by an objective comparison of the sensitivity directed towards each child; that is, the extent to which their environments are non-shared is presumed from a comparison of the sensitivity experienced by each child directly (van IJzendoorn et al., 2000). When siblings' relationships are conceptualized from a family systems perspective, a wider spectrum of non-shared influences – and a more multifaceted picture of the processes shaping sibling outcome variability – emerges. Within this broader literature, non-shared influences related to parenting are typically represented via two main categories: those arising from each child's experience of *differential parenting*, or the difference in the quality of parenting directed towards himself versus towards his

sibling(s); and those arising from the child's unique experience of *ambient parenting*, or the holistic quality of parenting within the family overall (Meunier, Bisceglia, & Jenkins, 2012). Each contributes in unique ways to variability in siblings' outcomes, as below:

Non-shared influences arising from differential parenting. Substantial theoretical and empirical evidence suggests that when the link between parenting and adjustment is examined within families, and not simply as it relates to each child in the family independently, the mechanisms underlying sibling variability appear increasingly complex. First, several studies support the possibility of a "cross effect" in parenting, whereby Sibling 1's outcomes are shaped by the parenting directed towards Sibling 2 (Feinberg & Hetherington, 2001). For instance, Reiss et al. (1995) reported that punitive behavior and disagreement directed towards Sibling 1 were linked with lower levels of antisocial behavior in Sibling 2; conversely, more support and warmth towards Sibling 1 were linked with higher depression in Sibling 2. While the specific mechanism underlying this effect remains to be investigated further (Anderson et al., 1994), these findings support the overall conclusion that siblings' outcomes are indeed influenced by their experience of the parenting directed towards their siblings.

Given these "cross effects", to what extent are siblings' outcomes affected by the degree to which the quality of parenting directed towards their sibling differs from the parenting that they receive directly? To investigate this question, a unique study by Feinberg and Hetherington (2001) examined whether links between differential parenting and adjustment (e.g., depressive symptoms, social responsibility) differed for the recipients of positive versus negative parenting (i.e., whether the impact of differential parenting changes depending on whether a child is favored or disfavored relative to his sibling). Results revealed that siblings were indeed impacted by differential parenting in

varying ways depending on their family status. For instance, the link between differential parenting and adjustment appeared stronger for adolescents who directly experienced more negativity and less warmth; that is, for disfavored children, the level of differential parenting within the family appeared especially salient in terms of its impact on adjustment. In contrast, the link between differential parenting and adjustment was weaker for those who directly experienced more positive parenting. Together, these results highlighted that that “one cannot account for developmental trajectories solely on the basis of measures that ignore dynamics outside the parent-child dyad” (Feinberg & Hetherington, 2001, p. 33); rather, a more comprehensive approach reflecting the complexity of siblings’ non-shared experiences within the family is required.

A key question arising from this literature concerns the question of *why* differential parenting occurs; that is, why do parents interact differently with each of their children? A detailed review of the literature exploring this issue is outside the scope of this study; briefly, however, differential parenting is thought to arise from the complex, ongoing interaction between parent and child characteristics (Lamb, 2012; Patterson, 2002; Richmond & Stocker, 2008; Sameroff, 1975; Scarr & McCartney, 1984). Research exploring mothers’ reasons for interacting differently across children suggests that differential parenting may be especially likely when one child displays needs that are objectively greater; when mothers hold strong beliefs about how to treat children based on gender, birth order, and so on; when they identify one child as being more ‘like them’; and under circumstances of marital conflict, when they may identify each child as aligning more with one parent (Caspi et al., 2004). From the perspective of the child, numerous factors – including genetic and temperamental differences, personal experiences within and outside the family, and so on – result in each sibling having a

unique set of personal characteristics that evokes certain interpersonal responses, leads them to attend to certain aspects of the environment, and influences the ways in which they process environmental stimuli (Hoffman, 1991). Over time, reciprocal contributions from both mother and child shape the uniqueness of each child's rearing environment, resulting in differences in siblings' outcomes.

Non-shared influences arising from ambient parenting. As described above, research exploring the impact of the shared family environment has been less widely emphasized than that focusing on overtly non-shared influences: because Plomin and Daniels' (1987) seminal paper found that siblings' outcomes so frequently differed across domains of adjustment, researchers tended to view work focusing primarily on their non-shared environments as a more straightforward approach to identifying key developmental influences (Plomin et al., 2001). This emphasis was strengthened by the limitations associated with many common statistical approaches, which are unable to accommodate the nested structure of family data (i.e., child-specific *and* family-wide effects; Boyle et al., 2004; Jenkins et al., 2009). However, studies exploring the relative contributions of both shared and non-shared parenting have recently increased in number due to more widespread use of statistical techniques (e.g., multilevel modeling) that can not only accommodate both levels of effect, but also the experiences of more than two children per family (Boyle et al., 2004; Jenkins et al., 2009; Steele, Rasbash, & Jenkins, 2013). These methods allow for exploration of the extent to which shared and non-shared environments contribute to outcome variability across siblings, including similarities and differences between them.

Consistent with Plomin and Daniels' (1987) assertions, the majority of research exploring links between shared parenting (i.e., the average quality of parenting

experienced by all siblings) and outcome variability indicates that parenting at the family level indeed contributes to similarity among siblings. For instance, one study involving a sample of over 1 000 families reported that high ambient negativity (i.e., parental negativity averaged across siblings) and high parenting variability (i.e., the standard deviation for parenting within the family, representing the overall degree of variability across siblings) adversely impacted the outcomes of all siblings in the family – even favored siblings, who demonstrated poorer outcomes than children who were the recipients of comparable parenting at the individual level in families characterized by less negativity and variability at the family level (Boyle et al., 2004). Similar conclusions were reported by Jenkins et al. (2009), who also reported that ambient negativity adversely impacted child outcomes – here, aggression – beyond the effects of parenting at the child-specific level. Together, these findings demonstrate “the importance of going beyond the study of individuals and dyads to examine higher-order system dynamics” (Shanahan, McHale, Crouter, & Osgood, 2008; p. 492): while child-specific effects may explain why siblings are different, family-wide factors may explain why they are similar.

Additional complexity emerges, however, when considering that although family-wide parenting is shared among all siblings within the family, the unique way in which each child experiences this factor can vary depending on each child’s unique ‘vantage point’ within the family which, in turn, is shaped by a constellation of personal factors – including, of course, his non-shared experience of parenting (Jenkins, Rasbash, & O’Connor, 2003; Turkheimer & Waldron, 2000). For instance, as described above, Boyle et al. (2004) found that high ambient negativity adversely affected the outcomes of all siblings as compared to those whose overall family environment was not similarly negative. However, siblings who directly received more negative treatment than their

sibling were especially adversely affected by ambient negativity as compared to those who received less negative treatment. Thus, while shared components of parenting contributed to some degree of similarity among siblings, their interaction with non-shared components resulted in variability. In general, the literature suggests that when factors that adversely impact child adjustment combine, the effects extend far beyond what would be expected if individual risks were simply added together (Deater-Deckard, Dodge, Bates, & Pettit, 1998; Meunier, Bisceglia, & Jenkins, 2012); that is, the consequences of directly experiencing more negative parenting within the context of a negative family environment appear multiplicative or exponential, not additive (Feinberg & Hetherington, 2001). Again, these patterns suggest that the effects of both shared and non-shared parenting should be considered in a comprehensive exploration of the factors shaping siblings' outcomes, especially given that their combined effects may account for more variability than either component alone.

Of course, another key question emerging from these concepts is *how* these aspects of parenting actually contribute to differences in siblings' social-emotional outcomes. As above, this issue is not the focus of the present study, but is again related to the fact that children are not passive recipients of their environments; rather, each child is thought to shape the impact of parenting on his outcomes by engaging in an active process of social comparison with his siblings (Boyle et al., 2004) in which he or she (consciously or unconsciously) compares a) the level and quality of parenting directed towards each child; and b) the magnitude of the discrepancy between them. Siblings who receive more negative parenting are thought to fare worse because their comparisons result in experiences of insecurity and unfairness; moreover, they may be most sensitive to differential parenting as they attempt to determine whether the negative parenting

directed towards them reflects something within them, or a trait-like quality of the parent (Feinberg & Hetherington, 2001). Even siblings who receive more positive parenting are affected by differential and ambient parenting via social comparison: observing higher levels of negative parenting being directed towards their siblings, as well as marked variability in the quality of parenting across siblings, results in distress about the possibility that they, too, may become the recipient of negativity (Boyle et al., 2004).

Applying Perspectives from the Broader Literature to Attachment: Do Similar Mechanisms Link Sensitivity and Security?

Despite theoretical interest in applying a family systems approach to the study of siblings' relationships – and, by extension, to the study of individual differences in attachment (Cowan, 1997; Fearon et al., 2010; Marvin & Stewart, 1990), empirical work exploring these issues has been very limited to date. There are, however, indirect cues that the processes shaping attachment within families may parallel those outlined above. In particular, Fearon et al. (2006) examined the link between sensitivity and security in a sample of 9- to 12-month-old mono- and dizygotic twins, all of whom were observed in triadic interactions. As predicted, similarity in attachment security across twins could be explained to an extent by shared components of sensitivity; that is, similarity in the sensitivity directed towards each child was associated with similarity in the quality of their relationships. Unexpectedly, however, the cross-twin correlation between sensitivity and security was even stronger than the direct within-twin link. That is, sensitivity expressed toward Twin 1, but not Twin 2, resulted in lower security for Twin 1; conversely, insensitivity towards Twin A had a negative impact on the security of Twin B, even if Twin B directly experienced sensitive parenting.

Explanations for these novel findings parallel the conclusions expressed in many studies within the broader literature (Caspi et al., 2004; Boyle et al., 2004; Jenkins et al., 2009; Reiss et al., 1995): parenting directed towards a sibling impacts one's own outcomes. As in Boyle et al. (2004) and Meunier et al. (2013), negative parenting (or insensitivity, in the case of attachment) toward a sibling appears to have negative consequences even for the child who directly experiences more positive parenting (sensitivity). Fearon et al.'s (2006) findings additionally suggest that witnessing a sibling being treated more positively improves the outcomes of those who directly receive less desirable treatment. Although this possibility may seem overly complex considering that the infants in Fearon et al.'s (2006) sample were only a year old or younger, other studies have reported that even young infants are aware of how their mother's attention is balanced between themselves and others. For example, Hart, Field, Del Valle, and Letourneau (1998) found that infants were more likely to actively seek their mother's attention when she attended to a baby doll than to a book.

Although the work outlined above represents a useful starting point for further research, the extent to which it is generalizable to the developmental processes experienced by non-twin siblings remains unclear, as previously discussed. Moreover, this study approached the question of sibling attachment variability from a behavioral genetics perspective, not necessarily a family systems perspective; that is, it modeled the extent to which variability in relationships arose from shared, non-shared, and genetic components by examining correlations or covariances within- and across twins. While this approach yielded novel perspectives on the ways in which sensitivity operates within a family context, it did not reflect the full range of processes outlined above - including the hierarchical nature of parenting within the family system and the interaction between

shared and non-shared components (Boyle et al., 2004). Still, Fearon et al.'s (2006) work represents an important opportunity for the field by supporting the possibility that the empirical approaches adopted within the broader parenting literature – which, as described above, have been successful in providing more insight into the processes underlying child and sibling outcomes than could be achieved via between-family approaches alone – may also shed new light on the underpinnings of attachment within the family. That is, even in terms of attachment, multilevel aspects of parenting appear to contribute to sibling outcome variability in ways that are more complex than would be typically considered in conventional attachment research.

The Present Study

In recent years, the need to move sibling attachment research forward in new directions has become increasingly pressing: following preliminary efforts to investigate sibling attachment concordance (e.g., van IJzendoorn et al., 2000), the field has largely experienced a slow rate of progress that likely arises – at least in part – from the limited opportunities afforded by conventional methods. Approaching the puzzle of sibling attachment from a perspective that more comprehensively captures children's experiences within the family, and explores ways in which these experiences may be associated with the quality of their relationships, is urgently needed to move the field towards a more sophisticated understanding of the roots of variability in attachment.

To this end, the present study drew upon the theoretical and empirical framework utilized within the broader parenting literature, as described above, to explore the extent to which sensitivity – when conceptualized from a family systems perspective (Hinde, 1987; Minuchin, 1985) – is linked with patterns of attachment within the family. In addition to exploring the processes underlying the development of siblings' attachment

relationships, the overarching purpose of this study was to direct attention beyond methods and constructs that have traditionally been ‘first-line’ in dyadic-level attachment research, and to provide a plausible starting point for further research examining the roots of individual differences, and within-family variability, in attachment.

Several specific research questions were explored in the present study:

How do patterns of attachment within the family manifest when assessed concurrently? In the course of exploring the ways in which shared and non-shared components of sensitivity shape siblings’ attachment relationships, this study was also one of the first to assess the quality of their relationships concurrently using the same measure across siblings. Using multilevel modeling, the present study investigated within- and between-family variability in the quality of siblings’ attachment relationships as they appear at the same point in time, thus complementing estimates of concordance that are currently available within the literature by exploring the extent to which patterns of attachment are similar within a true family context.

How do shared and non-shared aspects of parenting contribute to variability in siblings’ attachment relationships? This study also explored the extent to which shared and non-shared sensitivity contribute to patterns of attachment within the family. Specifically, this study focused on two aspects of sensitivity that are novel to the field of attachment, but consistent with conceptualizations of parenting from a family systems perspective: *ambient sensitivity*, representing siblings’ shared experiences of the average level of sensitivity directed towards children within the family; and *differential sensitivity*, representing each child’s non-shared experience of the extent to which the sensitivity directed towards them differs from the family average (Meunier et al., 2012). This study also examined effects related to the interaction between differential and ambient

sensitivity, representing the possibility that siblings' shared environments may have varying effects on their outcomes depending on the quality of their unique experiences (Boyle et al., 2004).

Although little work has directly explored the ways in which these components may underlie patterns of attachment within the family, the literature exploring links between differential parenting, ambient parenting, and sibling outcome variability in domains beyond attachment lends itself to several hypotheses:

1. Differential sensitivity within the family will be systematically associated with differences in the quality of siblings' relationships (i.e., non-shared outcomes). Those who receive comparatively more sensitivity than their sibling will display higher levels of security than those who receive less sensitivity (more insensitivity).
2. Family-average sensitivity will contribute to similarity in siblings' outcomes. Those whose families are characterized by higher ambient sensitivity will display higher levels of security overall than those whose families are characterized by lower ambient sensitivity.
3. The interaction between differential and family-average sensitivity will contribute to differences in siblings' attachment security. While those in families characterized by low family-average sensitivity will display lower levels of security overall, recipients of less sensitivity will display markedly lower security than their favored sibling (i.e., their outcomes will be markedly different, or non-shared). In families characterized by high family-average sensitivity, the difference in security displayed by favored and non-favored siblings will be less emphasized; that is, siblings' outcomes will be different, but to a lesser extent.

Methods

Participants

The present study's sample consisted of families drawn from the Kids, Families, and Places Study, a longitudinal study of children and families in the Hamilton and Toronto areas. Families were initially recruited through local Public Health Units and were invited to participate in an intensive stream of this broader study if they had a newborn weighing at least 1500 grams, at least one older sibling less than four years older, the mother spoke conversational English, and the family agreed to be videotaped. These families participated in in-depth assessments of a range of developmental outcomes over a span of four years. Five hundred and one families participated in the first time point, which took place when newborns were one month old. The present study used data collected from the second time-point, which took place when 'newborns' were approximately 18 months old; this visit was selected because of its focus on mother-child interactions and because children's ages were conducive to assessments of attachment security within the home using a widely-recognized measure (i.e., the AQS; see below). Only six families who had participated in the first assessment declined to participate in the second time point; however, 98 families could not be contacted, resulting in a total sample of 397 families.

For the present study, several criteria were used to select participating families from among those participating at the second time point. To maximize the psychometric properties of the AQS (van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen Walraven, 2004), the 50 families with the youngest older siblings in the sample were selected; that is, families were selected so that older siblings were the youngest in the sample. Families were also selected if they spoke English throughout the visit. This

criterion was imposed so that the subtle aspects of verbal and non-verbal interaction that are key to coding the AQS could be preserved.

Within this final group, mothers' ages at the time of the home visit ranged from 25 to 43 years ($M = 34.65$ years, $SD = 4.62$). On average, mothers had completed 15.73 years of education ($SD = 2.92$; ranging from 10 to 22 years). Data on ethnicity was available for 45 mothers; of these, 34 (68%) described their ethnicity as European, 5 (10%) as Asian, and 6 (12%) as black. Approximately 69% of mothers were born in Canada; those born elsewhere had been in Canada for an average of 14.17 years ($SD = 11.47$). Mean personal income ranged from \$20 000 – \$29 999, which is slightly lower than the average personal income reported by Statistics Canada for women between the ages of 20 and 50 years with at least one child (\$30, 504.16; $SD = \$37\ 808.12$). Most mothers were married or cohabiting (94%); 4% were separated or single. The majority of households (64%) included two children under age 18, 24% included three children, and 12% included four children.

Older siblings' ages ranged from 2.50 to 3.33 years ($M = 3.04$ years, $SD = 0.20$), while younger siblings' ages ranged from 1.33 to 1.92 years ($M = 1.54$ years, $SD = 0.10$). Spacing between siblings ranged from 1.00 to 1.83 years ($M = 1.50$ years, $SD = 0.19$). Siblings were 14 boy-boy, 10 girl-boy, 12 boy-girl, and 14 girl-girl pairs. All siblings were fully biologically related and lived/participated with their biological mother.

Measures

Maternal sensitivity. Sensitivity was assessed using elements of the Coding of Attachment-Related Parenting (CARP; Matias, Scott, & O'Connor, 2006), and the Parent-Child Interaction System (PARCHISY; Deater-Deckard, Pylas, & Petrill, 1997). These

scales have been used in other research exploring variation in maternal interactive behavior (Bisceglia, et al., 2012) and its links with child outcomes (Meunier et al., 2013).

The CARP is a reliable, valid tool for assessing the quality of parent-child interaction via observation (Matias, 2006; O'Connor, Matias, Futh, Tantam, & Scott, 2013). This measure is based upon attachment theory, particularly the notion that sensitive parenting forms the basis for a secure parent-child relationship (Kochanska & Murray, 2000; Matias, 2006; Solomon & George, 1999; Thompson & Raikes, 2003). Two scales were used for the present study: Sensitive Responding, reflecting the extent to which the parent appears aware of the child's needs and responds appropriately; and Mutuality, which reflects the extent to which the interaction is consistent with a goal-corrected partnership. Scores on these scales range from 1 to 7, with low scores reflecting low Sensitivity or Mutuality and 7 reflecting high levels of these constructs.

The PARCHISY (Deater-Deckard et al., 1997) is an 18-item rating scale that assesses aspects of parent-child interactions. The Positive Control subscale from the PARCHISY was used to describe the extent to which the mother uses explanation, praise, and open-ended conversation to influence the child's behavior. Again, scores on this scale range from 1 to 7, with lower scores reflecting an absence of Positive Control and high scores reflecting high levels of this construct.

Maternal Sensitivity, Mutuality, and Positive Control were rated from home visit videotapes by trained observers. Mothers received a score on each of these scales for each of the three mother-child interaction episodes (see "Procedure" below). Child-specific (i.e., "direct") sensitivity scores were then calculated by averaging mothers' scores on all three subscales across the three episodes. There were no significant differences in scores by coder, $F(6, 93) = 1.23, p = .30$.

Internal consistency and inter-rater reliability were calculated for the sample overall (i.e., the broader sample of 501 families from which the present study's sample was drawn). Internal consistency for direct sensitivity scores was .85, which is considered good (George & Mallery, 2003). Inter-rater reliability was established by having an expert code 10% of coders' data or, in cases where coders were reliable with the expert, by comparing 10% of their codes to each other. Reliability was checked after every 10 videos and discrepancies were resolved via expert review. Inter-rater reliability was excellent ($\alpha = .94$).

Two scores were created to assess shared and non-shared components of sensitivity. First, a family average for sensitivity was created for each family by averaging direct sensitivity scores across siblings. Next, a differential sensitivity score was calculated for each child by subtracting his/her direct sensitivity score from the family average for sensitivity. Thus, children who were the recipients of higher direct sensitivity had a positive deviation score, and vice versa.

Attachment security. Attachment security was coded using the mini version of the Attachment Q-Sort (AQS; Waters & Deane, 1985). This measure describes the security of the attachment relationship between an infant or young child and his/her caregiver. It consists of 30 items, each describing an aspect of attachment behavior (e.g., "child keeps track of mother's location"; see Appendix H). Items are sorted into 5 piles of 6 items each to describe behaviors that are *most like* to *very unlike* the child. Security scores are then calculated by correlating the child's score with a criterion sort describing a prototypically secure child, as established by experts in the field. Thus, the mini-AQS provides a continuous security score that can range from 1.0 (*prototypically secure*) to 1.0 (*least secure*). This measure is well-suited to home observation because it includes

fundamental attachment behaviors as well as theoretical correlates of attachment security (e.g., social referencing, novelty-seeking), thus capturing aspects of security typically displayed under everyday circumstances (Thompson & Raikes, 2003; van IJzendoorn et al., 2004). The mini-AQS was used in the present study (as opposed to the full 90-item version) because children were generally observed while engaged in structured activities. Consequently, most did not display the full spectrum of behaviors that typically emerge under the naturalistic conditions considered ideal for coding the 90-item AQS, particularly those that are subtle and require longer periods of uninterrupted interaction.

The mini-AQS was coded for each child based on their behavior throughout the two-hour visit, not only during aspects of the visit specifically focused on mother-infant interaction. This approach was favored over coding only during the designated dyadic paradigm for several reasons: first, it allowed for greater sampling of the child's behavior across several contexts (e.g., direct interaction with the mother; interaction with a stranger); second, it limited the extent to which attachment behaviors were directly influenced by maternal behavior – as would have been the case if security was rated only during episodes specifically dedicated to mother-infant interaction. Each child was coded from a separate videotape that focused primarily on him/her, with his/her sibling only present during several limited portions of the visit.

Psychometric properties. A meta-analysis exploring the validity of the full-version AQS concluded that this measure “belongs to the same small set of gold standards in our field, in the same league with the SSP” (van IJzendoorn et al., 2004, p. 1204). More specifically, this study reported that observer-completed AQS scores displayed substantial convergent validity with the SSP and strong predictive associations with measures of maternal sensitivity and child social-emotional development (van IJzendoorn

et al., 2004; also see Schneider, Atkinson, & Tardif, 2001). This measure's validity appeared to be strongest as child age decreased, with highest validity around 18 months of age (van IJzendoorn et al., 2004).

To date, no published work has specifically compared the extent to which AQS scores from the full 90-item version are correlated with those arising from the mini 30-item version. This association, however, has been explored in unpublished work involving a sample of mothers and their firstborn infants who participated in a longitudinal study of attachment through the Child Development Centre at the University of Western Ontario. As part of this study, mothers and their infants participated in a semi-structured home visit when infants were approximately 12 months old (see Forbes, Evans, Moran, & Pederson, 2007). Following this visit, visitors completed a 90-item AQS to reflect the infant's attachment behavior in the home. To test the association between scores on this measure and those derived from the mini version, Xue (Y. Xue, personal communication, May 5, 2014) randomly selected 50 participants from this sample and used the weightings assigned in their 90-item sort to extract a security score based on the mini-AQS; that is, items that also appear in the mini version were extracted from the full version and their weightings were used to calculate a mini-security score according to the same process that occurs when item weightings are generated from direct observation. These mini-security scores and those generated from the 90-item AQS were strongly correlated ($r = .92$), suggesting that scores from the mini-AQS can be considered comparable to the 90-item AQS.

All AQS sorts were completed by one coder (who was unfamiliar with the scales used for coding sensitivity and blind to the sensitivity scores that had been assigned) with a lag of at least one month between videos pertaining to the same family. Twenty videos

(10 older and 10 younger siblings) were re-coded by an expert coder, yielding good inter-rater reliability ($r = .83, p < .05$).

Demographic information. Mothers provided information about a range of demographic factors, including their age and their children's ages and sexes, their marital status and level of education (in years); and the number of children under the age of 18 living in their home. Three variables were dummy coded in all analyses: child sex was dummy coded as male or female ; marital status was dummy coded as married/common-law or single/separated; and number of children in the home was dummy coded to represent families with two children in the home, or three or more children.

Mothers also provided information about several indicators of socio-economic status, including the number of rooms in their home, their personal income, and the total value of their assets. Internal consistency among these items was good ($\alpha = .79$). Data stemming from each of these variables were standardized and averaged to represent overall SES (low values on this variable reflect low SES).

Procedure

Upon entry into the longitudinal study, mothers were provided with a letter of information (see Appendix I) and consented to their own involvement and that of their children (see Appendix J). Participants were treated in compliance with the “Ethical Principles of Psychologists” (Canadian Psychological Association, 2000) and the institutional standards pertaining to research with human subjects (see Appendix K).

Research assistants visited each family's home for approximately two hours. Visits began with each visitor separately inviting each sibling to play with provided toys in separate areas. Mothers sat nearby completing questionnaires; children were free to interact with her if they desired. Mothers were sometimes asked to assist with children

who were having difficulty engaging with visitors, but were asked to return to their questionnaires as soon as possible. Next, family members and visitors came together to complete DNA swabs. Visitors administered children's swabs whenever possible, but mothers were asked to help if necessary.

Next, children and visitors returned to their respective play areas to complete activities assessing various developmental skills. Mothers were sometimes in the room and children could interact with them if desired. Each dyad also participated in a 15-minute play sequence with their mother (5 minutes free play without toys, 5 minutes with a pegboard/shape sorter, and 5 minutes with a book). Finally, siblings were asked to play together with shared toys. Again, mothers sat nearby completing questionnaires and children were able to interact with her as they wished.

Results

Hypothesis testing was conducted via multilevel modeling with MPLUS, Version 7.11 (Muthén & Muthén, 2013). Multilevel modeling is a form of regression analysis that accounts for a) a data structure where observations are nested within groups (here, children within families); and b) dependence, or the fact that data pertaining to individuals within a group are likely to be more correlated than data pertaining to individuals across groups. In accordance with this nested structure, multilevel modeling partitions variance into two levels. One level (Level 1) reflects within-group variance; that is, the extent to which children in the same family differ from one another on a particular characteristic. The other level (Level 2) reflects between-group variance, or the extent to which that characteristic differs between families (Jenkins, Simpson, Dunn, Rasbash, & O'Connor, 2005; Peugh, 2013; Scherbaum & Ferreter, 2009; Twisk, 2006).

Part 1: Exploring Associations between Study Variables

As described previously, this study investigated whether differential and ambient sensitivity, as well as the interaction between them, accounted for variability in security. The first step in data analysis was an exploration of the bivariate relationships among all study variables of interest, including covariates (see Table 1 for bivariate relationships; see Table 2 for descriptive statistics). An important set of associations that emerged from these analyses involved links between security, direct sensitivity scores⁶, differential sensitivity scores, and ambient sensitivity scores. As expected, direct sensitivity scores were positively associated with security. Ambient sensitivity scores were also positively associated with security, whereby children whose families were characterized by higher levels of sensitivity overall displayed higher levels of security. However, direct and ambient sensitivity scores were highly correlated, suggesting that mothers appeared to interact with very similar levels of sensitivity across siblings.

In addition to exploring associations between variables directly related to attachment, links with potential covariates were examined to determine whether these factors needed to be accounted for in analyses. Level 1 covariates (i.e., those varying within families) included child age and gender, as well as maternal age at the time of each child's birth. Level 2 covariates (i.e., those varying between families) included age difference and gender correspondence among siblings, as well as maternal marital status, education, SES, and the number of children under the age of 18 in the home.

⁶ As noted above, direct sensitivity scores (i.e., mothers' sensitivity scores in interaction with each child separately) were not part of the main multilevel analyses as the purpose of this study was to explore links between sensitivity and security from a family systems perspective, not as they pertain to each child individually. However, direct sensitivity was included preliminary analyses as its association with security represents the cornerstone of most attachment research (de Wolff & van IJzendoorn, 1997) and to explore its associations with other study variables.

Table 1

Bivariate Associations between Study Variables and Covariates

Variables/covariates	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. AQS	.35**	.12	.36**	-.03	-.17	-.09	-.04	-.04	.08	-.09	-.07	-.01
2. Direct sens.	-	.61**	.80**	.25*	.09	-.04	.06	-.09	.23*	-.10	-.02	-.06
3. Differential sens.		-	.00	.38**	.00	-.05	.00	-.08	.00	.00	.00	.00
4. Ambient sens.			-	.04	.11	-.01	.08	-.05	.29**	-.13	-.02	-.08
5. Age				-	.12	.01	.01	-.15	.03	-.01	.00	.00
6. Age diff					-	-.18	.10	.05	.18	.08	.10	-.15
7. Male						-	.04	-.15	-.08	.21*	.10	.00
8. Same-sex							-	.31*	.11	-.09	-.02	.07
9. Maternal age								-	.11	-.34**	-.10	.15
10. Married									-	-.10	.05	.12
11. Maternal education										-	.44**	-.00
12. SES											-	.18
13. 2 children (<18 yrs.) in the home												-

Note. The following were coded as binary: gender, males = 1 and females = 0; sibling gender correspondence, same-sex = 1 and different-sex = 0; marital status, 1 = married/common-law and 0 = single/separated; and “number of youth in the home”, 1 = families with 2 children < 18years in the home and 0 = families with 3 or more children < 18years in the home. * $p < .05$; ** $p < .01$.

Table 2

Descriptive Statistics for Direct, Differential, and Ambient Sensitivity and Attachment Security for the Sample Overall, and for Older and Younger Siblings Separately

Variable	Overall		Older sibling		Younger sibling	
	<i>M (SD)</i>	Range	<i>M (SD)</i>	Range	<i>M (SD)</i>	Range
Direct	3.84 (0.84)	2.11 - 5.56	4.02 (0.85)	2.33 - 5.56	3.66 (0.79)	2.11 - 5.22
Differential	0.00 (0.50)	-1.39 - 1.39	0.18 (0.47)	-.61 - 1.39	-.18 (0.47)	-1.39 - 0.61
Ambient	3.84 (0.67)	2.61 - 5.11	3.84 (0.67)	2.61 - 5.11	3.84 (0.67)	2.61 - 5.11
Security	.14 (0.45)	-.77 - .82	.12 (0.37)	-.71 - .69	.17 (0.52)	-.77 - .82

Note. Ambient sensitivity represents average composite sensitivity across siblings;

differential sensitivity represents the difference between the child's composite sensitivity score and his/her family ambient sensitivity.

As shown in Table 1, there were few associations between covariates and main study variables, with two exceptions. First, marital status was significantly associated with individual and ambient sensitivity. The most striking links, however, were between child age and sensitivity: the older a child was, the more positive direct and differential sensitivity he experienced. Given that age was associated with several aspects of sensitivity in the present study, and because parenting behaviors and style are known to differ with child age (Holden & Miller, 1999; Huang, Caughy, Lee, Miller, & Genevro, 2009) especially in a dyadic context (Else-Quest, Clark, & Owen, 2011), direct sensitivity scores were regressed on child age separately for older and younger children. Ambient and differential sensitivity scores were re-calculated from these standardized residuals according to the procedures outlined above.

As a final step prior to conducting multilevel models, AQS scores were also regressed on child age separately for older and younger children, and the resulting standardized residuals used in subsequent analyses to represent attachment security. This step was conducted to address the fact that distributions of AQS scores were rather different across younger and older siblings. More specifically, the distribution for younger siblings was platykurtic (kurtosis = -1.32, $SD = .66$), with fewer children clustered in the middle range of scores; in contrast, the distribution for older siblings was negatively skewed (skewness = -.52, $SD = .34$), with more children clustered towards the positive range of scores. These differences are likely related to age-based responses to the experimental paradigm: younger children may have experienced the visit as more novel and stressful, thus responding with heightened attachment behavior in either a positive or negative direction. On the other hand, older siblings may have found the visit less stressful (e.g., due to more experience with strangers through school); consequently,

those in non-Secure relationships may have been less likely to display the intense “safe haven” attachment behaviors that are characteristic of lower AQS scores. Thus, AQS scores were ‘recalibrated’ via the use of standardized residuals, as described above, so that this metric suited the range of behaviors displayed within each age group.

Part 2: Main Analyses

Several multilevel models were conducted sequentially and their difference in deviance (i.e., -2LL) was compared to determine whether fit improved. Models were initially conducted using fixed effects, and then each variable was explored as a random effect to determine whether model fit improved when slopes and intercepts were allowed to vary across groups (Field, 2009); however, these adjustment did not improve fit, so only fixed effects were retained. Ambient sensitivity scores were grand-mean centered to facilitate interpretation of coefficients (Enders & Tofighi, 2007; Paccagnella, 2006); differential sensitivity scores were not centered as their mean is zero, by definition.

The first model (Model 1, also known as the null model) was conducted to partition variance in attachment security into within- and between-family levels (see Table 3). This model revealed an intra-class correlation (ICC) of 0.29, which objectively reflects a relatively modest degree of similarity among siblings on attachment security. However, given the range of considerations associated with quantifying human behavior via observational measures (e.g., measurement error, the idiosyncrasies of child behavior on any given day), this ICC actually reflects rather notable similarity among siblings on attachment security. That is, while this statistic demonstrated relatively more variability *within* families on attachment security than *between* families, it also indicates that contextual influences at the family level do appear to have some effect (Field, 2009).

Table 3
Fixed-Effects Estimates and Variance-Covariance Estimates for Models Predicting Attachment Security from Differential Sensitivity, Ambient Sensitivity, and the Interaction between Them

Effects	Model 1 (Null)	Model 2	Model 3
Intercept	0.00 (0.11)	1.11 (0.60)	1.11 (0.61)
Level 1			
Differential sensitivity		0.15 (0.18)	0.15 (0.18)
Interaction			0.01 (0.23)
Level 2			
Ambient sensitivity		0.33 (0.14)*	0.33 (0.14)*
Between families	0.24 (0.13)	0.11 (0.1)	0.11 (0.11)
Within families	0.72 (0.15)**	0.64 (0.13)**	0.64 (0.13)**
-2Log likelihood	-138.18	-103.85	-103.84
Change in model fit (χ^2)		0.44	0.01
Change in <i>df</i>			1

Note. Standard errors are presented in brackets beside coefficients. Ambient sensitivity represents the family average for sensitivity. *Interaction 1* represents the interaction between differential and ambient sensitivity.

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

Table 4

Fixed-Effects Estimates and Variance-Covariance Estimates for Model Predicting Attachment Security from Ambient Sensitivity and Potential Covariates

Effects	Model 1
Intercept	1.34 (1.03)
Level 1	
Differential sensitivity	0.17 (0.19)
Gender	-0.34 (0.20) [†]
Maternal age	-0.01 (0.03)
Level 2	
Ambient sensitivity	0.30 (0.13)*
Age difference	-1.25 (0.46)**
Gender correspondence	-0.30 (0.23)
Marital status	-0.09 (0.15)
Maternal education (yrs.)	0.10 (0.05)*
SES	-0.16 (0.19)
Children in home	-0.04 (0.23)
Between families	0.06 (0.11)
Within families	0.63 (0.13)**
-2Log likelihood	-102.08

* $p < .05$. ** $p < .01$. [†] $p < .10$

Next, differential and ambient sensitivity (i.e., this study's main effects at Levels 1 and 2) were added into the model to explore the extent to which these scores predicted attachment security. Level 1 and 2 covariates were also added into this model (see Table 4). Three covariates – gender, age difference among siblings, and maternal education – were significant (or approached significance, in the case of gender), and were thus retained in the main model; other non-significant covariates were dropped as including extraneous variables can negatively impact statistical power (Jaccard & Turrisi, 2003). Model 2 (see Table 3) revealed that only ambient sensitivity significantly predicted attachment security, with each one-unit increase in sensitivity associated with an increase of 0.33 in attachment security. Finally, the interaction between differential and ambient sensitivity was added in Model 3. The addition of this predictor to the model did not significantly improve model fit.

Model 2 was compared with Model 1 to explore the extent to which differential and ambient sensitivity accounted for between- and within-family variance in attachment security (Heck, Thomas, & Tabata, 2013). The family-level variance accounted for by sensitivity was calculated by dividing the difference in between-family variance estimates from Model 1 to Model 3 (i.e., 0.24 – 0.11) by the between-family variance estimate in Model 1 (i.e., 0.24). This analysis indicated that 54.17% of the between-family variance in attachment security was accounted for by sensitivity. A parallel calculation was conducted using within-family variance estimates (i.e., $[0.72-0.64]/0.72$), revealing that sensitivity accounted for 11.11% of the within-family variance in attachment security.

Taken together, these results suggest that the only aspect of sensitivity that significantly predicted attachment security was ambient sensitivity, or the average sensitivity at the family level. Differential sensitivity, or the extent to which the

sensitivity directly experienced by each child differed from the family average, did not account for additional variability in security. Moreover, there was no significant interaction between ambient and differential sensitivity: links between differential sensitivity and security did not vary depending on the overall level of sensitivity within the family, and vice versa. That is, for instance, children who experienced lower levels of sensitivity as compared to the family average (and, by definition, as compared to their sibling) displayed relatively similar levels of security regardless of whether their family was characterized by high or low levels of sensitivity overall.

Discussion

To date, research exploring the underpinnings of attachment within the family has focused almost exclusively on accounting for variability in siblings' relationships by comparing the level of sensitivity displayed by mothers in interaction with each child separately (van IJzendoorn et al., 2000). This approach was originally adopted for several reasons: first, it is consistent with the focus of between-family research, which has traditionally viewed sensitivity as a primary determinant of individual differences in relationships; and with the behavioral genetics literature, which typically emphasizes that exploring siblings' non-shared environments is the most straightforward way of accounting for differences in their outcomes (Plomin et al., 2001).

While the approach outlined above represented a useful starting point for the field of sibling attachment research, there are clear issues with continuing along this path. First, this work has not fully described the extent of variability in the quality of siblings' concurrent attachment relationships with their mother, limiting the field's understanding of how patterns of attachment across siblings manifest in a family context where several relationships are unfolding simultaneously. Second, attachment researchers have

increasingly recognized that parenting, as displayed within each dyad in isolation, represents only one of the numerous ways in which children are exposed to and shaped by maternal interactive style (Tamrouti-Makkink et al., 2004). Consequently, many within the field have called for the implementation of a framework for conceptualizing the underpinnings of attachment that more comprehensively reflects the factors shaping siblings' relationships (Cowan, 1997; Marvin & Stewart, 1990). Family systems theory, which has been applied extensively within the broader literature focused on links between parenting and aspects of social-emotional adjustment beyond attachment, proposes that child outcomes are shaped by parenting at various family levels (Hinde, 1987; Minuchin, 1985), including both non-shared and shared effects (Anderson et al., 1994; Plomin & Daniels, 1987; Turkheimer & Waldron, 2000). Indeed, empirical work utilizing this framework has generally achieved more insight into the factors underlying sibling outcome variability than could be achieved via traditional between-family approaches. Yet, the extent to which sensitivity operates within each of these domains to shape variability in siblings' attachment relationships has not yet been explored.

The present study had two main objectives, each aimed at addressing a limitation of the existing sibling attachment research. First, this study provided new insight into patterns of attachment among siblings by assessing the extent to which the concurrent quality of siblings' relationships varies within and between families. Second, this study drew upon theoretical and empirical approaches from the broader parenting literature to examine the extent to which variability in siblings' relationships is associated with shared and non-shared components of sensitivity. This feature was intended to be a first step towards integrating the field of sibling attachment research with a family systems framework, providing a more comprehensive approach to the ways in which maternal

interactive style shapes the quality of siblings' relationships than could be achieved via the methods traditionally used within this branch of attachment research.

Patterns of Attachment across Siblings: A Concurrent Perspective

The present study's first objective was to explore the extent to which attachment security appears similar across siblings when their relationships are assessed at the same point in time, when each child was a different age. As described in Chapter 2, research exploring patterns of attachment within the family historically utilized either families with twins; or assessed siblings' relationships when each child was the same age, with a time lag of months to years between assessments (van IJzendoorn et al., 2000). The rationale underlying these studies' designs is certainly strong, including the capacity to explore the role of behavioral genetics in twin studies (Fearon et al., 2006; Roisman & Fraley, 2008); or, in the case of sibling studies, to accommodate constraints on the ages at which the Strange Situation can be administered (van IJzendoorn et al., 2004). Still, these designs do not provide a full picture of the nature of non-twin siblings' relationships as they co-exist in a family context, leaving much unknown about the patterning of siblings' relationships when considered from the perspective of the family system.

The present study assessed the quality of siblings' relationships using a mini version of the Attachment Q-Sort, a measure that is less widely recognized than the SSP but has the capacity to assess relationships across the toddler and preschool years while remaining psychometrically sound (van IJzendoorn et al., 2004). Using multilevel modeling, this sample's intra-class correlation revealed that security was associated across siblings at a level of 0.29; that is, attachment security was associated within families, but to a relatively modest degree. Although this finding is difficult to directly compare with concordance estimates reported in other sibling attachment research

because the latter typically reflect concordance across siblings at the same age *and* are based on categorical measures of attachment (see Chapter 2), all support a similar conclusion: the quality of siblings' relationships frequently differ – especially when compared to expectations based on traditional attachment theory, which would suggest that relationships with the same mother should be similar (O'Connor et al., 2000; van IJzendoorn et al., 2000). The present study complements this work by indicating that variation within the family is typical even when relationships are assessed concurrently. That is, variability in siblings' relationships is not entirely tied to the intervening role of factors that may change over time (e.g., sensitivity; DiLalla & Bishop, 1996; Touris et al., 1995); rather, it appears linked with factors that can differ contemporaneously across relationships, including – for instance – the reciprocal interaction between child characteristics and maternal interactive style (as discussed further below).

In addition to providing insight into the degree of similarity among siblings on attachment security, the intra-class correlation described above also provides a measure of the extent to which siblings were similar on attachment security as compared to children from other families (i.e., variability within and between families; Meunier et al., 2012; Fields, 2009). This value (which, again, was 0.29) suggested that security varied within families to a greater extent than it varied between families; that is, siblings in the same family were not substantially more similar to each other than to children from other families. By extension, this finding indicates that factors shared among siblings – including shared sensitivity, but also a range of other potential contextual influences (for instance, household chaos, quality of the marital relationship) – may contribute to similarity among siblings, but not deterministically so; if they did, siblings equally exposed to them would be more similar (Field, 2009). Thus, consistent with the

conclusions reported within the broader behavioral genetics literature, variability in siblings' relationships appears strongly linked with environmental influences that vary among siblings (Plomin & Daniels, 1987). It is important to recall, however, that these influences likely include factors that clearly differ among siblings *as well as* unique experiences arising from factors that appear shared (i.e., each child's personal perception of family-wide experiences; Turkheimer & Waldron, 2000; Boyle et al., 2004). Thus, the impact of shared factors on the quality of siblings' relationships should not be minimized. Rather, the possibility that shared factors contribute to similarities *and* differences in siblings' relationships should be explored further, as should the child-specific factors leading to differences in how they are experienced across siblings.

Accounting for Variability in Siblings' Relationships: How do Shared and Non-Shared Sensitivity Contribute?

This study's second main objective was to investigate the extent to which variability in siblings' relationships could be explained by shared and non-shared sensitivity (Anderson et al., 1994). Specifically, the present study focused on the role of *ambient* sensitivity, or shared parenting experienced across siblings; *differential* sensitivity, or siblings' non-shared experience of the extent to which sensitivity directed towards them differed from family-wide parenting; and the interaction between them, reflecting the possibility that siblings' non-shared experiences lead them to experience shared factors differently, resulting in non-shared effects (Boyle et al., 2004; Turkheimer & Waldron, 2000). In the broader parenting literature, all three of these components – sometimes separately, and sometimes together (Meunier et al., 2012) – have accounted for variability in siblings' social-emotional outcomes beyond what could be predicted by examining each child's experience in isolation (Boyle et al., 2004; Feinberg &

Hetherington, 2001; Jenkins et al., 2009; Shanahan et al., 2008). Guided by this work, the present study explored whether similar processes might underlie variability in siblings' attachment relationships, representing one of the first efforts to explore the roots of attachment as they relate to sensitivity from a family systems perspective.

Overall, results from the present study indicated that only ambient parenting was significantly linked with the quality of siblings' relationships; that is, high ambient sensitivity was associated with security across siblings, while low ambient sensitivity was associated with non-security. Thus, as expected (Anderson et al., 1994; Plomin & Daniels, 1987), family-wide parenting contributed to similarity in siblings' outcomes. However, contrary to expectation, non-shared sensitivity – including both differential sensitivity and the interaction between differential and ambient sensitivity – were not linked with differences in the quality of siblings' relationships. Overall, these results converge with traditional attachment theory, which suggests that mothers interact in similar ways across siblings, leading them to share a similar quality of attachment with each (O'Connor et al., 2001; Roisman & Fraley, 2008); and are partially consistent with previous research reporting that the quality of twins' relationships is mainly associated with their shared experiences of sensitivity (Fearon et al., 2010; Roisman & Fraley, 2008). However, the present study's findings also diverge from most studies exploring the underpinnings of sibling outcome variability, both within and outside the field of attachment. Specifically, this research has consistently highlighted the importance of non-shared parenting in shaping sibling differences (Anderson et al., 1994; Plomin & Daniels, 1987) whether in expected (Feinberg & Hetherington, 2001; Roisman & Fraley, 2008) or unexpected ways (Fearon et al., 2010; Reiss et al., 1994).

At first glance, these results could be interpreted as support for the conclusion that non-shared aspects of sensitivity do not play a role in shaping patterns of attachment within the family. This conclusion, however, would be premature. First, it is important to note that mothers in this study tended to display similar levels of sensitivity across siblings, resulting in little variability in siblings' non-shared experiences of parenting. Previous research suggests that stability in maternal interactive style is not unusual, especially in studies assessing global parenting "styles" (i.e., parents' overall constellation of attitudes and behaviors, as in sensitivity) versus parenting "behaviors" (i.e., the specific behaviors via which style is expressed, dependent upon the child's developmental stage, the context, etc.; Metsäpelto, Pulkkinen, & Poikkeus, 2001). Indeed, stability in global aspects of parenting has been observed even across child ages (Dallaire & Weinraub, 2005) and differences in children's personal characteristics (DiLalla & Bishop, 1996).

Why might sensitivity have appeared as stable across siblings as it did in the present study? On one hand, traditional attachment theory would suggest that stability arises because sensitivity tends not to vary substantially from the 'set point' established by state of mind (George & Solomon, 2008); that is, state of mind leads mothers to respond similarly to their children largely independent of differences in their personal characteristics. Indeed, most attachment research exploring sensitivity across two children suggests that this construct is primarily stable, including across twins (Fearon et al., 2006; Roisman & Fraley, 2008); and across siblings, regardless of similarity in their relationships (Pederson et al., 1999; van IJzendoorn et al., 2000). From this perspective, it may be that sensitivity's main impact within the family is to shape similarity in

siblings' relationships, leaving other factors that operate outside of dyad (as discussed further below) potentially responsible for their differences.

On the other hand, it is also possible that sensitivity may actually be more non-shared across siblings than it appeared in the present study and that assessing sensitivity under different conditions may reveal additional variability in mothers' interactive styles (Metsäpelto et al., 2001). The present study's play-based paradigm for assessing sensitivity was selected because it has evoked individual differences in sensitivity that are meaningfully related to the quality of attachment (Fuertes, Lopes Dos Santos, Beeghly, & Tronick, 2006); further, similar approaches have also been used in research exploring links between differential parenting and adjustment, in general (Feinberg & Hetherington, 2001). However, some have suggested that dedicated play situations are experienced relatively infrequently compared to other types of caregiver-infant interactions and are qualitatively unique in that they allow caregivers to "share a common experience with the infant that is centered on the pursuit of pleasure" (Hane, Fox, Polak-Toste, Ghera, & Guner, 2006, p. 1078). Thus, the capacity to respond to bids for attention during dyadic play may not fully translate to a similar style of responding during day-to-day tasks, which require mothers to divide their attention with other demands. Moreover, the extent to which sensitivity changes from context to context could depend on child-specific factors. For example, mothers might interact similarly with a temperamentally easygoing sibling across contexts, but display more variable patterns of responding with a fussy child who struggles to adapt to situational constraints (Hane et al., 2006). Patterns could further appear different if sensitivity were assessed in a triadic context, which would require mothers to choose which sibling respond to and how – thus mirroring the demands of everyday life. Again, as described above, the rationale for selecting the

paradigm utilized in the present study was strong; however, the possibilities outlined above represent opportunities to further explore whether more variable patterns of sensitivity across siblings emerge when assessed under different conditions; and, if so, whether they account for more variability in the quality of siblings' relationships.

These possibilities aside, it is important to note that although levels of sensitivity were rather stable in the present study, there was still some level of variability across siblings. Why, then, was this variability not associated with differences in siblings' relationships? One explanation, which is increasingly promoted by researchers examining links between differential parenting and adjustment in general, is that not *all* differential parenting is necessarily detrimental to child adjustment (Meunier et al., 2012). That is, while some imply that differential parenting necessarily corresponds with poor child adjustment, particularly for the disfavored child, others have proposed that some degree of differential parenting is actually required if parents are to respond appropriately to each sibling's unique needs (Brody, Stoneman, & McCoy, 1992; Meunier et al., 2012). Indeed, the field of attachment has long emphasized that the capacity to tailor one's responses to the child is an integral component of sensitive parenting (Ainsworth et al., 1971). Work within the broader literature suggests that siblings tend to perceive some discrepancy in parenting as fair and attributable to objective differences in each child's needs – thus avoiding the negative consequences associated with higher levels of differential parenting (Kowal & Kramer, 1997). Within the present study, mothers who interacted sensitively overall may have adapted their interactive style slightly to suit the needs of each child, thus maintaining similarly secure relationships with each. On the other hand, mothers who interacted insensitively overall may also have modified their behavior with each child slightly – perhaps in an attempt to respond sensitively or,

assuming a non-Autonomous state of mind, as a defensive response to attachment-related stimuli that arise in the course of interacting with each child (see Chapter 3; George & Solomon, 2008). Regardless of the underlying mechanism, these deviations in either a positive or negative direction from the insensitive parenting characterizing the family overall still appeared to result in similarly low security across siblings.

Of course, the possibility that the low levels of differential sensitivity seen in the present study fell within a range that was not especially impactful in terms of child adjustment is difficult to test without examining a) links between sensitivity and security in a sample characterized by greater variability; and b) siblings' perceptions of differences in parenting. The latter would be particularly difficult given that children who are young enough to be assessed via the SSP or AQS are typically too young to reliably report on parenting (Meunier et al., 2012). Some work suggests that infants as young as 15 months of age are sensitive to how fairly resources are allocated amongst themselves and other individuals, and can behave altruistically when deciding how resources should be distributed (Schmidt & Sommerville, 2011; Shaw, DeScioli, & Olson, 2012; Sommerville, Schmidt, Yun, & Burns, 2013). However, this research may not directly translate to the processes potentially involved in the present study: most studies investigating the emergence of these capacities has explored toddlers' understanding of the distribution of material resources (e.g., toys) or the attention of unfamiliar individuals (e.g., experimenters) – not maternal resources, which may be sought in different ways due to their evolutionary significance (Fearon et al., 2010). Moreover, this research assessed infants' perceptions and behavior following a short experimental paradigm, not their overall impressions of complex, long-term relationships in which 'fairness' may be more difficult to judge. Still, given that siblings' perceptions factor heavily in the extent to

which differential parenting is linked with adverse child outcomes (Kowal & Kramer, 1997), future research should explore ways of assessing children's attributions regarding the distribution of parental resources within the family, as well as links between these attributions and the quality of siblings' relationships.

Beyond Sensitivity: What Might Account for Variability that Remains?

Beyond this study's specific goals was the overarching objective of exploring the extent to which sensitivity – including shared and non-shared components – is associated with patterns of attachment within the family. Overall, sensitivity accounted for approximately 10% of the variance in attachment security among siblings; while this value is not insubstantial (and could change if sensitivity were measured differently, as above), it indicates that much of the variability in siblings' relationships remains unaccounted for. Sensitivity's limitations in accounting for individual differences in attachment have already been outlined in the between-family (DeWolff & van IJzendoorn, 1997) and within-family literature (O'Connor et al., 2000; van IJzendoorn et al., 2000); the fact that similar conclusions also emerged via the present study's novel approach further highlights the pressing need to consider a broader spectrum of variables and processes. In other words, what factors might account for outstanding variability in siblings' relationships when the effects of sensitivity are accounted for?

First, although the present study's approach was more consistent with a family systems perspective than most previous work on sibling attachment, it is important to note that it examined only a section of the complex web of family relationships. For instance, research suggests that children's relationships with their fathers – once “forgotten contributors to child development” (Grossmann et al., 2002, p. 310; Lamb, 1975) – may play an important role in shaping their social-emotional outcomes. In particular, several

studies suggest that the quality of fathers' parenting, including their differential parenting, accounts for different domains of child adjustment and/or impacts child adjustment via different mechanisms as compared to maternal parenting (Boyle et al., 2004; Feinberg & Hetherington, 2001; Shanahan et al., 2008). Robust links between child adjustment and the quality of sibling relationships have also been reported (Volling, 2003). Children's interactions with their siblings – including, for instance, the quality of their conflict resolution, pretend play, and use of mental- and emotion-based language with each other (Dunn, 2002) – appear to shape developmental outcomes spanning emotional, social, moral, and cognitive domains (Carpendale & Lewis, 2004; Howe & Recchia, 2006; Prime, Pauker, Plamandon, Perlman, & Jenkins, 2014; Volling, 2003). In some cases, these effects have been reported even after the impact of other factors have been controlled; for instance, Garcia, Shaw, Winslow, and Yaggi (2000) found that level of sibling conflict accounted for unique variance in child delinquent behavior beyond socio-economic status, parenting, and child behavior at previous time-points, suggesting that the quality of siblings' relationships should not be overlooked when exploring the processes shaping child outcomes.

Research also points to the importance of considering the interrelatedness of family sub-systems (including parent-child, marital, and sibling) in predicting child and sibling adjustment (Steele et al., 2013). For example, some research indicates that the extent to which a child is sensitive to one parent's differential treatment depends on the level of differential treatment displayed by the other parent (Meunier et al., 2012). Similarly, another study found that while the quality of the mother-child relationship predicted poor adjustment, marital conflict also predicted poor adjustment – but only for older siblings. Poor adjustment for younger siblings, in turn, was predicted by conflict in

the sibling relationship arising from their older sibling's negative behavior (Erel, Margolin, & John, 1998). Thus, overall, the broader literature suggests that children's social-emotional outcomes are best accounted for when the contributions of other family members and relationships are included (Chambers, Power, Loucks, & Swanson, 2001; Lamb, 2012).

Historically, the field of attachment has fallen somewhat behind the broader parenting literature in examining the role of relationship dynamics beyond the mother-infant dyad in shaping the quality of attachment (Fox, Kimmerly, & Schafer, 1991). More recently, however, researchers have begun to explore the ways in which other family relationships influence the quality and patterning of attachment, focusing in particular on the role of fathers. For instance, some suggest that while maternal sensitivity is associated with the child's use of safe haven behaviors, paternal sensitivity may be linked with the child's exploratory skills (Grossmann et al., 2002). These differences are often attributed to cultural effects, emphasizing the role of mothers as caregivers and fathers as facilitators of new experiences (Bakermans-Kranenburg, van IJzendoorn, Bokhorst, & Schuengel, 2004; Bretherton, 2010). In this way, each parent's contribution to "the child's attachment development might be different and complementary depending on the role each parent plays" in child socialization (Grossmann et al., 2002, p. 325). Other work indicates that the child's experience of sensitivity from one parent may depend on the level of sensitivity displayed by the other. For example, Schoppe-Sullivan et al. (2006) reported that fathers interacted more sensitively with sons in non-Secure relationships with their mother, suggesting that parents may modulate their interactions in response to the quality of the child's other relationship. These results support a systems effect, whereby a "family attachment

network” (Schoppe-Sullivan et al., 2006, p. 382) underlies child outcomes and, by extension, sibling outcome variability. Future research examining shared and non-shared sensitivity arising from both parents – as well as the effects of marital and sibling relationships, as above – may account for more variability in siblings’ relationships than could be achieved by focusing on maternal sensitivity alone (Bretherton, 2010).

Research also suggests that further variability in security may be explained by certain child characteristics – and, critically, sibling similarity on these characteristics. For instance, some research suggests that genetic factors that increase vulnerability to stress may a) moderate the link between environmental factors (e.g., parenting) and child adjustment; and b) help to explain differences in siblings’ responses to their environments and their subsequent outcomes (Jenkins & Bisceglia, 2011). Other work has focused on more overt child characteristics, such as gender (O’Connor et al., 2006; Feinberg, Neiderhiser, Simmens, Reiss, & Hetherington, 2000), age (Jenkins et al., 2003; Jenkins et al., 2009), and temperament (Brody, Stoneman, & Burke, 1987; Deater-Deckard et al., 2001) – all of which appear to have a complex effect on the extent to which child outcomes are predicted by parenting. Some characteristics appear to shape children’s subjective experiences of differential parenting (which, as mentioned previously, represent the mechanism via which differential parenting exerts its effects; Kowal & Kramer, 1997). For example, girls may be more sensitive to differential treatment than boys, resulting in poorer adjustment than what might be expected from the level of parenting they objectively experience (Tamrouti-Makkink et al., 2004). Similarly, earlier-born child appear more likely to recognize differential treatment than later-born children; however, they also appear to reason in more sophisticated ways about why it occurs, thus avoiding the adverse outcomes one might expect from the level of

differential parenting they experience (Kowal & Kramer, 1997). Other research suggests that *similarity* across siblings on various child characteristics is linked with poorer adjustment as it increases the salience of differential treatment, and the extent to which siblings engage in cross-sibling comparisons (Plomin et al., 2001; Tamrouti-Makkink et al., 2004). Together, this literature suggests that child characteristics may modulate the impact of parenting on child and sibling outcomes by strengthening or weakening the link between the parenting each child objectively receives and the quality of his/her outcomes.

While the literature exploring links between parenting, child/sibling characteristics, and attachment is more limited, there is some evidence to support the possibility that similar processes as those described above may be in effect. A particularly compelling set of findings was reported by Fearon et al. (2010), who conducted a more in-depth exploration of their previous report that maternal sensitivity directed towards one twin appeared to lower the sensitivity of the co-twin (i.e., their work identifying “cross-effects”, as outlined previously; Fearon et al., 2006). Fearon et al. (2010) proposed that the extent to which twins are influenced by the distribution of parental resources within the family may depend on the degree to which their temperaments are similar: because infants with similar temperaments often place similar demands on the parent, they may be more likely to directly compete with each other for parental resources, thus creating a ‘niche-competition’ effect that presents as shifts in attachment behavior (e.g., increased bids for proximity and contact) that are not necessarily predicted by the objective quality of parenting that each child receives. While this possibility remains to be investigated further, it supports the possibility that the patterning of attachment behavior may not arise solely from the quality of maternal interaction; rather, child characteristics (and sibling similarity) may result in variation in

the quality of siblings' relationships as a result of processes operating alongside those arising from the child's experience of parenting.

In conclusion, the present study contributed to the study of siblings' attachment relationships in several ways. First, it demonstrated that variability in siblings' attachment relationships is common, even when assessed concurrently; moreover, it supported the notion that non-shared influences, yet to be fully elucidated, may play a greater role in shaping the quality of siblings' relationships as compared to factors that are shared. It also examined the specific role of sensitivity, indicating that this aspect of siblings' environments operates primarily as a shared factor that contributes to similarity in siblings' relationships. In contrast, non-shared components of sensitivity do not seem to account for differences in siblings' relationships.

While the specific results outlined above are important in that they contribute new information to the study of sibling attachment relationships, they are also significant in highlighting that much remains unknown within this field of research. Clearly, many doors remain unopened when it comes to understanding how multidimensional elements of the family context – including the complex relationships existing within the family context and the characteristics of its members – intersect to produce unique outcomes for each child. However, turning to the broader literature, including its theoretical frameworks and methodologies, may provide some guidance regarding which doors to open next, thus moving traditional approaches for studying attachment towards a more comprehensive, 'real-world' understanding of the context in which individuals and relationships develop.

References

- 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.
- Anderson, E. R., Hetherington, E. M., Reiss, D., & Howe, G. (1994). Parents' nonshared treatment of siblings and the development of social competence during adolescence. *Journal of Family Psychology, 8*, 303-320.
- Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Bokhorst, C. L., & Schuengel, C. (2004). The importance of shared environment in infant-father attachment: A behavioral genetic study of the Attachment Q-Sort. *Journal of Family Psychology, 18*, 545-549.
- 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* (pp. 59-74). New York: Lawrence Erlbaum Associates.
- Bisceglia, R., Jenkins, J. M., Wigg, K. G., O'Connor, T. G., Moran, G., & Barr, C. L. (2012). Arginine vasopressin 1a receptor gene and maternal behavior: Evidence of association and moderation. *Genes, Brain and Behavior, 11*, 262-268.
- Boyle, M. H., Jenkins, J. J., Georgiades, K., Cairney, J., Duku, E., Racine, Y., et al. (2004). Differential-maternal parenting behavior: Estimating within- and between-family effects on children. *Child Development, 75*, 1457-1476.
- Bretherton, I. (2010). Fathers in attachment theory and research: A review. *Early Child Development and Care, 180*, 9-23.
- Brody, G. H., Stoneman, Z., & Burke, M. (1987). Child temperaments, maternal differential treatment and sibling relationships. *Developmental Psychology, 23*, 354-362.
- Brody, G. H., Stoneman, Z., & McCoy, K. (1992). Parental differential treatment of siblings and sibling differences in negative emotionality. *Journal of Marriage and the Family, 54*, 643-651.
- Carpendale, J. I. M., & Lewis, C. (2004). Constructing an understanding of mind: The development of children's social understanding within social interaction. *Behavioral and Brain Sciences, 27*, 79-96.
- Canadian Psychological Association. (2000). *Canadian code of ethics for psychologists* (3rd Ed.). Ottawa, ON: Canadian Psychological Association.

- Caspi, A., Moffitt, T. E., Morgan, J., Rutter, M., Taylor, A., Arseneault, L., et al. (2004). Maternal expressed emotion predicts children's antisocial behavior problems: Using monozygotic-twin differences to identify environmental effects on behavioral development. *Developmental Psychology, 40*, 149-161.
- Chambers, J., Power, K., Loucks, N., & Swanson, V. (2001). The interaction of perceived maternal and paternal parenting styles and their relation with the psychological distress and offending characteristics of incarcerated young offenders. *Journal of Adolescence, 24*, 209-227.
- Collins, W. A., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting: The case for nature and nurture. *American Psychologist, 55*, 218-232.
- Cowan, P. A. (1997). Beyond meta-analysis: A plea for a family systems view of attachment. *Child Development, 68*, 601-603.
- 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.
- Dallaire, D. H., & Weinraub, M. (2005). The stability of parenting behaviors over the first 6 years of life. *Early Childhood Research Quarterly, 20*, 201-219.
- Deater-Deckard, K., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1998). Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. *Development and Psychopathology, 10*, 469-493.
- Deater-Deckard, K., Pylas, M., & Petrill, S. A. (1997). The Parent-Child Interaction System (PARCHISY). London: Institute of Psychology.
- Deater-Deckard, K., Pike, A., Petrill, S. A., Cutting, A. L., Hughes, C., & O'Connor, T. (2001). Nonshared environmental processes in social-emotional development: An observational study of identical twin differences in the preschool period. *Developmental Science, 4*, F1-F6.
- DiLalla, L. F., & Bishop, E. G. (1996). Differential maternal treatment of infant twins: Effects on infant behaviors. *Behavior Genetics, 26*, 535-542.
- Dunn, J. (2002). Sibling relationships. In P. K. Smith & C. H. Hart (Eds.), *Blackwell handbook of childhood social development* (pp. 223-237). Malden, MA: Blackwell Publishers Ltd.
- Else-Quest, N. M., Clark, R., & Owen, M. T. (2011). Stability in mother-child interactions from infancy through adolescence. *Parenting: Science and Practice, 11*, 280-287.

- Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*, 121-138.
- Erel, O., Margolin, G., & John, R. S. (1998). Observed sibling interaction: Links with the marital and the mother-child relationship. *Developmental Psychology, 34*, 288-298.
- Fearon, R. M. P., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2010). Jealousy and attachment: The case of twins. In S. L. Hart & M. Legerstee (Eds.), *Handbook of jealousy: Theories, principles, and multidisciplinary approaches* (pp. 362-377). United States: 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.
- Feinberg, M., & Hetherington, E. M. (2001). Differential parenting as a within-family variable. *Journal of Family Psychology, 15*, 22-37.
- Feinberg, M. E., Neiderhiser, J. M., Simmens, S., Reiss, D., & Hetherington, E. M. (2000). Sibling comparison of differential parental treatment in adolescence: Gender, self-esteem, and emotionality as mediators of the parenting-adjustment association. *Child Development, 71*, 1611-1628.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: SAGE Publications Ltd.
- Forbes, L. M., Evans, E. M., Moran, G., & Pederson, D. R. (2007). Change in atypical maternal behavior predicts change in attachment disorganization from 12 to 24 months in a high-risk sample. *Child Development, 78*, 955-971.
- Fox, N. A., Kimmerly, N. L., & Schafer, W. D. (1991). Attachment to mother/attachment to father: A meta-analysis. *Child Development, 62*, 210-225.
- Fuertes, M., dos Santos, P. L., Beeghly, M., & Tronick, E. (2006). More than maternal sensitivity shapes attachment: Infant coping and temperament. *Annals of the New York Academy of Sciences, 1094*, 292-296.
- Garcia, M. M., Shaw, D. S., Winslow, E. B., & Yaggi, K. E. (2000). Destructive sibling conflict and the development of conduct problems in young boys. *Developmental Psychology, 36*, 44-53.
- George, D., & Mallery, M. (2003). *Using SPSS for Windows step by step: A simple guide and reference*. Boston, MA: Allyn and Bacon.

- 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.
- Grossmann, K., Grossmann, K. E., Fremmer-Bombik, E., Kindler, H., Scheuerer Englisch, H., & Zimmermann, P. (2002). The uniqueness of the child-father attachment relationship: Fathers' sensitive and challenging play as a pivotal variable in a 16-year longitudinal study. *Social Development, 11*, 307-331.
- Hane, A. A., Fox, N. A., Polak-Toste, C., Ghera, M. M., & Guner, B. M. (2006). Contextual basis of maternal perceptions of infant temperament. *Developmental Psychology, 42*, 1077-1088.
- Hart, S., Field, T., Del Valle, C., & Letourneau, M. (1998). Infants protest their mothers' attending to an infant-size doll. *Social Development, 7*, 54-61.
- Heck, R. H., Thomas, S. L., & Tabata, L. N. (2013). *Longitudinal modeling with IBM SPSS* (2nd Ed.). New York: Routledge.
- Hinde, R. A. (1987). *Individuals, relationships, and culture: Links between ethology and the social sciences*. Cambridge, UK: Cambridge University Press.
- Hoffman, L. W. (1991). The influence of the family environment on personality: Accounting for sibling differences. *Psychological Bulletin, 110*, 187-203.
- Holden, G. W., & Miller, P. C. (1999). Enduring and different: A meta-analysis of the similarity in parents' child rearing. *Psychological Bulletin, 125*, 223-254.
- Howe, N., & Recchia, H. (2006). Sibling relations and their impact on children's development. In R. E. Tremblay, R. G. Barr, R. & deV. Peters (Eds.), *Encyclopedia on early childhood development* [online]. Montreal, QE: Centre of Excellence for Early Childhood Development. Retrieved from <http://www.child-encyclopedia.com/documents/Howe-RecchiaANGxp.pdf>.
- Huang, K-Y., Caughy, M. O., Lee, L-C., Miller, T., & Genevro, J. (2009). Stability of maternal discipline practices and the quality of mother-child interaction during toddlerhood. *Journal of Applied Developmental Psychology, 30*, 431-441.
- Jaccard, J. & Turrisi, R. (2003). *Interaction effects in multiple regression* (2nd Ed.). Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-072. Thousand Oaks, CA: Sage.
- Jenkins, J., & Bisceglia, R. (2011). Understanding within-family variability in

- children's responses to environmental stress. In D. Keating (Ed.), *Nature and nurture in early child development* (pp. 145-168). Cambridge, UK: Cambridge University Press.
- Jenkins, J. M., Cheung, C., Frampton, K., Rasbash, J., Boyle, M.H., & Georgiades, K. (2009). The use of multilevel modeling for the investigation of family process. *Special Issue of the European Journal of Developmental Psychology*.
- Jenkins, J. M., Rasbash, J., & O'Connor, T. G. (2003). The role of the shared family context in differential parenting. *Developmental Psychology, 39*, 99-113.
- Jenkins, J., Simpson, A., Dunn, J., Rasbash, J., & O'Connor, T. (2005). Mutual influence of marital conflict and children's behavior problems: Shared and nonshared family risks. *Child Development, 76*, 24-39.
- Kochanska, G., & Murray, T. K. (2000). Mother-child mutually responsive orientation and conscience development: From toddler to early school age. *Child Development, 71*, 417-431.
- Kowal, A., & Kramer, L. (1997). Children's understanding of parental differential treatment. *Child Development, 68*, 113-126.
- Lamb, M. E. (1975). Fathers: Forgotten contributors to child development. *Human Development, 18*, 245-266.
- Lamb, M. E. (2012). Mothers, fathers, families, and circumstances: Factors affecting children's adjustment. *Applied Developmental Science, 16*, 98-111.
- Marvin, R. S., & Stewart, R. B. (1990). A family systems framework for the study of attachment. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the preschool years: Theory, research, and intervention* (pp. 51-86). Chicago, IL: University of Chicago Press.
- Matias, C. (2006). *Direct observation of parent-child interaction based on attachment theory*. Unpublished doctoral dissertation, Institute of Psychiatry, King's College, London, UK.
- Matias, C., Scott, S., & O'Connor, T. G. (2006). Coding of attachment-related parenting (CARP). Unpublished manuscript, Institute of Psychiatry, King's College, London, UK.
- Metsäpelto, R-L., Pulkkinen, L., & Poikkeus, A-M. (2001). A search for parenting style: A cross-situational analysis of parental behavior. *Genetic, Social, and General Psychology Monographs, 127*, 169-192.
- Meunier, J. C., Bisceglia, R., & Jenkins, J. M. (2012). Differential parenting and

- children's behavioral problems: Curvilinear associations and mother-father combined effects. *Developmental Psychology*, 48, 987-1002.
- Meunier, J. C., Boyle, M., O'Connor, T. G., & Jenkins, J. M. (2013). Multilevel mediation: Cumulative contextual risk, maternal differential treatment, and children's behavior within families. *Child Development*, 84, 1594-1615.
- Minuchin, P. (1985). Families and individual development: Provocations from the field of family therapy. *Child Development*, 56, 289-302.
- Moran, G., Pederson, D. R., & Tarabulsky, G. M. (2010). Becoming sensitive to sensitivity: Lessons learned from the development of the Maternal Behavior Q-Sort. In D. W. Davis & M. C. Logsdon (Eds.), *Maternal sensitivity: A scientific foundation for practice*. Hauppauge, NY: Nova Science Publishers, Inc.
- Muthén, L. K., & Muthén, B. O. (1998-2013). Mplus User's Guide (6th Ed.). Los Angeles, CA: Muthén & Muthén.
- O'Connor, T. G., & Croft, C. M. (2001). A twin study of attachment in preschool children. *Child Development*, 72, 1501-1511.
- O'Connor, T. G., Croft, C., & Steele, H. (2000). The contributions of behavioral genetic studies to attachment theory. *Attachment and Human Development*, 2, 107-122.
- O'Connor, T. G., Matias, C., Futh, A., Tantam, G., & Scott, S. (2013). Social learning theory parenting intervention promotes attachment-based caregiving in young children: Randomized clinical trial. *Journal of Clinical Child and Adolescent Psychology*, 42, 358-270.
- Paccagnella, O. (2006). Centering or not centering in multilevel models? The role of the group mean and the assessment of group effects. *Evaluation Review*, 30, 66-85.
- Patterson, G. R. (2002). The early development of coercive family process. In J. B. Reid, G. R. Patterson, & J. Snyder (Eds.), *Antisocial behavior in children and adolescents: A developmental analysis and model for intervention* (pp. 25-44). Washington, DC: American Psychological Association.
- Pederson, D. R., Moran, G., Bailey, H. N., & 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.
- Peugh, J. L. (2013). Conducting three-level cross-sectional analyses. *The Journal of Early Adolescence*, 34, 7-37.

- 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., & Daniels, D. (1987). Why are children in the same family so different from one another? *Behavioural and Brain Science, 10*(1), 1-16.
- Prime, H., Pauker, S., Plamondon, A., Perlman, M., & Jenkins, J. (2014). Sibship size, sibling cognitive sensitivity, and children's receptive vocabulary. *Pediatrics, 133*, 394-401.
- Reiss, E., Hetherington, E. M., Plomin, R., Howe, G. W., Simmens, S. J., Henderson, S. H., ... Law, T. (1995). Genetic questions for environmental studies: Differential parenting and psychopathology in adolescence. *Archives of General Psychiatry, 52*, 925-936.
- Richmond, M. K., & Stocker, C. M. (2008). Longitudinal associations between parents' hostility and siblings' externalizing behavior in the context of marital discord. *Journal of Family Psychology, 22*, 231-240.
- Roisman, G. I., & Fraley, R. C. (2008). A behavior-genetic study of parenting quality, infant attachment security, and their covariation in a nationally representative sample. *Developmental Psychology, 44*, 831-839.
- Sameroff, A. J. (1975). Transactional models in early social relations. *Human Development, 18*, 65-79.
- Scarr, S., & McCartney, K. (1983). How people make their own environments: A theory of genotype --> environment effects. *Annual Progress in Child Psychiatry & Child Development*, pp. 98-118.
- Scherbaum, C. A., & Ferreter, J. M. (2009). Estimating statistical power and required sample sizes for organizational research using multilevel modeling. *Organizational Research Methods, 12*, 347-367.
- Schmidt, M. F., & Sommerville, J. A. (2011). Fairness expectations and altruistic sharing in 15-month-old human infants. *PLoS One, 6*(10), e23223. doi: 10.1371/journal.pone.0023223
- Schneider, B. H., Atkinson, L., & Tardif, C. (2001). Child-parent attachment and children's peer relations: A quantitative review. *Developmental Psychology, 37*, 86-100.
- Schoppe-Sullivan, S. J., Diener, M. L., Mangelsdorf, S. C., Brown, G. L., McHale, J. L., Frosch, C. A. (2006). Attachment and sensitivity in family context: The roles of parent and infant gender. *Infant and Child Development, 15*, 367-385.

- Shanahan, L., McHale, S. M., Crouter, A. C., & Osgood, D. W. (2008). Linkages between parents' differential treatment, youth depressive symptoms, and sibling relationships. *Journal of Marriage and Family, 70*, 480-494.
- Shaw, A., DeScioli, P., & Olson, K. R. (2012). Fairness versus favoritism in children. *Evolution and Human Behavior, 33*, 736-745.
- Solomon, J., & George, C. (1999). The measurement of attachment security in infancy and childhood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 287-316). New York: Guilford Press.
- Sommerville, J. A., Schmidt, M. F., Yun, J. E., & Burns, M. (2013). The development of fairness expectations and prosocial behavior in the second year of life. *Infancy, 18*, 40-66.
- Steele, F., Rasbash, J., & Jenkins, J. (2013). A multilevel simultaneous equations model for within-cluster dynamic effects, with an application to reciprocal parent-child and sibling effects. *Psychological Methods, 18*, 87-100.
- Tamis-LeMonda, C. S. (1996). Maternal sensitivity: Individual, contextual and cultural factors in recent conceptualizations. *Early Development and Parenting, 5*, 167-171.
- Tamrouti-Makkink, I. D., Dubas, J. S., Gerris, J. R. M., & van Aken, M. A. G. (2004). The relation between the absolute level of parenting and differential parental treatment with adolescent siblings' adjustment. *Journal of Child Psychology and Psychiatry, 45*, 1397-1406.
- Teti, D. M., Sakin, J. W., Kucera, E., Corns, K. M., & Das Eiden, R. (1996). And baby makes four: Predictors of attachment security among preschool-age firstborns during the transition to siblinghood. *Child Development, 67*, 579-596.
- Thompson, R. A. (1997). Sensitivity and security: New questions to ponder. *Child Development, 68*, 595-597.
- Thompson, R. A., & Raikes, H. A. (2003). Toward the next quarter-century: Conceptual and methodological challenges for attachment theory. *Development and Psychopathology, 15*, 691-718.
- Touris, M., Kromelow, S., & Harding, C. (1995). Mother-firstborn attachment and the birth of a sibling. *American Journal of Orthopsychiatry, 65*, 293-297.
- Turkheimer, E., & Waldron, M. (2000). Nonshared environment: A theoretical, methodological, and quantitative review. *Psychological Bulletin, 126*, 78-108.
- Twisk, J. W. (2006). *Applied multilevel analysis: A practical guide*. Cambridge, UK:

Cambridge University Press.

- 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., 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.
- Volling, B. L. (2003). Sibling relationships. In M. H. Bornstein, L. Davidson, C. L. M. Keyes, & K. A. Moore (Eds.), *Well-being: Positive development across the life course* (pp. 205-220). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Volling, B. L. (2012). Family transitions following the birth of a sibling: An empirical review of changes in the firstborn's adjustment. *Psychological Bulletin, 138*, 497-528.
- Volling, B. L., Kennedy, D. E., & Jackey, L. M. H. (2010). The development of sibling jealousy. In S. L. Hart & M. Legerstee (Eds.), *Handbook of jealousy: Theories, principles, and multidisciplinary approaches* (pp. 387-417). United States: Wiley-Blackwell Publishing.
- Waters, E., & Deane, K. (1985). Defining and assessing individual differences in attachment relationships: Q-methodology and the organization of behavior in infancy and early childhood. In I. Bretherton & E. Waters (Eds.), *Monographs of the Society for Research in Child Development, 50*, 41-65.

Chapter 5: Discussion

Sibling attachment research has been at a crossroads for some time. Interest in this field was initially ignited by research demonstrating that both concordance and non-concordance in the quality of siblings' relationships are common – unexpectedly so, based on a straightforward interpretation of traditional attachment theory (van IJzendoorn et al., 2000). While these early studies were useful in drawing researchers' attention to the growing possibility that conclusions based upon within-family research cannot be directly extended to describe processes taking place within the family, they were also subject to limitations that restricted their capacity to provide a full description of family relationships: for instance, they tended to involve small samples and often did not describe concordance among siblings according to the full spectrum of attachment classifications (i.e., Avoidant, Secure, Resistant, and Disorganized). Moreover, very little early work explored aspects of concordance beyond comparing the quality of siblings' relationships at the same age; for instance, no previous research explored the extent to which mothers' state of mind is consistent with the quality of their relationships across children, and only limited work examined similarity in the quality of siblings' relationships as they appear contemporaneously. Since this preliminary research, however, no further work has proceeded to address these gaps in the sibling attachment literature. As a result, the existing literature offers only a preliminary view of the ways in which attachment presents in a family context, resulting in a rather limited foundation for more advanced theoretical and empirical work within this area of research.

The existing body of sibling attachment research has also been limited in terms of its success in uncovering the roots of variability in the quality of siblings' relationships. To date, the field has focused almost exclusively on accounting for differences in security

by searching for parallel differences in maternal sensitivity (van IJzendoorn et al., 2000). These predictions, however, have not been entirely supported: overall, the sensitivity of mothers' interactions with each child have not meaningfully distinguished between patterns of concordance in siblings' relationships (Pederson, Moran, Bailey, & Bento, 1999; van IJzendoorn et al., 2000). Following these studies, however, little work has been devoted to explaining variability in siblings' relationships, leaving many questions about the processes shaping family attachment relationships – and, by extension, differences among individuals (Plomin & Daniels, 1987) – unanswered.

Together, the three studies that comprised this dissertation aimed to further sibling attachment research by exploring the two main avenues outlined above; that is, this work aimed to address the field's need for a) a more comprehensive description of the patterning of attachment within families; and b) further insight into the factors and processes underlying these patterns. In addition to answering several specific research questions, as outlined below, this work was intended to fulfill several overarching goals: to build a stronger foundation for further research in the field of sibling attachment; and to explore the utility of applying theoretical, empirical, and analytic approaches beyond this specific branch of attachment research (and, in some cases, beyond the field of attachment in general) towards propelling the field in novel, productive directions.

Strengthening the Foundation and Rationale for Family Attachment Research:

Variability is Common across Mothers and Siblings

This dissertation contributed to the foundation of sibling attachment research by describing patterns of attachment within the family in several ways. First, Chapter 2 (and Chapter 3, given that its sample was a subset of that in Chapter 2) built upon and replicated previous work (e.g., van IJzendoorn et al., 2000) by estimating concordance in

the quality of siblings' relationships according to the full spectrum of attachment classifications, as assigned when siblings were the same age. Conclusions from this study converged with those described in past work: although concordance rates varied depending on how broadly relationships were classified – for instance, 43% of siblings were in concordant relationships when relationships were classified according to the four major classifications (Avoidant, Secure, Resistant, and Disorganized), but rates increased to 65% based on secondary classifications of either Secure or non-Secure– all estimates indicated that both concordance and non-concordance were common. When considered along with previous work, these results suggest that the field of attachment must indeed shift to accommodate the consistent finding that siblings' relationships do not unfold with as much consistency and stability as conventional theory might predict.

This dissertation also provided further insight into a complementary issue related to patterns of attachment across siblings: the extent to which the quality of siblings' relationships appears similar when assessed concurrently, at different ages. This investigation, conducted in Chapter 4, provided important information about patterns of attachment as they appear within a family context where several relationships are unfolding simultaneously. Interestingly, this novel perspective yielded similar conclusions to those arising from more traditional approaches to estimating concordance, even in light of conceptual and methodological differences: specifically, both suggested that differences in the quality of siblings' relationships are common. Indeed, the multilevel approach adopted in Chapter 4 – which had the capacity to separate variability in attachment security into between- and within-family components – suggested that comparatively more variability in attachment security existed within families as opposed to between families. Together, these studies suggest that differences in siblings'

relationships are not entirely attributable to when and how security is measured (e.g., at the same age or same time; categorically or continuously); rather, variability in attachment quality appears to be a relatively normative phenomenon requiring more comprehensive integration into theory and research.

Along with describing patterns of attachment across siblings, this dissertation characterized patterns of attachment across generations by examining whether theoretically- and empirically-predicted links between maternal state of mind and infant attachment security, as established via dyadic research, were maintained across mothers' relationships with more than one child. Not surprisingly, this work (described in further detail in Chapter 2) demonstrated that variability in attachment across generations appears typical: while there was some tendency for Autonomous mothers to be in Secure relationships with their two children, there were no significant links between state of mind and sibling attachment concordance overall. While these effects are not entirely unexpected given that the quality of siblings' relationships also frequently diverged, they are (again) unexpected from the perspective of traditional attachment theory. Thus, the patterning of siblings' relationships is not the only aspect of family attachment that requires further theoretical and empirical investigation – the patterning of relationships across mothers *and* siblings warrants further investigation as well.

Exploring Factors Underlying Patterns of Attachment within the Family: Some Answers, but Many Questions

This dissertation also aimed to provide further insight into the processes underlying variability in siblings' relationships, focusing primarily on the role of two factors. The first (see Chapter 3) was *mentalization*, conceptualized as mothers' capacity to represent their infant's mental processes and apply this representation to inform their

understanding of (and ultimately, their behavioral responses to) the child's behavior. This study was unique in that no previous research had explored consistency in mentalization across children and whether this consistency varies according to state of mind; moreover, no work had yet considered the role of mentalization in shaping the extent to which siblings' relationships are similar. Results revealed that mothers engaged in similar levels of mentalization across siblings, providing support for the concept of mentalization as a stable trait (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011) applied relatively consistently across mothers' significant relationships. Contrary to prediction, however, neither a) overall levels of mentalization or b) patterns of mentalization across siblings varied according to state of mind, nor did they vary depending on whether siblings were in two Secure, two non-Secure, or non-concordant relationships. More compelling findings emerged when the quality of siblings' relationships was represented continuously: here, as expected, differences across siblings on mothers' use of certain mental attributes predicted differences in the quality of their relationships. While preliminary, these results contribute to the broader literature highlighting the role of mentalization in shaping attachment, suggesting that this factor may be an important determinant of variability in the quality of siblings' relationships.

The second factor explored in this dissertation was *sensitivity*, which refers to the mothers' ability to tailor their behavioral responses to suit the child's unique attachment needs (Ainsworth, Bell, & Stayton, 1971). In contrast to previous work exploring links between sensitivity and sibling attachment concordance, Chapter 4 was unique in that it a) explored links between sensitivity and the quality of each child's relationship concurrently, complementing more traditional designs exploring this association when each child was the same age (van IJzendoorn et al., 2000); and b) was centered on a

family systems perspective proposing that security is shaped by two components of sensitivity: shared (i.e., experienced across siblings, thus contributing to similarity between them) and non-shared (i.e., experienced differently by each child, thus contributing to differences; Plomin & Daniels, 1987; Reiss et al., 1994). In Chapter 4, mothers tended to interact with similar sensitivity across their two children, a pattern that – as predicted – contributed to similarity in the quality of their relationships.

Unexpectedly, however, differences in sensitivity across siblings were not associated with differences in security. Together, conclusions from this study echo longstanding calls from the between-family literature (de Wolff & van IJzendoorn, 1997), as well as early calls from the within-family literature (O'Connor, Croft, & Steele, 2000; van IJzendoorn et al., 2000), to expand the scope of attachment research (both in general, and in relation to siblings) beyond sensitivity and towards other factors potentially underlying variability in the quality of attachment. While sensitivity likely explains differences to an extent, the full picture is likely much more multifaceted.

Overall, results from these exploratory studies point to several preliminary conclusions. First, they highlight the possibility that different factors shape patterns of attachment within the family in varying ways: some, such as sensitivity, may be particularly impactful as shared effects and thus may primarily work to make siblings' relationships more similar; others, such as mentalization, may operate to make siblings' relationships different (although this possibility should be tested further using multi-level analyses that allow for partitioning of shared and non-shared effects, as in Chapter 4). In other words, the field's understanding of how various factors shape the quality of attachment on a family level should not be based on a straightforward extension of the processes described in the dyadic literature, nor should researchers assume that similarity

among siblings on a given factor reliably leads to similar outcomes and vice versa.

Rather, an insightful, comprehensive approach to understanding the processes underlying variability in siblings' relationships will involve a thorough exploration of numerous factors – on their own, and in conjunction with other factors – from a systems perspective that reflects the multiple layers of influence inherent within the family context.

A second observation arising from the results outlined above relates to the issue of measurement, specifically the use of continuous measures for representing attachment security. The benefits of utilizing continuous measures (such as that developed by Richters, Waters, & Vaughn, 1988), as well as the growing body of evidence suggesting that individual differences in attachment are most consistent with a continuous model (Fraley & Spieker, 2003), have been described in detail throughout this dissertation. In support of researchers' efforts to further develop and promote the use of these measures, it is worth noting that the most informative results described in Chapter 3 (i.e., those demonstrating significant, parallel links between sibling differences on attachment security and on mothers' use of mental attributes) would not have emerged if a continuous measure of attachment had not been used. Moreover, the statistical technique utilized in Chapter 4 –multilevel modeling, considered ideal for exploring sources of variability in nested data (i.e., families; Field, 2009) – would have been substantially more challenging to implement if only categorical measures were available. Together, these studies further illustrate the value of developing and using continuous measures of attachment – especially in sibling research, where sample sizes are frequently small and may be especially impacted by the statistical limitations associated with categorical data. Not only could these measures reveal effects that may be masked by the use of categories,

they also make the high-level statistical approaches required to fully explore complex, multidimensional effects more accessible to researchers.

In expanding on the issues outlined above, a final point related to measurement concerns the in-depth, intensive nature of most traditional attachment measures, whether continuous (as in Chapters 2 and 3) or categorical (as in Chapter 4). While these measures have the potential to provide highly detailed information about attachment and its correlates, they may not be entirely practical for collecting data longitudinally and/or from large numbers of families – thus limiting the field’s capacity to fully explore the complex pathways underlying attachment via the high-level statistics commonly utilized in other branches of developmental research. In the case of multilevel modeling, for instance, a sample involving 50 groups at Level 2 (i.e., the between-groups level) is viewed as approaching the lower limit of acceptable in terms of producing non-biased estimates of regression coefficients and variance components (Maas & Hox, 1999); other common approaches (e.g., structural equation modeling) require a sample of 150 individuals or more (Anderson & Gerbing, 1988; Hooper, Coughlan, & Mullen, 2008). Given the potential benefits of introducing these statistical approaches into attachment research, it may be prudent for attachment researchers to explore the possibility of developing less resource-intensive measures of attachment and associated factors (e.g., sensitivity) for use with large sample sizes to complement the use of more traditional measures. While developing less intensive yet psychometrically strong measures would likely be challenging, especially given the multifaceted nature of relationships, the availability of these tools would make exploring sophisticated research questions about attachment’s nature, underpinnings, and sequelae much more feasible for researchers.

Limitations

Limitations specific to each study in this dissertation have been discussed in detail in other sections. There are, however, several overarching limitations. First, this research only addressed Disorganization in a descriptive sense; that is, Chapters 2 and 3 included this category in sections characterizing the sample at hand, but all infants in Disorganized relationships were re-classified according to their secondary organized classification in sections exploring the underpinnings of variability in siblings' relationships. Further, Disorganization was not referenced in Chapter 4. Overall, there were two main reasons for focusing primarily on organized attachment throughout this dissertation. First, in Chapter 3, sample sizes were generally small and power would have been compromised by including yet another classification as a basis for concordance in siblings' relationships. Second, this dissertation focused conceptually on constructs primarily to underlie individual differences in organized attachment; while mentalization and sensitivity are likely involved to some extent in the emergence of Disorganized relationships (Fonagy & Target, 2005; Moran, Forbes, Evans, Tarabulsky, & Madigan, 2008), Disorganization in low-risk samples is thought to mainly arise from a specific set of anomalous maternal behaviors that reflect mothers' histories of unresolved loss or trauma (Lyons-Ruth, Bronfman, & Parsons, 1999; Main & Hesse, 1990). Thus, results from these studies should be interpreted with the awareness that for some families in these samples, Disorganization represented an important dimension of family attachment relationships that was not reflected in this preliminary work. Given the wide-ranging developmental sequelae associated with Disorganization (Sroufe, 2005), the need to investigate the ways in which it operates within a family context represents an important avenue for further research.

A second caveat is that these studies focused primarily on relatively low-risk community samples. Several features of high-risk groups suggest that the patterning and development of their family attachment relationships may differ fundamentally from the processes associated with low-risk families. For example, between-family attachment research suggests that the pervasive stress and instability typically experienced by those in high-risk groups (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010) are associated with marked fluctuation in maternal sensitivity over time (Pianta, Sroufe, & Egeland, 1989) and, accordingly, with more discontinuity in the quality of mother-infant attachment (Vondra, Hommerding, & Shaw, 1999). Similar patterns have emerged from within-family research from the broader parenting literature. That is, parents in high-risk contexts display more variability in parenting quality across children, presumably because contextual distress diminishes parents' capacity to manage more demanding children and draws them towards children whom they experience as comforting and supportive (Asbury, Dunn, Pike, & Plomin, 2003; Crouter, McHale, & Tucker, 1999; Jenkins, Rasbash, & O'Connor, 2003). Accordingly, differences in social-emotional adjustment across siblings appear to be most pronounced in families characterized by environmental disadvantage (Jenkins et al., 2009). In considering patterns of sibling attachment, one might expect to find more variability in the quality of siblings' relationships in high-versus low-risk families, as well as corresponding and heightened differences among high-risk siblings in the factors underlying attachment quality. These predictions, however, essentially represent a straightforward extension of results pertaining to low-risk families – an approach that may be overly simplistic and mask fundamental differences between groups. Thus, processes underlying family attachment in high-risk

families, and the differences between these processes and those pertaining to low-risk families, remain to be explored further in future research.

Future Directions and Implications

As with much of the sibling attachment literature, this dissertation largely represents a preliminary effort to address research questions that have not yet been explored in relation to patterns of attachment within the family. Indeed, much of the theoretical and empirical basis for this work arose from areas beyond this specific branch of attachment research, including between-family research exploring individual differences among dyads; behavioral genetics and twin studies; and research exploring the underpinnings of variability in siblings' outcomes beyond the realm of attachment. Moreover, the present work focused on relatively specific issues – that is, characteristics of within-family attachment and their links with mentalization and sensitivity – that represent only a small slice of the broad spectrum of factors likely shaping family relationships. Still, this work made important contributions to sibling attachment research in several ways: not only did it provide more information about the patterning of family attachment relationships and yield some insight into the ways in which two attachment-related factors may (or may not) shape relationships within the family, it also demonstrated more generally that introducing new conceptual models, methodologies, and statistical approaches can lead research programmes – especially those largely characterized by inactivity – in new and often unexpected directions.

Moving forward, one issue that will almost certainly limit the scope of sibling attachment research – as well as other branches of the field, such as those focusing on attachment across the lifespan – concerns the availability of well-validated measures for assessing attachment beyond the first few years of life. In contrast to Ainsworth and her

colleagues, who devoted years of careful research to developing and validating the Strange Situation (Ainsworth et al., 1978), contemporary researchers focusing on attachment beyond infancy have been criticized for adopting a “frontier mentality” (Solomon & George, 1999, p. 310) whereby the increasing pace of research has resulted in a large number of tools being developed without adequate attention to their psychometric properties. On one hand, those developing measures appropriate for use with children, adolescents, and adults face a challenging task: psychological and behavioral manifestations of attachment become increasingly multifaceted with age, requiring tools that tap into both conscious and unconscious processes (Thompson, 2008; Thompson & Raikes, 2003). Still, researchers have increasingly recognized that efforts to investigate attachment beyond infancy will only achieve the same level of respect and consideration afforded to Ainsworth’s early work if based upon a similarly thorough, well-validated approach (Kerns, Tomich, Aspelmeier, & Contreras, 2000; Thompson & Raikes, 2003). Until these measures are developed, the field’s capacity to truly explore attachment within family systems – which involve ever-changing relationships among individuals of all ages – will be markedly constrained.

Amid the possibilities and opportunities discussed above, we must also address “the gloomy prospect” that chance, in the form of “random noise, idiosyncratic experiences, or the subtle interplay of a concatenation of events” (Plomin, Asbury, & Dunn, 2001, p. 231), also plays an important role in the patterning and development of family attachment relationships. The possibility that we may never understand relationships at the dyadic, triadic, or family level to an extent that is satisfying to researchers, especially in light of the substantial resources required to formulate and test hypotheses, is certainly disheartening. However, the potential costs of *not* pursuing the

study of attachment within a family context – especially given the profound implications of this research for our understanding of family systems, the structure and function of attachment relationships, social-emotional development across the lifespan, and so on – are too consequential to consider leaving any stone unturned.

References

- 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.
- 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.
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*, 411-423.
- Asbury, K., Dunn, J. F., Pike, A., & Plomin, R. (2003). Nonshared environmental influences on individual differences in early behavioral development: A monozygotic twin differences study. *Child Development*, *74*, 933-943.
- Crouter, A. C., McHale, S. M., & Tucker, C. J. (1999). Does stress exacerbate parental differential treatment of siblings? A pattern-analytic approach. *Journal of Family Psychology*, *13*, 286-299.
- Cyr, C., Euser, E. M., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2010). Attachment security and disorganization in maltreating and high-risk families: A series of meta-analyses. *Development and Psychopathology*, *22*, 87-108.
- 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.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: SAGE Publications Ltd.
- Fonagy, P., & Target, M. (2005). Bridging the transmission gap: An end to an important mystery of attachment research? *Attachment and Human Development*, *7*, 333-343.
- Fraley, R. C., & Spieker, S. J. (2003). Are infant attachment patterns continuously or categorically distributed? A taxometric analysis of Strange Situation behavior. *Developmental Psychology*, *39*, 387-404.
- Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*, 53-60.
- Jenkins, J. M., Cheung, C., Frampton, K., Rasbash, J., Boyle, M.H., & Georgiades, K.

- (2009). The use of multilevel modeling for the investigation of family process. *Special Issue of the European Journal of Developmental Psychology*.
- Jenkins, J. M., Rasbash, J., & O'Connor, T. G. (2003). The role of the shared family context in differential parenting. *Developmental Psychology, 39*, 99-113.
- Kerns, K. A., Tomich, P. L., Aspelmeier, J. E., & Contreras, J. M. (2000). Attachment based assessments of parent-child relationships in middle childhood. *Developmental Psychology, 36*, 614-626.
- Lyons-Ruth, K., Bronfman, E., & Parsons, E. (1999). Maternal frightened, frightening, or atypical behavior and disorganized infant attachment patterns. *Monographs of the Society for Research in Child Development, 64*, 67-96.
- Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences, 1*, 86-92.
- Main, M., & Hesse, E. (1990). Parents' unresolved traumatic experiences are related to infant Disorganized/disoriented attachment status: Is frightened and/or frightening parental behavior the linking mechanism? In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the Preschool Years* (pp. 121-160). Chicago, IL: University of Chicago Press.
- Meins, E., Fernyhough, C., Arnott, B., Turner, M., & Leekam, S. (2011). Mother- versus infant-centered correlates of mind-mindedness in the first year of life. *Infancy, 16*, 137-165.
- Moran, G., Forbes, L., Evans, E., Tarabulsy, G. M., & Madigan, S. (2008). Both maternal sensitivity and atypical maternal behavior independently predict attachment security and disorganization in adolescent mother-infant relationships. *Infant Behavior and Development, 31*, 321-325.
- O'Connor, T. G., Croft, C., & Steele, H. (2000). The contributions of behavioral genetics studies to attachment theory. *Attachment and Human Development, 2*, 107-122.
- Pederson, D. R., Moran, G., Bailey, H. N., & 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.
- Pianta, R. C., Sroufe, L. A., & Egeland, B. (1989). Continuity and discontinuity in maternal sensitivity at 6, 24, and 42 months in a high-risk sample. *Child Development, 60*, 481-487.

- 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.
- 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.
- Reiss, E., Hetherington, E. M., Plomin, R., Howe, G. W., Simmens, S. J., Henderson, S. H., ... Law, T. (1995). Genetic questions for environmental studies: Differential parenting and psychopathology in adolescence. *Archives of General Psychiatry*, *52*, 925-936.
- Richters, J. E., Waters, E., & Vaughn, B. (1988). Empirical classification of infant mother relationships from interactive behavior and crying during reunion. *Child Development*, *59*, 512-522.
- Solomon, J., & George, C. (1999). The measurement of attachment security in infancy and childhood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 287-316). New York: Guilford Press.
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment and Human Development*, *7*, 349-367.
- Thompson, R. A. (2008). Attachment-related mental representations: Introduction to the special issue. *Attachment and Human Development*, *10*, 347-358.
- Thompson, R. A., & Raikes, H. A. (2003). Toward the next quarter-century: Conceptual and methodological challenges for attachment theory. *Development and Psychopathology*, *15*, 691-718.
- 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.
- Vondra, J. I., Hommerding, K. D., & Shaw, D. S. (1999). Stability and change in infant attachment in a low-income sample. *Monographs of the Society for Research in Child Development*, *64*, 119-144.

Appendix A

Letter of Information (Archival Sample)

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.

Sandi Bento, Research Coordinator

Effic Avgoustis, Research Assistant

David R. Pederson, PhD., Department of Psychology

Greg Moran, PhD., Department of Psychology

Appendix B

Letter of Information (Recent Sample)

Dear Parent,

We are conducting a study with mothers and their second born children to learn more about how babies develop social and emotional relationships with their mothers related to their birth order. We want to understand how a mother's past and present experiences, including having a previous child influence the growing relationship with her second born child. We will be asking parents about many different types of experiences which may or may not apply. You are always free to not answer any questions should you not feel comfortable.

Our study will last 1 year and will involve 3 visits. Some of the visits will be in your home; others will be at the university. We are interested in your opinions about why your baby behaves as he/she does in different situations with you and with their older sibling. We are also interested in the demands and rewards of parenting.

If you agree to participate in the study:

- Visit One: When your baby is about 12 months old, (maximum 2 hours): We will visit you at home. We would like to observe how your baby plays with you and their older sibling. Certain parts of this visit will be videotaped. We will ask you about your experiences in your relationships with your children. This portion of the visit will be audio taped. We have questionnaires for you to complete about your current relationships and your experiences as a parent.
- Visit Two: When your baby is 13 months old, (about 1 hour): You will visit us at the Child Development Centre at UWO. For this visit, we are interested in how your baby plays in new surroundings both when you are with your baby and when you are away. We will ask you to leave your baby for two brief periods (no more than 3 minutes each) during this part of the procedure. If your baby becomes upset, we will send you back in immediately. We can provide transportation.
- When your baby is about 17 months of age, we will be sending you a questionnaire about your younger child's behaviour to fill out and mail back to us.
- Visit Three: When your baby is about 24 to 30 months of age, (maximum 90 minutes): you will visit us at the Child Development Centre at UWO. We will observe how your toddler interacts and plays in different surroundings and how he/she reacts to an interesting but unusual remote-controlled toy. This visit will be videotaped. We will ask you about your experiences with your toddler since we last saw you and ask you to fill out some questionnaires.

All information collected from you for the study will be kept confidential. All written, audiotaped, and videotaped records and questionnaires will be assigned numbers to maintain confidentiality. Audiotapes are erased after transcription. Any identifying information such as names and place of birth will be changed to maintain confidentiality. Only those directly involved in the study will see the transcripts and videotapes unless you agree that fragments can be used for professional training.

Family names will only be available to direct members of the research group. Absolute confidentiality cannot be guaranteed as we may have to disclose certain information as required by law according to provisions under the Child and Family

Services Act. This includes any suspicion that a child under the age of 16 years is or has been abused or if you are in imminent danger of hurting yourself or another person. If the results of the study are published, your name will not be used and no information that discloses your identity will be released or published.

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time. Even if specific questionnaires request that you answer every question you do not have to do so. There are no known risks associated with any of the procedures. This study will not result in any direct benefit to you or your baby but may help us to further understand factors that may have an impact on the social and emotional development of infants and how relationships develop. In appreciation for your assistance and to cover any expenses, you will receive \$25.00 for each visit or \$75.00 over the course of the study.

If you wish, you will have the opportunity to receive the results of the study. You may receive a copy of the videotape of the home visits if you wish. Throughout the study we will ask you if you have any questions about any of the procedures. We would also appreciate any ideas or advice about your experience as a participant. We hope that participating in this study will be an interesting time for you and your children. If at any time you have questions or concerns, please do not hesitate to let the researcher know or you can contact the principal investigators or research coordinator listed below:

Dr. Greg Moran
Department of Psychology
University of Western Ontario

Dr. David Pederson
Department of Psychology
University of Western Ontario

Sandi Bento
Research Coordinator
Child Development Centre

Dr. Heidi Bailey
Department of Psychology
University of Guelph

If you have questions about the conduct of this study or your rights as a research subject you may contact:

The Director
Office of Research Ethics
The University of Western Ontario

Appendix C
Consent Form (Archival Sample)

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 me 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 D**Consent Form (Recent Sample)**

I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction

Parent's Name (Please Print)

Parent's Signature

Date

Name of Person Obtaining Informed Consent

Signature of Person Obtaining Informed Consent

Date

Appendix E

Ethics Approval (Archival Sample)

113

The University of Western Ontario
Department of Psychology

May 25, 1993

MEMORANDUM

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

- 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 F
Ethics Approval (Recent Sample)



Principal Investigator: Dr. G. Moran

Review Number: 10390S

Revision Number:

Protocol Title: Exploring the Nature and Origins of Parent Child Relationships

Department and Institution: Psychology, University of Western Ontario

Sponsor:

Approval Date: 27-Apr-04

End Date: 30-Apr-08

Documents Reviewed and Approved: UWO Protocol, Letter of Information, Consent Forms

Documents Received for Information:

This is to notify you that the University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (REB) which is organized and operates according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario has granted full board approval to the above named research study on the date noted above.

This approval shall remain valid until end date noted above assuming timely and acceptable responses to the REB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the REB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the REB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the REB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the REB.

Chair of REB: Dr. Ben Foster

Faxed: N

Date: Apr. 28/04
JH

This is an official document. Please retain the original in your files.

UWO REB Ethics Approval

10390S

Page 1 of 1



Office of Research Ethics

The University of Western Ontario

Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. G. Moran

Review Number: 10390S

Review Date: September 28, 2007

Revision Number: 7

Review Level: Expedited

Protocol Title: Exploring the Nature and Origins of Parent Child Relationships

Department and Institution: Psychology, University of Western Ontario

Sponsor:

Ethics Approval Date: September 28, 2007

Expiry Date: April 30, 2010

Documents Reviewed and Approved: UWO Protocol, Revised Participant Numbers, Letter of Information and Consent

Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the study or consent form may be initiated without prior written approval from the NMREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the NMREB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the NMREB.

Chair of NMREB: Dr. Jerry Paquette

Appendix G

Modified Working Model of the Child Interview⁷: Questions Common to First and Second-Born Siblings

What were your impressions of (baby) during pregnancy?

Were you hoping for a boy or a girl? Why is it that you wanted a boy/girl?

When did you find out the sex of your baby? What was your reaction to finding out it was a boy/girl?

What was your first reaction when you saw (baby)?

Does your baby get upset often? How do you feel at those times? What do you do?

Tell me about a specific time when he/she was emotionally upset. How did you feel at that time? What did you do?

Tell me about a time when he/she was physically hurt. How did you feel at that time?

What did you do?

Has your baby been sick at all? Tell me more about that. How did you feel at that time?

What did you do?

Can you describe your impression of his/her personality?

If you had to pick 5 words or adjectives to describe his/her personality, what would you say? That is, the kind of boy/girl he is. I will write each word down and then ask you why you chose it. Tell me about a specific thing that he/she did one day that shows this.

What about (baby)'s behavior is most difficult for you to handle now?

Does this happen frequently? How do you feel when he/she is like this? What do you actually do when you feel like this? How does he/she respond when you act like this?

How would you describe your relationship with (baby)?

If I had to ask you for five words to describe your relationship with her, what would you say?

How you feel about each other, how you get along with each other, the bond you have? Describe an incident or memory that illustrates what you mean.

What pleases you most about your relationship with (baby)?

Is there anything you wish you could change about your relationship with him/her?

How do you feel that your relationship with him/her has affected his/her personality?

Whom does your baby remind you of? In what ways? When did you first notice similarity? *If only one parent is mentioned:* In what ways does (baby) remind you of (the other parent)? In what ways is his/her personality unlike each of his/her parents?

Which parent is your baby closest to now? How can you tell? Has it always been this way? Do you expect that to change (as the baby gets older, for instance)? How do you expect it to change?

Are there any experiences with your baby that you feel have been negative or a setback for him/her?

⁷ Adapted from the Working Model of the Child Interview (Zeanah & Benoit, 1995)

Appendix H

Mini- Attachment-Q-Sort (AQS) Items

- Child readily shares with mother or lets her hold things if she asks to.
- When child returns to mother after playing, he is sometimes fussy for no clear reason.
- Child laughs and smiles easily with a lot of different people.
- Child is lighthearted and playful most of the time.
- When child finds something new to play with, he carries it to mother or shows it to her from across the room.
- Child follows mother's suggestions readily, even when they are clearly suggestions rather than orders.
- When mother tells child to bring or give her something, he obeys.
- Child keeps track of mother's location when he plays around the house.
- Child enjoys relaxing in mother's lap.
- Child is independent with mother. Prefers to play on his own; leaves mother easily when he wants to play.
- 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.
- Child is demanding and impatient with mother. Fusses and persists unless she does what he wants right away.
- Child is often serious and businesslike when playing away from mother or alone with his toys.
- Child asks for and enjoys having mother hold, hug, and cuddle him.
- When child finishes with an activity or toy, he generally finds something else to do without returning to mother between activities.
- Plays roughly with mother. Bumps, scratches, or bites during active play.
(Does not necessarily mean to hurt mom)
- When child is in a happy mood, he is likely to stay that way all day.
- Child is easily upset when mother makes him change from one activity to another.
- Child easily grows fond of adults who visit his home and are friendly to him.
- When the family has visitors, child wants them to pay a lot of attention to him.
- Rarely asks mother for help. Middle if child is too young to ask.
- 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.)
- Child easily becomes angry at mother.
- Child uses mother's facial expressions as good source of information when something looks risky or threatening.
- Child cries as a way of getting mother to what he wants.
- When child is bored, he goes to mother looking for something to do.
- Child tries to get mother to imitate him, or quickly notices and enjoys it when mom imitates him on her own.
- If mother laughs at or approves of something the child has done, he repeats again and again.
- When something upsets the child, he stays where he is and cries.
- 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)

Appendix I

Letter of Information (Kids, Families, and Places Study)

Title of Project: Kids, families and places
Researchers: Dr. Jenny Jenkins, University of Toronto
 Dr. Michael Boyle, McMaster University
Project Manager: Mira Boskovic

You and your family are being invited to take part in a research project looking at what affects children and how they feel, behave and get along with others. The aim is to answer these questions.

- (1) How strong are the effects of neighbourhood on how children feel and behave?
- (2) How strong are the effects of out of home care on how children feel and behave?
- (3) How strong are the effects of family life on how children feel and behave?
- (4) What about the effects of genetics and stress factors?
- (5) What happens if these effects interact?
- (6) Why do different children react differently to these effects?

This work will help us understand what is important for good emotional health in children as they grow up. It is being carried out by researchers from the University of Toronto and McMaster University. About 580 Toronto and Hamilton families with a newborn baby and at least one other child are being asked to take part in this study.

Why this study is important:

Growing up presents many challenges. This work will help us understand why some children handle these challenges better than others. We hope the study results will help us plan services for young children and their families.

What we are asking you and your family to do:

You will be asked to take part in 3 home interviews over a period of five years. The first will take place now and will last about 2.5 hours. The next two will take place when your baby is 18 and 36 months old. Please look at the interview timetable that is attached. It lists how long the interviews will last and who will take part.

In this first interview, you will answer questions about you, your family and your neighbourhood. There will be questions about your background (e.g. family structure, income) about your parenting beliefs and practices and about your health before and after the birth of your child. You will also be asked about the health, behaviour and mood of each of your children who are between the ages 18 months and 16 years. Your spouse/partner (if you are living with one) will be asked to self-complete similar, briefer questionnaires. He/she will sign a consent for this. All children aged 30 months and over will also be asked to complete a word game to assess how many words they understand, and children who are between 5 and 10 years will be asked to play a puppet game about feelings and behavior. Any child who is 6 years of age will also be asked if he/she agrees to take part in this study. We would also like to observe the family while you are having a snack together. We will call you before each interview to set up a convenient time.

With your permission, we will videotape parts of this and later interviews when you are playing with your children. This will allow expert coders to look at these videos later and record behaviours in more detail than is possible during an in-home interview. These tapes will be confidential and will be used only by the research team for this study.

There are other parts of this study which will be described to you in more detail at later interviews. You may be invited to take part in all of these. If you are taking part, you will sign new consent form(s) for these parts. One part will only apply if you have a child or children in out of home care. If so, you will also be asked if your child(ren) can be observed with other children and teachers while in out of home care. At the second interview, you will hear more about possible genetic and biological measures. The genetic measures will be collected by swabbing the inner cheek of parents and your two youngest children. From

this we will be able to understand more about how genetics affect how children behave. You may also be asked for permission to collect saliva samples from your two youngest children. This is done by having the children chew on a sweetened cotton dental roll. It provides information on how the child reacts to stress.

What are the risks?

There are no known risks connected with this study. In the questionnaires and interviews, you are free to skip any questions that you do not want to answer. You are also free to skip any sections of the study that you do not wish to take part in.

What are the benefits?

We hope that this study will benefit future generations of children. This work will help us understand why some children in a family deal better than others with the normal challenges of growing up. That knowledge will help us to plan services for young children and their parents to help with these problems.

We will prepare a final report at the end of the study. It will give results for all the children in the study as a group. We will mail a copy of this report to you. We will also be giving your family cash payments for each interview completed. Details are shown in the interview timetable

What are your rights and how is your privacy protected?

You are under no obligation to take part in this study. Whether you take part or not will not affect any services you might receive from your local public health department. If you agree to take part, you may change your mind at any time and stop. All the information collected will be kept confidential. There is one exception to the confidentiality rule. By law, suspected child abuse must be reported, where failure to do so is likely to cause harm to the child. You will receive a signed copy of the consent to keep.

All results will be reported about groups of children and will not identify any single child or family. Identification numbers will be used. Your name and the name of your child (ren) will not be stored with any information collected. The biological and genetic materials will be stored only with a coded identification number. The videotapes will be kept in a locked cabinet in the study office. They will be stored by identification number. We will keep this information securely stored for 25 years.

Although the present study will only run for 5 years we hope to follow-up your children into their school years if we get more funding. We will only contact you for other studies if you agree that this can be done. If we do not receive more funding, all the information collected will be destroyed. This will also be done if you do not want to take part in future studies.

We will ask for telephone numbers of relatives who will know how to contact you if you move (address and phone number). This will help us to stay in touch with you.

Helpful numbers for families who are raising children. Raising healthy children can be difficult at times. We are giving all families a list of numbers that may be helpful if there are issues about raising children that you would like to discuss with someone. Family issues can also be discussed with your doctor.

Hamilton Public Health & Community Services:

Parent Help Phone Line (24 hours)

Distress Centre (24 hours)

Emergency numbers (24 hours):

Former Toronto, York, North York - Gerstein Centre

East York, Scarborough and Etobicoke - Mobile Crisis

Scarborough Distress Center

If you have any questions about the study, please call Mira Boskovic.

Appendix J

Consent Form (Kids, Families, and Places Study)

Research Project Title: Kids, families and places

Researcher:

Dr. Jenny Jenkins
Human Development and
Applied Psychology
University of Toronto

Dr. Michael Boyle
Dept. of Psychiatry & Behavioural
Neurosciences
McMaster University

A signed and dated copy of this consent form will be left with your family. Together with the information sheet, it should give you the basic idea of what the research is about and what you are being asked to do. Please take the time to read this and the information sheet carefully. Feel free to ask questions about anything that is unclear before you sign.

I, _____, understand that this study is looking at what affects children and how they feel, behave and get along with others. The aim is to answer these questions.

- (1) How strong are the effects of neighbourhood on how children feel and behave?
- (2) How strong are the effects of out of home care on how children feel and behave?
- (3) How strong are the effects of family life on how children feel and behave?
- (4) What about the effects of genetics and stress factors?
- (5) What happens if these effects interact?
- (6) Why do different children react differently to these effects?

This work will help us understand what is important for good emotional health in children as they grow up. It is being carried out by researchers from the University of Toronto and McMaster University.

I understand I will now take part in an interview that will last around 2.5 hours. I know I do not have to answer any questions I don't want to. I may stop the interview at any time. As part of the interview, I know I will be asked to play with my baby and their next oldest brother or sister. I understand that these play periods will be videotaped. I also understand that I will be contacted two times more when my baby is 18 and 36 months old. These interviews will each be for two and a half hours.

I understand that other parts of the study will be described to me in more detail at later interviews. I may be invited to take part in all of these. If I am taking part, I will sign more consent form(s) to cover these other aspects of the study. One part will only apply if I have a child or children in out of home care. If so, I will also be asked if my child can be observed with other children and teachers while in out of home care. At the second interview, I will hear more details about possible genetic and biological measures. The genetic measures will be collected by swabbing the inner cheek of parents and my two youngest children. From this we will be able to understand more about how genetics affect how children behave. I may also be asked for permission to collect saliva samples from my two youngest children. This is done by having the child chew on a sweetened cotton dental roll. It provides information on how the child reacts to stress.

I am assured that all information collected about my family will be securely stored. It will only be identified by an identification number. I understand that this information will be stored in this way for 25 years.

I know I will be asked for telephone numbers of relatives who will always have my contact information in case I move (address and phone number). This will help team members to re-contact me if I have moved houses.

I know that our family will receive cash payment for each interview we take part in. I have been shown a timetable for these interviews. I have been told what payment we will be given.

All information collected will be kept confidential. Neither my name nor the name of my child (or children) will be used in connection with this study. All results will be reported about groups of children and will not identify any single child or family. Identification numbers will be used so that my name and the name of my child (ren) will not be stored with the information collected. There is one exception to the confidentiality rule. By law, suspected child abuse must be reported, where failure to do so is likely to cause harm to the child.

I have received answers to all questions I have asked about the study. I understand that taking part in this study is **voluntary**. I can get services from the local public health department whether or not I take part in the study. I know that I can stop taking part at any time without explanation, even after I have signed this form.

I understand if I have questions about this form or the study, I can call the Project Manager:

Mira Boskovic

I agree to take part in this study.

Signature: _____

Date: _____
DD/MM/YY

Name: _____
PLEASE PRINT

Witness Signature: _____

Date: _____
DD/MM/YY

Appendix K

Ethics Approval (Kids, Families, and Places Study)



University of Toronto

Office of the Vice-President, Research

Office of Research Ethics

PROTOCOL REFERENCE #12871 now #20018, 22887 (amend), #22729 (ann ren)

June 10, 2008

Prof. Jennifer Jenkins
Dept. of Human Development



Dear Prof. Jenkins:

Re: Your research protocol newly entitled, "Transactional Processes in the Development of Socioemotional Competence: Individuals in Context", formerly entitled, "Individuals in Context" by Prof. J. Jenkins

ETHICS APPROVAL

Original Approval Date: January 27, 2005

Next Expiry Date: January 26, 2009

Renewal: 3 of 4

Continuing Review Level: 2*

We are writing to advise you that the Health Sciences Research Ethics Board has granted annual renewal of ethics approval to the above referenced research course template through the REB's expedited process. Please note that all protocols involving ongoing data collection or interaction with human subjects are subject to re-evaluation after 5 years. Ongoing projects must be renewed prior to the expiry date.

Any changes to the approved protocol or consent materials must be reviewed and approved through the amendment process prior to its implementation. Any adverse or unanticipated events should be reported to the Office of Research Ethics as soon as possible.

Best wishes for the successful completion of your project.



Marianna Richardson
Research Ethics Coordinator

Xc: Mr. W. Maurice, Grants Officer, Health Sciences

*See Continuing Review Guidelines on the Office of Research Ethics website -
http://www.research.utoronto.ca/ethics/pdf/human/nonspecific/Continuing%20Review%20Guidelines_approved%20version.pdf



Curriculum Vitae: Kathleen Anne O'Connor

Education

- In progress **Doctor of Philosophy, Clinical Psychology**
 University of Western Ontario, London, ON
Advisor: Greg Moran, Ph.D., C. Psych.
Dissertation: Attachment Relationships across Siblings and their Common Mother: Patterns and Predictors
- 2009 **Master of Science, Clinical Psychology**
 University of Western Ontario, London, ON
Advisor: Greg Moran, Ph.D., C. Psych.
Thesis: Exploring the Roots of Attachment Within the Family: Evidence for the Role of Non-Shared Social Experience
- 2007 **Bachelor of Arts, Honours Psychology with Distinction**
 Queen's University, Kingston, ON
Advisor: Dean Tripp, Ph.D., C. Psych.
Thesis: Ethnic Differences in the Facial Expression of Pain

Refereed Publications

O'Connor, K., & Barrera, M. (2014). Changes in parental self-identity following the death of a child to cancer. *Death Studies*, 38, 404-411.

Barrera, M., **O'Connor, K.**, D'Agostino, N.M., Spencer, L., Nicholas, D., Jovcevska, V., Tallet, S., & Schneiderman, G. (2009). Early parental adjustment and bereavement after childhood cancer death. *Death Studies*, 33, 497-520

Conference Proceedings - Presentations

Rasmussen, C., **O'Connor, K.**, Nash, K., Andrew, G., & Koren, G. (2014). A novel screening tool for Fetal Alcohol Spectrum Disorders: Sensitivity and specificity against other childhood psychiatric disorders. Presentation at the 15th Annual Meeting of the Fetal Alcohol Canadian Expertise (FACE) Research Network, Toronto, ON.

O'Connor, K., Xue, Y., & Moran, G. (2012). Deconstructing maternal sensitivity within the family: Distinct routes to a secure relationship. Symposium presentation at the biennial meeting of the International Society for the Study of Behavioural Development, Edmonton, AB.

Barrera, M., & **O'Connor, K.** (2010). Changes in parental self-identity following the death of a child to cancer: Who am I now? Paper presented at the 18th International Congress on Palliative Care, Montreal, QC.

Barrera, M., D'Agostino, N., Spencer, L., Schneiderman, G., Tallet, S., Nicholas, D., Capra, M., Jovcevska, V., & **O'Connor, K.** (2006). Bereaved parents' continuing relationships with their deceased children at 6 months post-loss. Paper presented at the 16th International Congress for the Terminally Ill, Montreal, QC.

Conference Proceedings – Posters

O'Connor, K., Smith, K., & Moran, G. (2013). Attachment and mothers' reflections on the mental processes of their two children. Poster presented at the biennial meeting of the Society for Research in Child Development, Seattle, WA.

O'Connor, K., Morley, T., DiRaimo, J., Potter, B., Goobie, S., Moran, G., ... Prasad, C. (2013) The emotional impact of expanded newborn screening: Exploring mothers' experiences and perceptions of parenting. Poster presented at the Annual Clinical Genetics Meeting, Phoenix, AZ.

O'Connor, K., Bailey, H. N., Pederson, D., & Moran, G. (2012). Attachment disorganization in a family context: Children's responses to the competitive presence of a sibling. Poster presented at the biennial meeting of the International Society for the Study of Behavioural Development, Edmonton, AB.

O'Connor, K., Xue, Y., Pederson, D. R., Bento, S., Bailey, H., & Moran, G. (2011). The puzzle of sibling attachment non-concordance: Implications of categorical versus continuous approaches to attachment. Poster presented at the biennial meeting of the Society for Research in Child Development, Montreal, QB.

O'Connor, K., Moran, G., Pederson, D. R., & Bento, S. (2010). Maternal state of mind: How does it impact the ability to flexibly adjust to siblings' needs? Poster presented at the International Conference on Infant Studies, Baltimore, MD.

Morley, T., Xue, Y., **O'Connor, K.**, Moran, G., Pederson, D., & Bento, S. (2010). Beyond sensitivity: Patterns of maternal interaction in secure vs. non-secure attachment relationships. Poster presented at the International Conference on Infant Studies, Baltimore, MD.

O'Connor, K., Xue, Y., Morley, T., Moran, G., Pederson, D. R., Bento, S., & Bailey, H. N. (2009). Sibling mother-infant attachment: Different patterns of interaction lead to similar relationships. Poster presented at the biennial meeting of the Society for Research in Child Development, Denver, CO.

Barrera, M., **O'Connor, K.**, & Jovcevska, V. (2007). Changes in parental self-identity after the death of a child to cancer. Poster presented at the 2007 Pediatric Oncology Group of Ontario Multi-Disciplinary Symposium, Toronto, ON.

Barrera, M., **O'Connor, K.**, D'Agostino, N.M., Spencer, L., Nicholas, D., Jovcevska, V., Tallet, S., & Schneiderman, G. (2007). Early parental adaptation to life following the

death of a child to cancer. Poster presented at the 2007 Pediatric Oncology Group of Ontario Multi-Disciplinary Symposium, Toronto, ON.

O'Connor, K., Hsieh, A., Tripp, D.A., Tam, M., & Haley, T. (2007). Ethnic and gender differences in the facial expression of pain. Poster presented at the 2007 Anesthesiology Research Day, Department of Anesthesiology, Queen's University, Kingston, ON.

Professional/Invited Presentations

O'Connor, K. (2013). Attachment theory, assessment, and applications. Presentation to the University of Alberta FASD Research Group, Edmonton, AB.

Prasad, C., Morley, T., **O'Connor, K.**, Diraimo, J., Goobie, S., Potter, B., et al. (2013). The emotional impact of expanded newborn screening: A pilot project of experiences for mothers in Southwestern Ontario. Presentation at the *Newborn Screening Ontario (NSO)* annual meeting, Ottawa, ON.